

Conservation Agriculture

Getting Agriculture to Work for People & the Environment

newsletter

The Professional Alliance for Conservation Agriculture (PACA) is a platform that has emerged from concerns surrounding agriculture given the increasing importance and diminishing interest. Recent deliberations surrounding food security, diversion of croplands for other applications, and the subsequent ecological impact are all adding to heightening worry for farmers and policy makers alike.



The PACA logo symbolises sustained productivity achieved through optimal management and conservation of natural resources

Given this scenario and ensuing measures likely to emerge to counter perceived threats, there is a need to rethink the way agriculture should be practiced, with the emergence of a new paradigm. It goes without saying that such a paradigm will have to address concerns of poor farmers, of productivity, and of environment if it has to be considered seriously. This is what forms the raison d'être of the PACA initiative.

The task at hand is not one of a new technology or approach, but of bringing a change in thinking of the manner in which agriculture is pursued. Thus developing an understanding, internalising and building conviction to gradually move in the right direction would hold the key. This then would need to scale up through willingful adoption by farmers who are the primary stakeholders of land based resources.

Understanding the scale of effort required to address accelerating deterioration, PACA hopes to motivate concerned stakeholders involved with agriculture to come together as a platform. Such a platform could bring about the required change by addressing emerging needs through adoption of Conservation Agriculture practices. As a beginning, PACA will concentrate on building awareness about possible means to address contemporary problems facing agriculture by focusing on needs of developing nations in the Asian region. This will be complemented through efforts directed towards policy and implementation in the field, working through a "conviction by practice" approach.

PACA is promoted by Centre for Advancement in Sustainable Agriculture (CASA) and Society for Strategy Technology & Delivery for Development (Society STADD) who will be managing the initiative that will seek involvement of concerned stakeholders to join the movement and contribute to the cause.

As we set out to achieve our goals we seek your blessings and look forward to your support and involvement in the days ahead.

- PACA Team



MESSAGE

Development, adaptation and widespread adoption of technologies to enhance farm productivity, which simultaneously address issues of resource conservation and efficient inputs use, call for building partnerships amongst professionals

having a range of specialized knowledge and other stakeholders including farmers, policy makers, development officials, NGOs, private sector etc. Efforts of Centre for Advancement in Sustainable Agriculture (CASA) and Society for Strategy Technology & Delivery for Development Society (SSTADD) to forge an alliance of professionals along with concerned stakeholders to promote the cause of conservation agriculture is, therefore, most timely. The concept of conservation agriculture as has evolved under varying farming situations, calls for an integrated and participatory approach to solve emerging problems and elevating farmers' knowledge and understanding for improved management.

Dr Mangala Rai
Secretary & Director-General, DARE and ICAR



MESSAGE

Indian Agriculture faces serious challenges arising from stagnating productivity, widespread problems of resource degradation and environment on one hand; and continually rising demands on account of population growth and improved living standards on the other. Meeting these challenges calls for greatly accelerated creation of relevant knowledge, new technologies and matching policy and institutional arrangement to put agriculture on a trajectory of higher growth. Conservation Agriculture technologies integrate such concerns of increasing productivity and resource conservation and have the potential to contribute significantly to achieving goals of sustainability. The CASA-SSTADD initiative to promote the cause of Conservation Agriculture is therefore most welcome and I send my best wishes for its success.

Prof. V.L. Chopra
Member, Planning Commission

IN THIS ISSUE

Sustaining Agriculture	3
The Need for PACA	4
Event Announcements	6



MESSAGE

I would first like to congratulate the Centre for Advancement of Sustainable Agriculture for giving conservation agriculture a new impetus with the creation of the Professional Alliance for Conservation Agriculture along

with the Society for Strategy Technology & Delivery for Development.

Conservation agriculture is a way to combine profitable agricultural production with environmental concerns and sustainability and it has been proven to work in a variety of agroecological zones and farming systems.

ICRISAT is working with partners in developing countries to promote an easy-to-implement conservation agriculture package suited to smallholder farmers in drought-prone areas. Its chief component is the planting basin in which seeds are planted and the nutrients and water are concentrated in it to maximize yield for a given level of inputs. The basin is combined with other crop/soil management practices such as the use of crop residues, fertilizer microdosing and manure treatment.

Improving crop production in marginal rainfall regions and cultural practices that conserve fragile soils and extend the period of water availability to the crop are ideally suited to vulnerable smallholder farmers in drought-prone areas and can breathe new life into their farming. Empowerment of these farmers is also a must. I wish you success in this endeavor.

William D Dar
Director General, ICRISAT



MESSAGE

Enhancing productivity of rainfed areas which account for 60 percent of crop acreage, 40 percent of the total food grains production, 66% of live-stock production, income and employment is critical to the country's food security and livelihood of vast majority of poor

engaged in subsistence farming. These are the regions where resource conservation and reversal of processes of resource degradation have become fundamental in achieving improved productivity on a sustainable basis. Education and widespread adoption of Conservation Agriculture practices therefore holds the key to success. CASA-SSTADD initiative to promote the cause of Conservation Agriculture is therefore timely for inclusive growth. I wish the initiative all success.

Dr. J.S. Samra
Chief Executive Officer, National Rainfed Area Authority



MESSAGE

Need for accelerated productivity growth in agriculture demands region specific approaches which take into account the natural resource endowments and prevailing socio-economic conditions. The new strategies

must also aim for productivity growth in ways which also conserve and improve the quality of natural resource base i.e soils, water and biodiversity.

Conservation Agriculture technologies have the potential to contribute to increased productivity in a sustainable way. The CASA-SSTADD initiative to promote a forum for promoting the cause of sustainable agriculture is very timely and welcome. I look forward to this initiative in catalyzing a change which has become a necessity.

Dr. N.B. Singh
Agriculture Commissioner, Ministry of Agriculture

MESSAGE



Abigail Adams once said, "Learning is not attained by chance; it must be sought for with ardour and attended to with diligence". Which is what the Centre for Advancement of Sustainable Agriculture (CASA) is set out to do through its new initiative on conservation

agriculture.

Having closely observed the development of agriculture in the sub-continent for over three decades, one agrees that the question of sustainable resource use touches almost all constituent of our production systems. We must discuss these delicate issues passionately and meaningfully to share our learning and experiences with wider stakeholders and to raise our collective consciousness to address some of our stubborn development challenges.

We look forward to the exciting arrival of the Newsletter!

Gopi N Ghosh
Officer-in-Charge, FAO India Office

The agriculture fraternity's encouraging response highly motivates us to diligently pursue the cause of conservation agriculture. Without such support the task ahead will not be achievable and we look forward to their continued involvement in our programme to bring about the required paradigm shift in agriculture.

- PACA Team

Sustaining Agriculture

Can conservation agriculture be the way forward?

The agriculture sector has reached a turning point. While the sector continues to play a vital role in the nation's economy, its contribution to our GDP has been declining over the years. However the proportion of our population dependent on agriculture has not declined in the same pattern, with almost 65 percent of our population continuing to rely on agriculture for subsistence. Given the trend, many questions are being raised, some being:

- How can we achieve greatly accelerated levels of productivity growth which have been stagnating for sometime?
- How can such a growth be pursued that does not leave an impoverished resource base with adverse environmental impact?
- How can productivity goals be met addressing social ends of equity and inclusiveness?

This evidently calls for a strategy to be evolved, different from the one pursued thus far. The new strategy must aim at achieving goals of sustainable agriculture in the face of multiple challenges confronting the sector, largely:

- Stagnating/declining productivity of major food crops, pulses, oilseeds etc. The most important challenge will be to raise productivity of vast cropland area under rainfed farming
- Widespread problems of land degradation, declining soil quality, depleting water resources, and diminishing biodiversity
- Increasing severity of environmental problems arising from pollution of surface and groundwater, gases, atmospheric loading of greenhouse pollution
- Need for adjustments and adaptations to climate change
- Spiraling energy needs

The strategy that we now seek must reconcile our short term needs of achieving enhanced productivity within the framework of long term sustainability goals. Globally 'Conservation Agriculture' (CA), has emerged as an alternative to conventional agriculture and can be considered a strategic response to the multiple challenges that we face. The term CA refers to a set of agricultural practices that have a basis in three basic principles of proven scientific soundness.

The three principles that have been well researched are:

- Minimum disturbance of soil through practices such as ploughing, tillage, among other practices
- Keeping the soil surface covered by leaving crop residues on it, or growing cover crops
- Adopting appropriate spatial and temporal crop sequencing, including agroforestry practices

Agricultural practices based on these principles have been shown to be beneficial in many ways. Farmers stand benefited primarily due to reduced production costs on account of savings on labour, fuel, and machinery wear and tear. Crop residues left on the soil surface serve to reduce run off and soil erosion, conserve rain water *in-situ*, and over a period of time enhance soil organic matter, thus improving soil fertility and capacity of soil to retain and supply moisture. The nature and extent of benefits will vary according to the farming conditions prevalent. Similarly crop sequencing including intercropping and agroforestry serve to strengthen ecological foundations for sustainable agriculture apart from enhancing farmer incomes though better utilization of time and space.

While the scientific soundness of principles guiding CA practices is not in doubt, wide spread adoption of CA practices is a challenge to the scientific and farming communities alike. Most importantly there is a need to bring about a change in their mindset. Development, adaptation, and widespread adoption of CA practices will critically depend on scientists from several disciplinary backgrounds coming together and working with farmers to bring forth the solution to problems faced while adopting new technologies. While farmers can best optimize resource use by pursuing an integrated approach; the ability of scientists to understand, appreciate, and respect the farming community's experience and knowledge will be decisive to promote CA practices. Equally important will be the emergence of a farmer led movement backed by efforts of the scientific community that will create a demand led research programme. Professional Association for Conservation Agriculture (PACA) has been created as an institutional platform in response to these very needs.

- PACA Editorial Team



The Need for PACA

Theodor Friedrich

Senior Officer Crop Production Systems Intensification
Crop Production and Protection Division, FAO

Agriculture globally is facing unprecedented challenges: food production will have to be nearly doubled during the next three decades to feed the growing world population and its increasing demand for meat products. In addition to the increasing food demand, the more recent demand for biofuel is exerting pressure on agricultural production. Climate change is also taking its toll and as a result we are facing already a global problem of soaring food prices.

New land for expanding agricultural production is only available in few continents, but not to the extent necessary for the required production increase. Particularly in South and South-East Asia the land suitable for agricultural production is mostly utilized already. Further expansion of agricultural land would go at the expense of natural protection areas and have significant repercussions on ecosystems. Also other resources, such as water, are getting increasingly scarce and agriculture will in future have to share freshwater resources with increased demand from other sectors.

The traditional response to high market prices would be the increase of production, and since the increase of agricultural production through extension of production area is limited, the production increase has to come from yield increase and higher production intensity. In many world regions there is plenty of scope to increase the actual yield levels, since they are far from the genetic potential of the crops. In other regions of the world, yields are already peaking and further increase does not seem to be possible even with increased use of production inputs. It appears that the traditional response to the actual problems of agricultural production; viz. increased use of fertilizers, irrigation water, and high yielding varieties, will not respond in the long-term to needs of sustainable intensification of agricultural production.

To demonstrate the situation it might be worthwhile focussing on a specific country, for example India. In this country a huge population is depending on agricultural production for food, feed and other resources. The green revolution enabled the country to feed its population, but a collapse of this production would have repercussions of global impact. Yet, the actual trends are not promising: many regions of highly intensive agriculture in India

are facing declining yield levels, which even with increased amounts of fertilizer cannot be controlled. Ground water tables are falling thus endangering the supply of irrigation water. Climate change is causing irregular weather patterns with draught periods and heavy unseasonal rain storms being experienced, causing flooding and destroying harvests. In addition, the flood waters are not retained in the ecosystem since they cannot infiltrate into the sealed soil to provide the desperately needed replenishment of groundwater resources.

The response from science to problems in agriculture is often focussing on single disciplines and topics, providing more tolerant varieties or developing equipment or management techniques for resource saving technologies. All this reduces the pressure on natural resources that often can only slow down but not reverse the long-term trend of declining resource base and yields. For this reason a more radical approach is required, which implies a qualitative change in the agricultural production system and in the understanding of processes involved. Under the term of Conservation Agriculture, a global community of practice has been forming, originating from field experiences of Brazilian farmers in the 1970s and spreading to an adoption level of about 100 million hectares on all continents and climatic zones. Conservation Agriculture bases itself on three fundamental principles:

1. Continuous minimum mechanical soil disturbance, ideally “permanent no-tillage”
2. Permanent organic soil cover, with dead mulch or living crops
3. Diversified crop rotations in the case of annual crops or plant associations in case of perennial crops.

The Food and Agriculture Organization FAO defines Conservation Agriculture (CA) as follows: “CA is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment.”

CA is based on enhancing natural biological processes above and below the ground. Interventions such as mechanical soil tillage are reduced to an absolute minimum, and the use of external inputs such as agrochemicals and nutrients of mineral or

organic origin are applied at an optimum level and in a way and quantity that does not interfere with, or disrupt, the biological processes.

The three CA principles are by no means new. They are well known as “resource conserving technologies”. The important new feature of CA is the simultaneous and permanent application of all three principles. The simultaneous use is creating synergy effects which enforce the effect of the single practice while eliminating the disadvantages of each technology applied in isolation. Such a permanent application leads to a long term change in the agro-ecosystem and makes the production system increasingly resilient to external factors, increasing the efficiency of external inputs but also of internal biological processes and hence increasing the parameters of sustainability of the production systems. More than 30 years of practical experience with CA shows that trends of conventional agriculture can be reversed. In CA, use of external inputs such as fertilizer, agrochemicals, fuel, labour and work time is reduced, declining in the long term; while yield levels stabilize and increase. Environmental parameters such as soil fertility, biodiversity, water quality and ground water levels are improving. Also socio economic parameters, profitability of farming and farmers’ livelihoods are improving after the introduction of CA.



Crops sown in standing residues (Source: CYMMIT)

Originally the pioneers who have envisaged conservation agriculture and who made it work in practice were not scientists and experts, but rather

generalists and visionaries and, more than anything else, farmers. Farmers have to adopt a systems approach that takes into consideration all elements in their production system, while scientists need to focus on their discipline and through mono-factorial experiments. Hence, Conservation Agriculture is a challenge for established science. Not only does it require a dramatic rethinking of conventional knowledge and wisdom, it has to find new ways of solving complex problems facing agriculture today.



Bed planting in conservation system (Source: CYMMIT)

Agricultural professionals have to rethink their objectives. Engineers need to focus on soil tillage where new technologies are required. Soil scientists need to reconsider commonly accepted soil parameters like bulk density and pore volumes, the dynamics in soil chemistry, soil biology and even plant nutrition and pest management. Finally economists have to look at the overall profits of production systems and not of single crops or commodities.

In addition to this, different disciplines have to work together, engineers for one have to understand agronomy to design machines according to the needs of new cropping systems. The solution to a mechanical problem might not be in engineering but in agronomic management. Soil scientists need to look at pore structures and learn about root behaviour rather than concentrate on “measurable” parameters. Since functional principles of CA depend on the synergy of different practices, factors can’t be analysed in isolation.

A systems approach to research and development requires a much closer collaboration between different disciplines to understand CA and to further improve its application. For this reason, an alliance such as PACA is very necessary for the advancement of Conservation Agriculture.



The 4th World Congress on Conservation Agriculture will be jointly organized by Indian Council of Agricultural Research (ICAR) and National Academy of Agricultural Sciences (NAAS) on 4-7 February 2009 at New Delhi. The co-sponsors of the Congress are The International Center for Agricultural Research in Dry

Areas (ICARDA), Rice-Wheat Consortium, Food and Agriculture Organization (FAO), Indian Society of Soil Science (ISSS), and Indian Society of Agricultural Economics (ISAE).

The Congress will aim to bring together stakeholders including researchers, farmers, extension-workers, policy planners, corporate leaders and non-governmental organizations to address innovations in agriculture for realizing improved efficiency, equity and environment. Important aspects of research and development related to Conservation Agriculture will be covered through plenary lectures, invited lead papers, poster papers, and workshops by experts on the thematic areas mentioned below:

- Resource Productivity and Efficiency
- Institutional Innovations and Policies
- Environment, Indigenous Knowledge and Practices
- Equity

The Congress will include a parallel event titled "Commerce Conference on Conservation Agriculture and Implements" that will help evolve a blueprint for commercialization of technologies useful in Conservation Agriculture.

For further details please browse the Congress web site at <http://www.icar.org.in/wccagri/index.html>.



PACA Event

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

June 17 is being observed by the United Nations Convention to Combat Desertification (UNCCD) as World Day to Combat Desertification with the 2008 theme being "Combating Land Degradation for Sustainable Agriculture".

The Professional Alliance for Conservation Agriculture (PACA) takes pleasure to announce a half day meet on "Combating Land Degradation for Sustainable Agriculture – Is Conservation Agriculture the Way Forward?". The meet has been scheduled for 14:00 hrs. on Tuesday, June 17th, 2008 at the Lecture Hall, National Academy for Agriculture Sciences, NASC Complex, Pusa, New Delhi.

The meet is expected to be well attended with participants from farmer groups, policy making, research, academic, and civil society streams. We look forward to a high degree of interaction through a panel discussion following the talk of invited speakers. It is our hope that the proceedings will point to a way forward to induct conservation agriculture practises in mainstream agriculture.

Entry is by invitation and should you be interested, may we request you to email us at info@conserveagri.org with "Invitation Requested" forming part of the subject line. For those who do not use the email, you may call us on +91-11-26496962. We look forward to hearing before 7th June, 2008 to enable us to despatch the invitations.

The Professional Alliance for Conservation Agriculture (PACA) is a platform of concerned agriculture and social professionals keen to address aspects of conservation agriculture. The initiative has been incubated by two not-for-profit bodies CASA and Society STADD.

Centre for Advancement in Sustainable Agriculture (CASA)

CASA since its formation in 1998, has been working towards improving prospects of induction of conservation agriculture and has contributed in this regard to efforts of the Indian agriculture R&D system. They have been instrumental in conducting the first National Conference on Conservation Agriculture in 2004 and have added substantial impetus to efforts under the Rice-Wheat Consortium program that provided valuable leads to the cause of conservation agriculture. Subsequently learnings have been shared with an EU based global project "Knowledge Assessment and Sharing on Sustainable Agriculture (KASSA)" involving countries such as France, Germany, UK, Spain, Brazil, Argentina, Pakistan and Vietnam, to name the prominent few. Another area that is being addressed by

CASA is the eco-regional approach to agriculture research that points to developing customised solutions to specific location based needs.

Society for Strategy Technology & Delivery for Development (Society STADD)

Society STADD is a not-for-profit organisation of well meaning development professionals that over the last four years has focused on hosting a platform on rural infrastructure and its related impact on livelihoods, health and education. Sustainable & Participative Initiative for Rural Infrastructure Technologies (SPIRIT) conference was held annually between 2005 and 2007 with the last conference deciding to pursue technology based initiatives in the field of agriculture, livestock and wasteland development. Most members involved with the Society are development professionals contributing to projects funded by Government of India, bi-lateral and multi-lateral agencies, and corporates. Most importantly, Society STADD believes in conservation agriculture as the way forward to provide meaningful livelihood options to the rural poor given the importance of agriculture to rural livelihoods.