FOR PRIVATE CIRCULATION ONLY

Issue 7 : May 2009

Conservation Agriculture newsletter

Getting Agriculture to Work for People and the Environment

IVth World Congress on Conservation Agriculture, New Delhi

Conservation Agriculture: Resource Productivity and Efficiency

As indicated in our last issue that carried an overall reporting of the World Congress (WCCA), the newsletter proposes to serialise proceedings of major sessions commencing with this issue. This is intended to reach a larger audience who may not have been able to attend the sessions

Conservation agriculture would require judicious translation of its basic principles – minimum soil disturbance, permanent organic soil cover and appropriate crop rotation for economically profitable, environmentally safe and efficient agriculture. The first theme "Conservation Agriculture for Resource Productivity and Efficiency" at the fourth World Congress on Conservation Agriculture (WCCA) deliberated on concerns related to soil and residue management, input management such as water, nutrients, and seeds. It also took up issues concerning diversified farming systems, irrigated systems, mechanization and energy management, genetic strategies, and indigenous knowledge and practices in the context of CA through a number of paper presentations. Major findings and critical areas of research that emerged through paper presentations and discussions include:

- Need to develop adaptive practices and technologies locally: Well adapted, affordable, and locally developed CA based technological interventions such as no-till drill and water conservation techniques to allow improved crop production, stability, and simplification of crop establishment with no additional costs of tillage and pre-planting weed control.
- Zero-tillage to be practiced along with surface management of crop residues: Most studies show that real benefits in terms of resource quality enhancement come about only when zero-tillage is practiced in conjunction with surface managed residues. The retention of at least a part of the crop residue is essential for sustainability of zero-tillage systems. In irrigated conditions where biomass production is higher, there is higher scope for removal of part of the residue for other uses. In rainfed conditions, the best use of crop residue is to retain them on the field as part of implementation of sound CA practice, although it may be possible to remove part of the residue for other uses.
- Comparison between rainfed and irrigated systems in Mexico in different agro-ecological systems concluded that in both situations, retention of crop residue, even partially was necessary to maintain soil quality *(Deckers, Raes and Sayre, 2009)*.
    - o Rainfed Systems: Critical research results for dryland CA research and practice from Yellow River Basin, China, revealed the benefits of harvesting rainwater using residues *(Changrong, et al)*. The competition for crop residues tends to be more intensive in low productivity rainfed environments as South Africa due to its potential to increase crop yields *(Wall, 2009)*.
    - o Irrigated systems: Rationale of CA application for irrigated production in Southern Europe and North Africa presented major problems and introduced promising options *(Gomez-Macpherson et al, 2009)* such as water balance models for adjusting irrigation scheduling to CA conditions and improving water use efficiency and soil protection. The system of raised bed planting for irrigated conditions that has been widely adopted by farmers in northwest Mexico offers an innovative option for diversifying wheat production practices in other similar areas around the world. Even more sustainable is to reduce tillage and manage crop residue on the surface by reuse of existing raised beds with only superficial reshaping in the furrows between the raised beds following even distribution of the previous crop residue before planting each succeeding crop *(Govaerts, et al, 2009)*.
- Need for adoption of CA technologies with a holistic perspective: For realising potential benefits, full CA practices involving all the key elements in a systems' perspective are to be developed and adopted at the farm level. A systems perspective is best built by working in partnership with farmers and other stakeholders for developing and promoting new technologies *(Jat et al, 2009)*. Long term effects of CA on crop, soil, biodiversity and climate in various production systems and agro-ecologies should form the future agenda of research under natural resource management programs.
- Natural resource improvement & need for long term studies: CA based on no-till system seems to be a sustainable alternative to conventional agriculture. Studying the role of residue retention in long-term dynamics of organic matter in no-tillage systems for a range of semi-arid rainfed soil and climate conditions using cropping systems modeling approach demonstrate that there are significant interactions between water and nutrients. These interactions determine whether CA in these conditions will or will not contribute positively to soil health and crop productivity as well as water and nutrient use efficiency. Change in farmer's behaviour towards residue management as a long term investment on soil quality has been noticed on established farmer's fields *(Gharras, Brahli and Mourid, 2009)*. Moreover, improvement in grain and straw production encourage farmers to leave more residue on their fields and ensure emergence of long term benefits of no-till system.
- Water conservation: CA adoption helps in natural resource preservation through *in-situ* water retention and conservation for long term sustainable farming under

IN THIS ISSUE

intensive agro-ecosystems compared to conventional intensive tillage practices. It results in increased water storage, reduced soil erosion, energy saving, improved farm profitability, and ability to adapt to climate change effects.

- Soil health improvement: CA systems aim at enhancing soil health and function as a precursor to sustainable production intensification. The major difference with CA systems is that the management of multiple sources of nutrients and the processes by which they are acquired, stored and made available to crops, are more biologically mediated. Opportunities and challenges for water and nutrient management in CA farming systems of Asia and Africa explored *(Roth, et al, 2009)* nutrient management strategies that would be required to attend general elements related to soils. These broader elements elaborate on the notion of soil health as a precondition for effective nutrient management strategy and discussions to formulate a comprehensive framework for nutrient management in CA systems *(Kassam and Friedrich, 2009)*.
- Elements of nutrient management strategy in CA cannot be reduced to simple physical input-output models and much new work needs to be done to formulate such strategies. All these strategies would need to ensure that soil health as elaborated above become the means of meeting crop nutrient needs in an optimum and cost effective way within prevailing ecological and socio-economic conditions.
- Reconciling competitive needs for crop residue management for soil and livestock needs: Livestock often may be more important than crops in the farming system, and so reduction in feed availability may provoke serious system incompatibilities. Success of CA under many conditions depends on soil cover with crop residue, a resource often used by smallholder farmers to meet other ends, especially for animal feed *(Patrick C.Wall, 2009)*. Animals are important components of smallholder farms where they provide sources of income and draught power, as well as serve as savings repository. Animal component is the basis for farming, and in CA, retention of crop residue is a must. Therefore, studies on CA based farming systems should be initiated for long term sustainability of the technology. The competition between needs of soil and animals for the scarce crop residue has thus become a major point for discussion and often disagreement. Strategies that will allow residue to be retained on the land while limiting the impact on total farm productivity include:
    - A gradual transition to CA on the farm so that the impact on total farm feed production is small, and strategies for increasing fodder production over time can be utilised
    - Taking advantage of increasing crop productivity, and therefore both economic yield and residue production, a portion of the residue can be used for feed and the remainder left on the soil
    - Using some of the land freed up for producing other crops through increased productivity and reduced risk of production of the staple crop, some area can be dedicated to the production of more productive and nutritive fodder crops
    - There is a need to change mindsets to control free grazing by animals for residue that is impacting degradation of natural resource, with measures such as agroforestry and live fences backed by favourable policy framework

  Conceptually simple, the strategy also results in maximum competition for residue and as a result tends to force a decision against CA before the promise of increased yields and system sustainability can be achieved. If the farm is converted gradually to CA, then competition is less, the farmer can learn to manage the new system appropriately under his/her conditions, and soil degradation on the farm can gradually be reverted while crop productivity increases.
- Participatory approaches: Participation of farmer communities as part of a strong scientific multidisciplinary team along with real involvement of extension agents and local authorities *(Gharras, Brahli and Mourid, 2009)* has helped rainfed agriculture in North Africa (Morocco). Development and fine tuning of CA techniques for different production systems in a farmer participatory innovation development mode has made significant impact at farm level and accelerated the adoption of RCTs in irrigated intensive production systems of the Indo-Gangetic Plains of South Asia *(Jat, et al, 2009)*.
- Mechanisation needs in conjunction with energy management reflected upon actual challenges for developing low cost no-till wheat seeding technology for heavy residue (Happy Seeder), small scale no-till seeders for two wheel tractors, and R&D of light no-till seeders. Controlled traffic systems for mechanized CA, their impact on green house gases and avoiding soil compaction through CA were also discussed. Resource conserving equipment for CA for improving no-till seeding quality with low disturbance furrow openers and residue handling devices that lead to higher productivity and profitability were also covered.
- Need for crop diversification: Crop diversification is the key strategy adopted to move away from the narrow perspective of concentrating on a few crops only. Crop rotation can contribute significantly to control and management of weeds/pests in emerging CA based cropping systems. Diversified farming systems through extension of direct seeding and mulch-based cropping systems among small scale farmers have been tested in main agro-ecological zones of Madagascar and have yielded important lessons *(Husson & Rakotondralambo, 2009)* including:
    - To succeed with small farmers, local adaptation of techniques and technologies with emphasis on low input systems that meet bio-physical and socio-economic needs, should be taken up.
    - Human resource is the key issue as these techniques/systems are knowledge intensive, availability of biomass needed for covering the soil, and need for training and technical support of farmers during the first few years (at least 3 years) of transition to CA systems is expensive, especially for small scale farmers.
    - Need to accompany the spreading of CA /direct drilling with basic research on different themes to develop cereal varieties with pivot type of rooting systems, alternative land uses and farm diversification strategies to strengthen CA (Cases of Brazil and India).
- Improved genetic strategies: Combining resource efficiency agronomy with better adapted crop cultivars will be vital if productivity of the world's food producing

system is to be maintained or increased. The existence of genotype x resource conserving crop management practice interactions, traits controlling these interactions, and breeding strategies that can be used to improve yield under CA were discussed, besides blending indigenous and scientific knowledge for innovative CA development using participatory action research.

- Knowledge intensive need for basic research studies: CA systems are much more complex and thus managing them efficiently will be highly demanding in terms of understanding of basic processes and component interactions which determine the whole system performance. Critical gaps and researchable issues need to establish minimum residue retention level (thresholds) with positive impact on soil quality and crop production.

Important Conclusions

- Failure to recognize that most semi-arid systems are in fact low-input, mixed crop-livestock systems with low levels of residue retention can lead to an over estimation of organic matter build-up and water and nutrient efficiencies to be gained from CA in these farming systems.
- Continuing with crop residue removal, tillage, and land degradation is not sustainable, and it is unethical to continue to propose short term solutions to small holder farmers.
- CA in arid and semi arid regions has to be understood in a broader perspective so that it minimizes soil loss, conserves water and controls weeds. It should involve both soil and water conservation methods, mutually reinforcing each other.
- Opportunities and challenges for water and nutrient management in CA farming systems suggests need for a framework to broadly categorise main types of CA systems before taking up water and nutrient balance approach. It will also require to fill in the discrepancy between a large proportion of the body of work and theoretical benefits in water and nutrient savings, and the reality on the ground.

Outputs and Recommendations from the World Congress on Conservation Agriculture

Dr. P.K. Joshi
Director, NCAP & Organizing Secretary of IVth World Congress on Conservation Agriculture

The Fourth World Congress on Conservation Agriculture presented a comprehensive review of global research and development efforts in conservation agriculture. Deliberations focused around successful adoption models and assessing the impact of conservation agriculture technologies. This also helped explore future global partnerships and policy initiatives, helped develop a road map, and broad sets of strategies and actions to promote conservation agriculture practices and technologies. Following recommendations emerged:

1. A Delhi declaration was released to strengthen CA at global level (published earlier in PACA Newsletter Issue 6)
2. CA must not be considered as an alternative development pathway, as it represents the best option for a sustainable future of agriculture in developed and developing countries.
3. CA must be brought into mainstream of crop management research and be closely linked with breeders and other agricultural disciplines to ensure development of tactical management practices suitable for CA-based crop management technologies.
4. More research needs to be done on:
   a. Different aspects of soil health, nutrient and residue management for various production systems under different CA practices across different agro-ecologies;
   b. Options to most efficient and cost-effective weed management strategies for different production systems;
   c. Water balance models for adjusting irrigation scheduling to CA conditions and improving water use efficiency and soil protection for different production systems;
   d. Identifying multipurpose cover crops that can protect and/or provide nutrients to soils as well as contribute to overcoming food and nutritional security;
   e. More energy saving options in different soils and agro-ecologies;
   f. Monitor impact of CA practices on GHG emissions under different production systems and agro-ecologies;
   g. More systematic adoption and impact assessment studies on different socio-economic groups.
5. A cafeteria of farm implements to be developed for different soil types and rainfall regime for better seed and fertilizer placement simultaneously for ensuring maximum biomass production.
6. Tailoring efficient genotypes for CA and tillage x genotypes interaction studies in cropping systems perspective needs special attention. Long-term effects of CA on soils, biodiversity and climate in various production systems and agro-ecologies should be researched and monitored in a consortia mode.
7. Poverty alleviation programs would get a big boost if carbon saved by CA adoption could be traded at fair prices. In this context, methodological perfections are to be researched to overcome uncertainties in estimating carbon sequestered/ mitigation of GHG emissions due to conservation technologies.
8. There is a need to have politically-acceptable level of support (such as credit, insurance, tax relief, R&D) for conservation agriculture, including technologies, so that CA practices are profitable to farmers even in the existing policy environment. CA policies should be compatible with other policy initiatives and should ideally form part of a coherent national policy on agricultural development.
9. CA programs at national, regional and global levels are to be developed in a partnership mode by involving relevant stakeholders. The programs should be designed in areas related to research and development, capacity building, and sensitization of policy advisors. Donor organizations such as the World Bank, International Fund for Agricultural Development, Food and Agriculture Organization of United Nations, Asian Development Bank, African Development Bank, among others, need to support such programs.
10. A global network of interconnected communities of practice has been initiated to accelerate the mainstreaming of CA. The network needs to be strengthened and supported financially and logistically.

PACA's First National Operations Group Meeting

The first meeting of the PACA National Operations Group (NOG) was held at PACA office on 21st April, 2009. Members met to discuss what the organisation needs to do to further the cause of Conservation Agriculture by helping develop an action agenda. Members of the NOG who attended the meet include (in alphabetical order): Dr. Sain Dass, Dr. T.C. Jain, Dr. M.L. Jat, Dr. P.K. Joshi, Dr. S.K. Kamra, Dr. R.K. Malik, Dr. Himanshu Pathak, Dr. V.N. Sharda, Dr. H.S. Sidhu, Dr. Gajendra Singh, Dr. Hardeep Singh, and Dr. S.K Tandon.

The meeting commenced with members being briefed about the past and ongoing efforts that the organisation has been able to achieve. The discussion took an interactive approach that helped define priorities that PACA needed to pursue in days ahead. Discussions that followed led to defining focus areas and what needed to be done to develop an operational plan for PACA. These key points are being shared with our readers for wider involvement:

1. Need for conceptual clarity on CA

To help achieve clarity in relation to its involvement with the subject of CA, need was felt to arrive at a commonly acceptable definition for conservation agriculture. While there was a common agreement on the three basic principles of minimum soil disturbance, permanent organic soil cover, and crop rotation, different views discussed expressed the need for more conceptual clarity to be arrived at for PACA to maintain clarity in relation to its efforts. The definition needed to reflect concerns for the environment and resource conservation. It also needed to take into consideration the thinking evolving within the country and globally. Other considerations include taking into account needs of all regions of the country, linkages between sustainable agriculture and CA, needs of farmers, and aspects relating to improved productivity and profitability.

Action Point:

PACA to arrive at a conceptual framework for CA as relevant.

2. Building Database & Knowledge on CA.

An important suggestion was made on developing a data and knowledge base on CA. Related to this was the need to develop policy papers, technical bulletins, books and course material that were identified as being crucial forms of delivery of the gathered knowledge. The need for collating available CA related information sources through PACA website was felt. Databases developed needed to provide information on areas that needed to be addressed on a priority basis. On another count, there was a need to develop a database related to progress of CA adoption in the Indian context. Data to be presented needed to be identified, monitored and measured on a credible basis with regularity. For PACA to carve out a role for itself as a "Think Tank" that could be depended on to provide knowledge on CA, it would need to position efforts in collaboration with the state system and facilitate the process of gathering, interpretation, and dissemination of knowledge through electronic and paper means. Similarly PACA needed to build a technology base on various aspects of CA and share it with ongoing project efforts or those in need.

Action Points:

Some of the immediate efforts that could be actioned are:

- PACA to prepare a policy paper to influence policy and change in research and extension, particularly relating to institutional setting & difficulties
- PACA to serve as nodal point/think tank on data directly related to the progress/status of CA in the Indian context. This would require concrete efforts on building both horizontal and vertical networks with key organizations involved with CA in the country
- PACA to act as nodal point and establish mechanisms for sharing knowledge through development of a network and a knowledge sharing platform
- Inclusion of CA within the course curriculum and establishment of efforts to make younger students more aware of its potential and what needed to be done. This should be carried out in collaboration with State Agriculture Universities
- PACA to prepare basic technical bulletins/factbooks related to CA for wider sharing
- Make efforts to collaborate with ICAR to start a network coordinated project on CA for adaptive research and frontline demonstration

3. Farmer Initiatives

Need was felt for CA to go beyond the rice-wheat cropping system and into rainfed cropping system through identification of 4-5 such eco-regions and related cropping systems. Water availability and resource situation of a region were two main parameters on which farmer's initiatives depended. Conceptually, CA has to become a farmer-led movement as the uptake of technologies would be demand driven and faster. To this end, the need for adaptive research on farmer fields to explore issues related to no tillage, crop residue, crop rotation and other related issues was also emphasized. Research has to be pursued in a participatory mode and indigenous technical knowledge of local regions needs to form the base to commence CA efforts. Easy to deliver initiatives have to become entry points as low hanging fruits to be pursued to win the confidence of farmers. Institutional systems need to be positioned and capacity strengthened for improved delivery and sustainability.

Action Points:

PACA to develop projects and execute them by way of farmer

The NOG Meeting in progress

participatory adaptive research. Some priority production systems to focus CA Efforts (field trails and demonstrations) as suggested could be:

- Soybean based cropping system in the medium and deep black soil regions in states of Madhya Pradesh, Maharashtra and Rajasthan.
- Cotton based cropping systems in the shallow and medium black soil region of Maharashtra, Madhya Pradesh and Gujarat.
- Maize-wheat cropping system dominated sub mountain hill and foot hill regions in states of HP, J&K and Uttarakhand.
- Intensively irrigated cotton-wheat cropping system dominated regions of semi arid north-western Indo-Gangetic Plains in states of Punjab, Haryana and Rajasthan.
- Kharif-fallow-rabi cropped areas in semi arid alluvial soil regions.
- Rice-fallow and rice-legume dominated region in the hot sub-humid eastern plateau regions of Jharkhand and Chattisgarh.

- PACA to develop proposals to take up research studies in the national context along with organisations that shared commonality of interest on the subject of CA. This would help influence the R&D process for CA with empirical evidence. Some of these could be:
  - Identify and assess technological and institutional challenges in addressing needs of rainfed/dryland areas through adoption of CA practices
  - Assessing the availability and need for crop diversification through cover crops, agro-forestry and fodder crops
  - Understanding perceptions of farmers and adaptive strategies practiced to cope with climate change impacts on agriculture and role of CA adoption in selected sites/ cropping systems
  - CA and its relationship to climate change and ecosystem services
  - Critical issues related to management of crop residues on the soil surface and its alternate use for fodder or as biomass in selected rainfed areas

4. Post-Congress Efforts linked to WCCA

There was a need to build upon efforts on the heightened awareness created by the World Congress on Conservation Agriculture (WCCA) in India during February 2009. Efforts needed to concentrate on sensitisation, popularisation and publication of CA related subject matter. A need was felt to organise an annual event to deliberate on the status and issues relating to CA at the national level. This event would endeavour to bring together stakeholders involved with CA and other professionals from the agriculture domain who wielded influence on the sector. It was decided that a concept note be prepared outlining need for the event and what it should achieve?

Efforts were also required to facilitate the sensitisation process for CA through other professional forums and events organized by professional associations on soil science, agronomy, crop sciences, economics etc. At the regional level, PACA could also help organise workshops on farmer led CA trials wherein farmers could share experiences through a process of presentation and interaction. Such events could link up to the national event planned. Similarly, activities could be organized at the regional level through collaborative efforts with SAUs where there was sufficient interest and momentum noticed with relation to the concept of CA. Such a networked platform functioning at the regional level was important, given the variability of resources and issues that were faced in different regions.

Continued on Page 7 Column 1

CA Makes a Beginning at Tirupati

Efforts to promote CA have been underway for more than a decade, largely confined to farmers in the northern and eastern Indo-Gangetic Plains of India. However, it is moving to other pockets of India as is evident from the recent CA based initiative to disseminate and create awareness of CA among farmers in Tirupati, Andhra Pradesh. R.Gangi Reddy, President of Rural Development Organization (RDO), was enthused to understand and learn more on CA as an alternative sustainable agricultural practice. After being convinced about the benefits of CA, Mr. Reddy initiated the process of dissemination of CA in his area by organizing a Consultative Meeting with NGO's and Progressive Farmers on 11th February, 2009 at Tirupati.

The discussion centered around the need to rebuild soil health, the role of microbial action to transform biowaste into humus, and their relationship to CA. Members also expressed concern arising from soil compaction, surface sealing of soils, and adverse effects of direct impact of rainfall on soil erosion by water and wind, and the role of organic matter in building soil quality. Members deliberated on needed technologies for direct seeding in undisturbed soil, crop residue management, and related issues. The meeting concluded with the expressed need for a Working Group (WG) to initiate the CA movement in the district and an eleven member group comprising NGOs, farmers and Mandal level officers of agriculture and horticulture was formed to steer the movement.

Working Group Meet

As a follow up, a working group meeting was organized on 23rd March, 2009 and a need was felt to create a platform for willing farmers, researchers, NGO's, government officials, and others interested in CA. A platform called "Association of No-Tillage Agriculture" (ANTA) was suggested as a way to facilitate dissemination of CA technologies, sharing of experiences, and holding stakeholder training. The group has proposed the following activities in the months ahead.

- Preparation of training material, modules and leaflets in local language
- Dissemination and awareness generation through pamphlets, posters, banners, wall writing campaigns, and awareness camps

PACA wishes ANTA well and is in touch with them for their technical needs.

Source: Activity Report of Rural Development Organization (First Quarter-2009), shared by R. Gangi Reddy, President, RDO

CSISA Project Launched in South Asia

The Cereal Systems Initiative for South Asia (CSISA) is an initiative aimed to help six million farmers to boost crop yields and their incomes substantially. The project intends to take forward past cereal research achieved in the public and private sectors, aims to produce an additional five million tons of grain annually, and increase the yearly incomes of six million poor rural households by atleast $350. CSISA aims to reverse declines in annual cereal yield growth of recent years, decrease hunger and malnutrition, and increase food and income security in South Asia through accelerated development and deployment of new cereal varieties, sustainable management technologies and agricultural policies.

The project effort looks to embody itself through conservation agriculture principles while pursuing project goals and efforts. The focus of CSISA is to be on the small landholder farmer with improved food security and improved returns being the critical objectives. To achieve this, the project will have to work through a better understanding of livelihoods and mechanisms of improved stakeholder participation.

The initiative will build on past work in the region supported by CGIAR, including that of the Rice-Wheat Consortium for the Indo-Gangetic Plains, which has developed and promoted resource conserving technologies. The three year initiative will address needs of sustainable cereal production in India, Pakistan, Bangladesh, and Nepal. CSISA is led by the International Rice Research Institute (IRRI) and International Maize and Wheat Improvement Centre (CIMMYT) with funding support from Bill & Melinda Gates Foundation and United States Agency for International Development (USAID). Other International Agricultural Research Centers that will partner include International Food Policy Research Institute (IFPRI) and the International Livestock Research Institute (ILRI). It will also partner with national agricultural research organizations, education and extension systems.

Major objectives of CSISA include better crop management and post harvest technologies and practices; the development and dissemination of improved rice, wheat and maize varieties; and the creation of a new generation of agricultural scientists and professional agronomists. The program will focus initially in eight

Conservation Agriculture – Opportunities beyond Rice-Wheat Cropping System

Dr. Ashok Yadav, Dr. R.K. Malik & Dr. V. Kumar
CCS Haryana Agricultural University, Hisar

The practice of seeding wheat crop in untilled land has been increasingly adopted by Rice-wheat farmers since early years of current decade. It is estimated that currently 2 million ha area under wheat is seeded using no till drill. Rapid and widespread adoption of the practice is ascribed to savings on the cost of production and increased crop yields which accrue through timely planting enabled by zero-till seeding. Wheat seeded in conventionally tilled and prepared land entails a cost of about Rs. 3,500 per ha in contrast to only Rs. 500 per ha when wheat is sown using a no-till drill. In addition to being cost effective, zero-till seeding implies savings in the use of a non-renewable energy source, diesel to the tune of about 47 liters per ha with consequent reduction in CO_2 emission on this account.

$1 = Rs. 50	Conventional Tillage	Zero-Till Seeding	Savings
Wheat seeding Rs./ha	3,500	500	3,000
Consumption of diesel L/ha (Rs/ha)	55 (1,705)	7.5 (232)	47.5
CO_2 Emission @ 206 kg/ha diesel consumed	143	19.5	

Table 1: Savings an account of zero-till wheat planting

Due to multiple benefits, both direct and indirect, there is a need to evaluate and promote CA practices such as zero tillage sowing in areas with other cropping system. The south-western districts of Haryana such as Rewari, Mahendragarh and Gurgaon are relatively drier with limited water resources compared to the north-eastern rice-wheat areas. These areas support a number of crops and cropping systems including pearl millet, cluster bean, cotton, peanut and others followed by wheat in the rabi season. Number of field trials were conducted during 2004 to 2008 in more than 30 villages, covering an area of more than 400 acres. The results invariably showed that yield of wheat in zero-till fields was higher or comparable to yields in conventionally tilled plots.

Year	Area (in ha.)	Average Yield (Kg/ha.) Zero-tillage	Conventional tillage
2004-05	4	4,824	4,712
2005-06	12.5	3,989	3,816
2006-07	34	4,657	4,554
2007-08	78	4,580	4,210

Table 2. Wheat yield in field trial in south western Haryana

On Station Trials

Trials have also been conducted at the experimental farm of CCS Haryana Agriculture University, Hissar for eight years with sorghum-wheat and for 11 years with pearlmillet-wheat cropping system. In these trials, zero-tillage and conventional tillage have been compared as to their impact on crop yields, incidence of insect-pests, and weed flora and related parameters. Results have shown that over the years, grain yield of wheat as well as pearl millet under zero-till sowing condition were more or less comparable to the yield under conventional tillage. Similar results were obtained with respect to grain yield of wheat and fodder yield of sorghum in the sorghum-wheat cropping system. Other significant observations included timely planting of wheat enabled by zero-tillage helped avoidance of terminal heat which adversely affected late planted wheat. Further, there was no major variation in the insect-pest or disease infestation observed on account of zero-tillage. While these results are encouraging, the challenge of educating the farmers towards the need of adopting integrated approaches which include zero-tillage and the need of maintaining organic cover on the soil by leaving crop residue on the soil or growing cover/green manure crops remains a major barrier for widespread adoption of CA practices.

Adapted from paper submitted by the authors

hubs of which five are to be in India, two in Bangladesh, and one in Nepal. Pakistan though included in the program has been deferred from an implementation perspective. These hubs represent key intensive cereal production systems that play a major role in feeding close to a quarter of the world population. The lessons learned will be transferred to smallholder farmers in Sub-Saharan Africa through building capacity in people, strengthening partners working in those regions, and exploring new models and strategies of agricultural development that may be applicable to Africa.

CSISA made a beginning through 2 major events, among others:

First Stakeholder Workshop at Karnal Hub, Nilokheri, Haryana

The workshop titled "Cereal Knowledge Bank – linking research, extension and farmers (the focus of local knowledge management)" was organized from 31st March to 3rd of April, 2009, at Extension Education Institute, CCS HAU, Nilokheri (Haryana). The workshop was designed for participants to work together to develop a plan of action for the creation, management and use of a local cereal knowledge bank. Dr. Raj. K. Gupta, Project Director, CSISA project dwelled upon the project objectives and expectations. More than 50 CSISA stakeholders representatives met to create a local forum for the Karnal hub that will serve as a point of contact for project partners and through which information for rapid adoption and intensification of improved cereal seed and crop management practices will be delivered to farmers.

Project Launch and Planning Workshop, New Delhi

This CSISA project launch and planning workshop took place in the last week of May 2009 at National Academy of Agriculture Sciences, NASC Complex, New Delhi. Working group discussions were structured around familiarization of activities and milestones of first two objectives of the CSISA project. Objective 1 included delivery of location specific and geographically differentiated production & post harvest technologies, and Objective 2 included adaptive research through management practices for future cereal based system. Activities around these objectives were discussed in separate groups and summed up based on the priority cropping systems around the hubs. The groups also dwelled upon the design and implementation plans, hub communication platforms and capacity building needs for the local level hubs.

PACA got an opportunity to attend these two inaugural events of the CSISA project and contributed by sharing its perspective on approaches to help make a success of the project.

PACA's First National Operations Group Meeting

Contd. from page 5

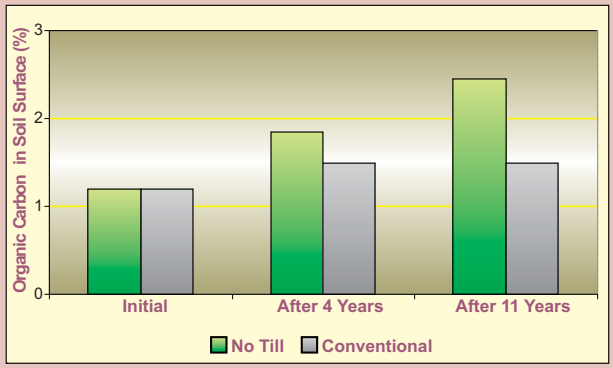
Action Points:

- PACA needed to continue undertaking the task of sensitization of policy makers and different ministries at the centre such as, MOEF, MOA, MORD, Planning Commission, and of State governments as a follow up of WCCA
- PACA to prepare a small brief on the need and objective of the annual national event on CA. (suggested date January-February annually)
- PACA to organize farmer group meetings at the regional level in collaboration with local organisations
- Linkages needed to be developed for induction of CA as a preferred approach in major ongoing development programmes of the Government such as Watershed and Drought Prone Area Development Programme, NREGA, Rashtriya Krishi Vikas Yojana, National Food Security Mission, and those covered under Panchayati Raj, National Rainfed Area Authority, and other similar efforts.

INFOPIX

This section will present researched data in pictorial form from past studies for benefit of readers

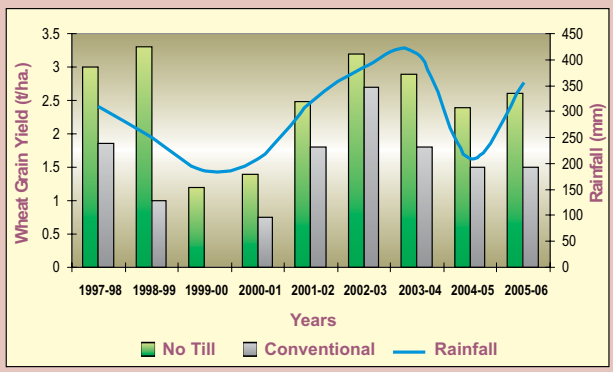
Soil Organic Carbon as affected by tillage system and time



Crop residues left on soil surface led to an increase in soil organic carbon (SOC) from 5.62 to 7.21 t/ha in 0-25 mm under no-tillage after 4 and 11 years (experimental field, at Sidi El Aïdi, Morocco). At the same horizon, SOC did not change under conventional tillage after the same periods. The results revealed that no-tillage soil had sequestered 3.5 and 3.4 t/ha of SOC more than the conventional tillage after 4 and 11 years. The figure illustrates that over 11 years the horizon gained 13.6% and 3.3% of its original SOC under no-till and conventional tillage respectively.

Source: Bessam, F. and R. Mrabet (2003) Long term changes in soil organic matter under conventional and no-tillage system in semi arid Morocco. Soil Use & Management, 19(2): 139-143.

Grain yield at farmer's field under conventional and no-till (1998-2006)



Grain yields reported from no-tillage pioneer farmers field showed increased yield obtained in dry as well wet years. In very dry years with less than 200 mm rainfall, farmers were able to produce 1.1 and 1.5 tonnes of wheat in two different locations where no-tillage fields were the only ones harvested in the entire region. In wet years, change in farmers perception was observed towards crop residue left in the field which was seen as an investment in their soil rather than wasted biomass.

Source: No-till System applied to North Africa Rainfed Agriculture: Case of Morocco (Q.EL Gharras, A. EL Brahli, and M EL Mourid, Lead Papers, Fourth Congress on Conservation Agriculture, pg 41-50, 2009)

SNIPPETS

NEWS

SANREM CONSERVATION AGRICULTURE SYMPOSIUM

SANREM will sponsor a symposium titled "Conservation agriculture and food security in developing countries" at this summer's international meeting of the Soil and Water Conservation Society in Dearborn, Michigan. The July 14 symposium will kick off the conservation agriculture focus of SANREM CRSP Phase IV by exploring the role of declining soil quality in agricultural productivity in developing countries; the potential of conservation agriculture to improve soil quality, agricultural productivity, and ecosystems services; and challenges that must be overcome if conservation agriculture is to improve food security.

The symposium will be recorded and available later on the SANREM and SWCS websites. Additional details will be forthcoming at SANREM CRSP.

CA TRAVELLING SEMINAR IN BIHAR

More than 100 farmers in Bihar, India, benefited from a travelling seminar on CA organised by CIMMYT in the Samastipur and Begusarai districts between 28-29 March, 2009. Farmers visited CIMMYT run experimental plots at Rajendra Agriculture University (RAU), and Regional Maize Research and Seed Production Centre. They observed on-station productivity improvements due to adoption of CA practices through several participatory trials. These trials included zero-till wheat, zero-till maize, bed planted with sugarcane and wheat intercropping, being practiced since 2006. Other points discussed included present status of zero-till wheat in Bihar state, and results of long-term CA experiments in rice-wheat systems in connection with soil changes. As a result of the effort, farmers learned to improve yields and cut production costs for major crops through participatory collaboration with scientists and extension workers on targeted modules.

Source: CIMMYT Informa No.1650

SMALLHOLDER CONSERVATION AGRICULTURE PROMOTION (SCAP) Project

The Smallholder Conservation Agriculture Promotion (SCAP) is a regional project financed by the International Fund for Agricultural Development (IFAD) and partly by Agence Française de Développement (AFD). The project was launched recently and is being implemented by the African Conservation Tillage Network (ACT) in collaboration with CIRAD and ICRAF. Project activities are hosted in 4 IFAD loan projects in Burkina Faso, Guinea and Niger. Targeted project areas comprise of arid, semi-arid and humid tropics.

REVISED SANREM CRSP PHASE IV CONCEPT PAPER AVAILABLE ON-LINE

Based on the substantial feedback received, the SANREM CRSP Management Entity has revised the concept paper for SANREM CRSP Phase IV: "Increasing smallholder food security through the introduction of conservation agriculture production systems (CAPS)". The revised version of the concept paper is available on the SANREM CRSP website at:

http://www.oired.vt.edu/sanremcrsp/documents/PhaseIVConceptApril09.pdf

PUBLICATIONS

PRACTICAL POINTERS FOR NO-TILL FARMING

The recently released new publication from SA No-Till Farmers Association (SANTFA) 'The Essential Guide to Conservation Agriculture – Moving Beyond Adoption' brings together the latest research knowledge and farmer experience on use of disc seeders and implementation of conservation farming practices in a range of soil conditions.

Published with support from the Grains Research and Development Corporation and ABB Grain. This brings together new and practical information of value to farmers practicing conservation agriculture across all winter cropping regions of Australia. Copies will be available at the conference or from SANTFA. For more information, please browse:

http://www.wantfa.com.au/index.cfm?objectID=57A495E0-65BF-EBC1-2A080A26E9781253

Conservation Agriculture: Technology Transfer and Adaptation for Africa's Smallholder Farmers, by Brian.G. Sims - Engineering for Development, Bedford, UK

CA equipment manufacturing capability is still in its infancy but the first green shoots of development in the sector are now emerging. Local manufacturers are encouraged by the market being created by FAO's strategy of promoting CA via farmer field schools and by enlightened government policies which encourage local manufacture by making batch purchases of CA equipment for subsequent sale via extension services. The article is available at: http://www.eurageng.eu/

2009 Call for Papers: Footprints in the Landscape: Sustainability through Plant and Soil Sciences

A Topical Session titled, "Management of Conservation Tillage and its Effects on Soil and Water" is being planned by Division S06 Soil & Water Management & Conservation for the American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA). 2009 International Annual Meetings are scheduled from November 1-5, 2009 at the David L. Lawrence Convention Center, Pittsburgh.

This session is designed for a systems level discussion of conservation/no-till techniques and summaries of long term scientific research. Topics of interest include; soil quality, soil-plant-water relations, soil fertility, integrated pest management, erosion control, and economics of conservation/no-till agriculture.

The early title and abstract deadline was April 27 (abstract fees increase after April 27), and the final submission and edits deadline is May 12.

For more information log on to: https://www.acsmeetings.org/

FAQ Book on Conservation Agriculture

We are happy to present a book on FAQs on CA that we hope the practitioners will find useful and informative to read. If you have feedback to offer or feel there are other questions deserving inclusion, we would appreciate hearing from you. The FAQ book can be downloaded as an electronic publication from www.conserveagri.org/faq.pdf