The merits and limitations of innovation platforms for promoting Conservation Agriculture in sub-Saharan Africa

Barry Pound[1], Helena Posthumus[2]

[1] *Independent consultant and Visiting Fellow, University of Greenwich, UK.* bazzapound@hotmail.com
[2] *Royal Tropical Institute (KIT)*

Abstract:
Despite many efforts, Conservation Agriculture (CA) has not been embraced on a large scale by African farmers. CA requires technological, organisational and institutional changes, as well as a strong capacity in problem solving from farmers and service providers to adapt CA practices to the local context. Such a broad set of changes is not suited to a top-down, linear approach of technology transfer. Over the last decade, various CA initiatives have therefore adopted an innovation systems approach, using innovation platforms (IPs) as an instrument to promote CA. However, to date CA innovation platforms have tended to focus on CA as a solution, thus overtaking the attention to tackle underlying problems and constraints such as declining soil fertility, insecure property rights, conflicting demands on farm resources, or lack of inputs and services. Innovation platforms that have functioned well in terms of experimenting with different CA practices required a lot of time and effort to facilitate the platform activities. Drawing on experiences from different projects (primarily ABACO[1], but also from DONATA[2]), we identified several lessons and strategic questions regarding the use of innovation platforms for CA.

Some of the issues to be considered when using IPs for sustainable agriculture are: identification of suitable themes for IPs; the influence of different starting points and structures that are used for the set-up of IPs; the use of external resources and facilitation in establishing and maintaining the IPs; opportunities and constraints to foster autonomous IPs; and relevant criteria for measuring success of IPs. The paper further discusses under which conditions, and to what extent, IPs are an improvement on conventional ways of developing and promoting agricultural technologies.

Key words: Conservation Agriculture; Innovation Platforms, Agricultural Innovation Systems

Introduction

The rapid environmental, economic and social changes occurring at national and local levels in sub-Saharan Africa require a research and development approach that is able to identify suitable technologies and provide the enabling environment (i.e. suitable policies, technical adaptation, social structures, infrastructure, facilities, resources, materials, skills and information) that will make them viable innovations in different situations. For this, donors[3] and government programmes are increasingly turning to *agricultural innovation systems (AIS) approaches* (Pound and Essegbey, 2007). Since the 1970s, alternatives to top-down, linear approaches to research and extension (e.g. technology transfer) have been evolving. They include farming systems approaches, and a host of participatory approaches, such as Participatory Rural Appraisal, Participatory Technology Development, Participatory Learning and Action, Farmer Field Schools and Action Research. Each one stresses different aspects or different stakeholders in the technology generation and utilisation continuum. During the same period there have been major shifts towards the de-centralisation of extension, the liberalisation of input supply, the empowerment of farmers to demand services relevant to their needs, and greater emphasis on post-

[1] Agro-ecology Based Aggradation-Conservation agriculture (ABACO) funded by the EC and managed by the African Conservation Tillage Network through in-country and international organisations
[2] Dissemination of New Agricultural Technologies in Africa funded by the African Development Bank, managed by FARA and implemented by ASARECA in eastern and central Africa
[3] Including the World Bank, DFID, the African Development Bank, and Regional organizations such as FARA

harvest activities and marketing of products. *The agricultural innovation systems approach brings these different components and actors together by emphasizing the linkages between actors, covering the spectrum from producers through processing and marketing to consumers* (Triomphe et al, 2007). The AIS approach is still evolving, and there is no blue-print for how to apply it. Rather it is a set of principles, experiences and best practices that together add up to a new way of conducting agricultural research for development (AR4D). The applied nature of the AIS approach is clear from the definition. It places innovation at the centre of a partnership, rather than technology or research organizations. One of the practical applications of the AIS approach is the design or strengthening of multi-stakeholder coordination to address a challenge or exploit an opportunity. One such way is through innovation platforms (IPs) that can operate at national scale (e.g. a task force made up of partners from government, academics, NGOs and the private sector) or local scale (e.g. local government, locally-based NGOs, locally-operating extension, training and research organisations, local entrepreneurs along the value chain and interested farming families).

Conservation agriculture (CA) is heralded by many as a means to achieve sustainable agricultural intensification, increase farmers' resilience to climatic variability and address soil degradation in sub-Saharan Africa (e.g. Kassam and Friedrich, 2011; Marongwe *et al.*, 2011) through its three central principles of soil cover, zero (or minimum) tillage and intercropping. However, there is also increasing recognition that the spread of CA in sub-Saharan Africa has been limited because of diverse agro-ecological and socio-economic factors, and that CA needs to be tailored to local circumstances (Giller *et al*. 2009; Knowler and Bradshaw, 2007; Nkala *et al.*, 2011; Tittonell *et al*. 2012). The transition from conventional agriculture to CA requires technological and institutional changes, as well as a strong capacity in problem solving from farmers and service providers to adapt CA practices to the local context (Posthumus *et al*. 2011). The promotion of CA as a full and indivisible package that farmers need to adopt leaves little room for manoeuvre for local adaptation, and has contributed to the very limited adoption of CA by resource-constrained farmers in Africa.

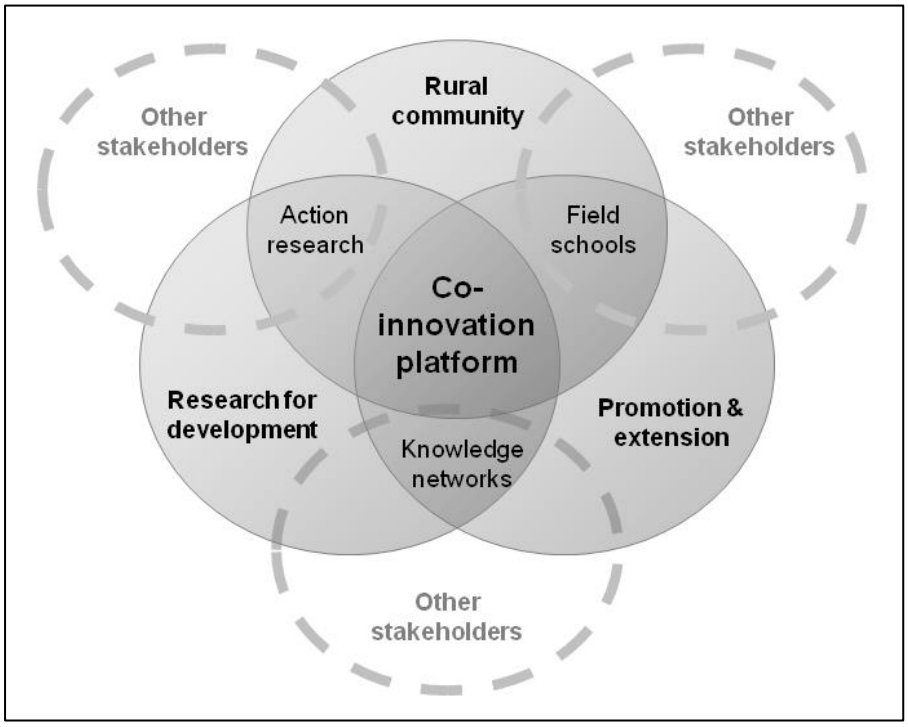


Figure 1. Co-innovation platforms in the ABACO project

The 4-year ABACO project, funded by the European Commission, applied an AIS approach to the promotion of CA. ABACO aimed at establishing site-specific innovation systems that rely on agroecology principles and recuperation measures to restore soil productivity in semi-arid regions of

Africa. ABACO tried to achieve this through the creation and support of co-innovation platforms that involve the farmer, extension and research communities interacting with other relevant stakeholders specific to each situation. The participation of farmers in technology development through action research, with a solid involvement of researchers working together with farmers and others (co-innovation), was thought to be a pre-requisite to the adoption of soil improving technologies. Figure 1 depicts how co-innovation should work in theory, bringing together a range of relevant actors (stakeholders) and activities.

This paper reflects on the outcomes of the ABACO project, in particular on the use of IPs in its project approach, and presents the lessons learned. The authors also draw on first-hand experience with the DONATA[4] project (African Development Bank project managed by FARA[5] and implemented by ASARECA[6] in eastern and central Africa)

Innovation platforms for the promotion of CA: experiences from ABACO

At the start of the project, it was decided that the IPs would be a core tool in the ABACO project. The IPs were expected to involve a range of stakeholders (community, state, commercial, civil society, international) in dynamic, creative and productive partnerships that benefit all of the stakeholders in some way. Without benefits of a magnitude and over a time-scale that are significant and interesting to the stakeholders, it was assumed that the partnership would falter.

The functions of the project IPs were defined as:

- Coordination: Provide co-ordinated relationship between organisations (leadership, common goals, roles and planning)
- Information and capacity building: Assist the flows of information and knowledge (including training) for the understanding and application of CA
- Experimentation: Testing and adaptation of CA options
- Socio-economic study: Understand farmer's circumstances, aspirations and support needs for CA options
- Advocacy: Engagement with national-level actors – influence on policy

IPs can exist at different levels (e.g. national, district and local). Some ABACO countries already had stakeholder structures of different sorts and at different levels at the start of the project. The priorities assigned to the various functions outlined above was different at each level, as follows:

- **National level functions** included: awareness raising of CA at Ministry and general public levels; influence on relevant policy formulation; influence on national strategy/action plan for CA; influence on allocation of resources to CA; import or manufacture of CA equipment; training of CA technical personnel (research, extension, NGOs etc.), resource mobilization, linkage with District level
- **District level functions** included: coordination of District-level partners and resources, linkage and communication with national and local level Co-IP; information exchange; capacity development; development and implementation of workplans; diagnosis and assessment, monitoring and evaluation,
- **Local level functions** included: site-specific definition of CA and how it should work; planning and implementation of CA workplans including experimentation; linkages with District partners (for input supply, marketing, information, training…); capacity development.

[4] Dissemination of New Agricultural Technologies in Africa (DONATA)
[5] Forum for Agricultural Research in Africa (FARA)
[6] Association for Strengthening Agricultural Research in central and Eastern Africa (ASARECA)

ABACO field experiences with Innovation Platforms

The functions and priorities of IPs given above constitute the theoretical model that the project ideally would have followed. In reality there was a big difference in the application of the IP principles between the five project countries: Zimbabwe (functioning IPs at four levels), Mozambique (partially functioning but fragile IPs at local and national levels), Kenya (no functioning IPs – but established Farmer Field Schools and a wide range of associated stakeholders), Madagascar (relatively weak and unsustainable farmer groups inherited from a previous project) and Burkina Faso, where a strong research-led process has had some success in establishing functioning IPs.

In **Zimbabwe**, there are functional Innovation Platforms at Ward, District, Provincial and National levels. At local level these are centred around Farmer Learning Centres that were present before the project started. At Ward level the Platform members are women and men farmers, the Ward extension worker(s), locally active NGOs and locally active private input suppliers or traders. District level IPs are coordinated by the District Agricultural Office with the participation of other District-level officials as well as private companies and the District representative of the Zimbabwe Farmers Union (ZFU). At National level the Zimbabwe Conservation Agriculture Network (ZIMCAN) is coordinated by AGRITEX (the national extension service). The ABACO project IPs were expected to mobilise farmers and stakeholders to co-learn, innovate and generate specific solutions around Conservation Agriculture, climate change and variability and other identified agricultural problems constraining food, nutrition and income security in the smallholder sector. The function of the District IPs (DIPs) was to link smallholder farmers to extension, the Environment Management Agency, the University of Zimbabwe, Rhizobium manufacturer, input suppliers, markets (including the Grain Marketing Board), Banks, the ZFU and the Meteorological Department. Although no NGOs are members of the DIP committee at present they are invited to meetings when relevant (e.g. Environment Africa). The DIP mobilises farmers into groups for the dissemination of technology and the sharing of experience. The DIP identifies training needs and coordinates input provision across all commodities. The DIP also coordinates inter-farmer visits. Modest resources come from ABACO through SOFECSA[7] to facilitate this agenda (e.g. stationery, refreshments for meetings etc.). Because CA is a mainstream government activity, government resources - such as transport - can be used to mobilise farmers. Apart from training, inputs, information and market access, the DIP now organises CA Learning Centres, field days and farmer exchange tours with the facilitation of the SOFECSA National Innovation Platform (NIP) and the research group at the University of Zimbabwe (UZ) These include prizes, which introduces an element of competition and pride among farmers in good work. The DIP links to the national level IP for support. For instance training advice is provided by CIMMYT/CIAT, E-Africa, Restless Development and UZ. A specific challenge is the very limited quantity of CA equipment at present (only one jab planter and one ripper per District). The DIP has a wider scope than CA. It is more correctly seen as an IP for agriculture as a whole into which issues such as soil fertility, climate change and CA can be inserted. It is both a discussion forum and a platform for action. CA participatory trials are conducted through the District IPs, while the local IPs are also used for wider objectives, such as advocating for a new community hall.

In **Mozambique** there is a national level Conservation Agriculture Working Group that comprises research, extension and the National Farmers Union which meets once per month, and reviews present activities, identifies future needs and shares experiences. There are, as yet, no IPs at District level or at local level. However, the national agricultural research institute (IIAM) is conducting a set of trials on CA in two locations. The sites were selected for the presence of research and extension staff and other service providers, accessibility and their provision of contrasting agro-ecological circumstances. Efforts have started in building IPs at the two locations but the Mozambique research system is suffering from serious lack of human capacity to fulfil its mandate. The facilitation of meetings and problem solving tends to be done by individuals from the Provincial level because those at the lower level lack the skills

[7] Soil Fertility Consortium for Southern Africa – the body implementing ABACO in Zimbabwe

and experience necessary. Training and support is needed for them to be able to act more autonomously.

In **Kenya** there are two starting points for IPs – the **national-level** Conservation Agriculture Task Force, and the **local-level** Farmer Field Schools (FFS). As they stand, neither could be seen as a fully functioning IP[8], and there is also little linkage between the two. The National CA Task Force was not active during the project period. At local level there were 9 FFS groups engaged in participatory research through group plots that compare CA maize with conventional agriculture, but there has been a diminishing trend in membership partly due to some poor harvests because of waterlogging (leading to members working for wages on flower farms and elsewhere), and due to old age (the group members have a high average age). Each FFS group has its own internal governance structure, but there is no structure coordinating service providers and the FFS groups (which would constitute an IP). At District level (Laikipia East) there is a wide range of stakeholders (including other projects/NGOs promoting CA), but again no structure that meets to discuss direction, assign roles and coordinate actions. There is a lack of materials and skills at farm level to implement CA properly, and there is a negative social pressure on the group members from the community. CA farmers were accused by their peers of laziness as they do not remove the stover nor produce a clean, ploughed seedbed. There is also social tension within some families. Normally only one family member, either the husband or the wife, attends trainings and works on demonstrations as a member. While they may be convinced of the benefits of CA, they have a hard time convincing their spouse, who then continues with his/her traditional practices. However the project has stimulated discussion within the family, and raised the status of women in the eyes of their husbands. Progress of the ABACO project in Kenya has been limited in terms of the number of committed adopters. However, encouraging signs are the number of knowledgeable, committed extension staff who now have good experience with the practicalities of implementing CA in the field, and the level of interest shown in field days by non-CA group farmers. They have noted that many of the CA-group member families are at, or near to, food self-sufficiency unlike many of their conventional farmer neighbours.

In **Madagascar**, ABACO was working with two existing local farmer groups near Lake Alaotra, but no regional IPs for CA have been created. The two farmer groups were considered as technical IPs, but operated as FFS, where researchers, farmers and extension agents carried out on-farm CA experiments. Farmers in the North used the group in an effective way to achieve rather advanced, technical objectives, but the group was perceived to be exclusive and closed to non-members, while the less-organised group in the South was more open to interested people but less active. The farmer groups allowed its members access to services provided by a previous comprehensive development project, BV/Lac. BV/Lac was instrumental in CA research and extension in the region. BV/Lac came to an end in 2013, and NGO activity has remained low since then as funding and staff capacities are low. CA adoption remained low, and various constraints (e.g. lack of public and private service providers, insecure land tenure) and other interests (e.g. alternative income activities on- and off-farm) restrained farmers' interests in the groups as well as in CA. A national umbrella organisation, *Groupement Semis Direct de Madagascar*, engages stakeholders interested in agroecology and CA at national level by sharing knowledge and experiences.

Numerous IPs have been implemented in **Burkina Faso** to encourage the adoption of agricultural innovations and stakeholder interactions within a value chain, in particular under DONATA. Innovation platforms have emerged gradually as a relevant means for the development and diffusion of many kinds of innovations. Few studies have examined how to implement IPs to address complex systemic innovations such as CA. Under the ABACO project, three complementary steps were followed to

[8] According to the ABACO project document (page 18): *"ABACO will adopt a definition of co-innovation platform which is a flexible and informal, dynamic, multi-stakeholder partnership working together to develop and use technologies and processes to improve livelihoods – in this case to implement/monitor/promote CA".*

establish three local innovation platforms for CA: (1) the diagnosis of existing forms of organization; (2) the development of an IP model; suited to local conditions and (3) the validation by stakeholders of the IP model and the planning of activities. The emphasis was on the village scale, building on existing structures, rather than imposing new ones. Following analysis, the research team opted for an IP structure consisting of two bodies, a technical body and an institutional body. The researchers viewed IPs as a space for experimenting and assessing innovative cropping systems, a means to ensure more effective participation on the part of local stakeholders in the production of knowledge and the adaptation of CA, and, in the medium term, a means to promote the adoption of CA. Stakeholders defined an activity plan and farmers played an active role year on year in modifying the cropping systems. As a result IPs attracted a growing number of farmers to their meetings. IPs improved the networking of farmers and interaction with external stakeholders was strengthened. The IPs also resulted in changing perceptions and attitudes regarding crop residues and grazing regimes. IPs have been an effective space for the joint design, testing and discussion of new cropping systems and crop residue management modes, and for training, emulation, and networking of stakeholders. Basing the IPs on existing organizations allowed the IPs to quickly gain legitimacy and an audience, and to rapidly become operational. However, it can be difficult to propose "innovative" activities which depart from those which the existing organizations and their members are accustomed to and are prepared to undertake. There is a dependence for facilitation and ideas on the research team that suggests weak prospects for sustainability. Regardless of their purpose, there is a limit to what village IPs can do to help change local agriculture. It is critical to also work at the level of the "enabling environment" in order for agricultural policy to be more supportive of the implementation of agro-ecological systems like CA.

Experience with innovation platforms for the dissemination of technologies in DONATA

The experience of ABACO can be contrasted to those of DONATA. This African Development Bank-funded project, managed by FARA, operated in three regions - western, southern and eastern/central Africa. In eastern and central Africa the 10 national research institutions served by the regional research body, ASARECA, chose two novel technologies for promotion though innovation platforms: orange-fleshed sweet potato and quality protein maize. Both were seen as ways to improve nutrition and to provide income through sale of the primary product and processed products along the value chain.

The national research organisations established innovation platforms at district and local levels. This was a time consuming process as it took a long period of negotiation for the stakeholders to understand and appreciate the idea of innovation platforms. In the first instance the platforms were mainly used to multiply the planting material of the two commodities, but as this became more readily available attention switched to developing the value chain. Thus for sweet potato, farming families and some private entrepreneurs started to use orange-fleshed sweet potato for making and selling cakes and doughnuts, while quality protein maize was found to enhance the growth of chickens and was used for fortifying the nutritional quality of bread . These linkages along the value chain took time to develop, and some were more successful, or on a larger scale, than others.

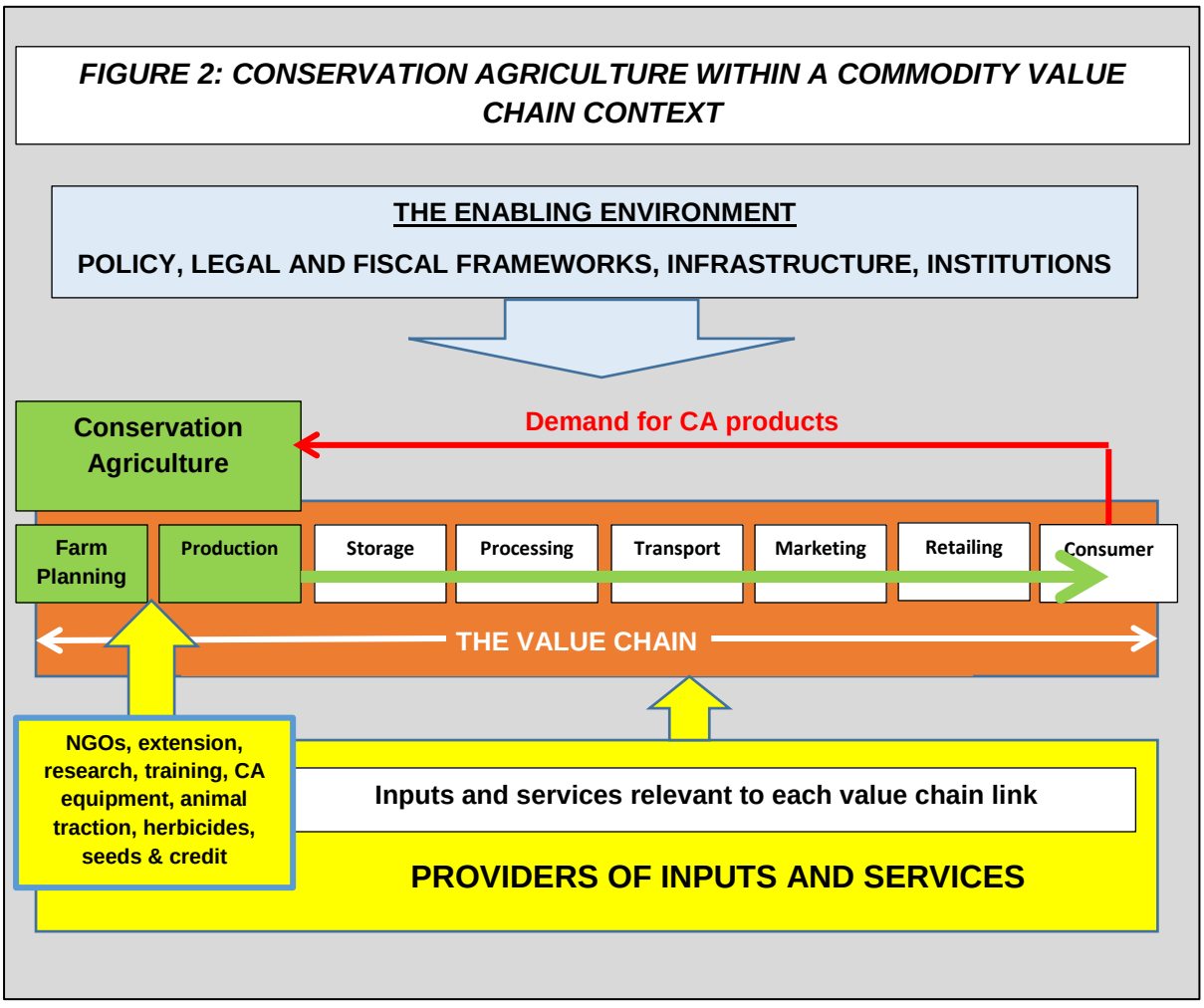
Kimenye and McEwan (2014) found that the factors that tended to result in successful innovation platforms in the DONATA projects in eastern and central Africa were as follows:

- Bringing together a diversity of actors to support learning, innovation, technology generation and dissemination processes.
- Using a range of tools and processes that can support the establishment and functioning of the IP, such as value chain analysis, stakeholder analysis and SWOT analysis.
- Building capacities and competencies for supporting innovation processes and IP functioning.
- Choosing a committed and energetic lead organization to coordinate and advocate for the IP at institutional level.
- Taking time to establish democratic, participatory governance and management processes.
- Ensuring good flows of information and feedback, and encouraging continued innovation.

- Encouraging sustainability by founding platforms on a sound business model and good business management principles.

Contrasting the use of IPs for promoting CA and for promoting value chain commodities

The main difference between the ABACO and DONATA situations is that ABACO was trying to promote a way of working that might bring environmental and production benefits in the long term, whereas DONATA was promoting technologies that brought tangible, short-term results (once the innovation platform was established and once good quality planting materials were available). DONATA technologies had a **commercial driver**, giving all stakeholders **along the value chain** an easily appreciated benefit in participating in the platform. Both of the DONATA chosen technologies had nutritional benefits[9] that provided further incentive for the involvement and support of international bodies such as CIMMYT and CIAT, and humanitarian NGOs (see Kimenye and McEwan, 2014).



Source: Pound and Posthumus, 2013

Figure 2 shows that Conservation Agriculture operates very much at the production end of the value chain. Unless there is a developed market paying a premium for CA products there is not much of a commercial **pull** driving the adoption of CA. An alternative might be policy instruments (such as a government payment to farmers during their transition from conventional to CA farming) to provide a

[9] Orange-fleshed sweet potato is rich in Vitamin A, while quality protein maize has enhanced levels of the amino acids lysine and tryptophan

push for the adoption of CA. For the widespread adoption of a set of practices such as CA, the enabling environment and the provision of inputs and services have to work in harmony, and have continuity over time.

Farmers have to be convinced that the new way of doing things is better than what they have been used to for many years, and the trade-offs are, on balance, more productive (and carry less risk of failure). For instance leaving crop residues on the field means they either have to find new sources of animal feed to replace the residues or dispose of some livestock. Social change may be necessary within the village to stop cattle owners from free grazing the residues in the field, as happened in Burkina Faso. Technical changes will be needed to plant through the trash left on the soil surface and new skills need to be learned to apply herbicides at the correct time and in the correct dosage, assuming the farmer has cash to purchase these inputs. The farmer has to weigh all these factors and decide if radical change is worth the investment and the risk. In addition, CA is a long-term measure, and the investment and upheaval caused by changing to CA are not recompensed in the first one or two years. For resource-poor farmers with little spare capacity (cash, labour or land), it may be difficult to weather this transition without some assistance.

Conclusions

The introduction of **CA requires fundamental change in the production system**, with implications for many farming operations and activities (including land preparation, stover management, cropping practices, weed management, animal feeding and grazing management). These imply big changes in commitment and behaviour for a range of stakeholders (farmers and service providers), requiring innovation in the 'software' (knowledge, information, skills of farmers and service providers) and 'orgware' (structures, linkages and ways of working) of the agricultural system (World Bank, 2012). There is also a need for the 'hardware' (materials, equipment) specific to CA (including specially designed hand, animal or tractor-mounted planters and weeders, herbicide applicators and effective herbicides) to be readily available to farmers, and accessible to them in terms of cost – with credit where necessary.

To date CA innovation platforms have tended to focus on CA as a solution, thus diverting attention from tackling underlying problems and constraints such as declining soil fertility, insecure property rights, conflicting demands on farm resources, or lack of inputs and services.

This suggests that **innovation platforms should not focus solely on CA**, but rather on underlying shared complex problems which form obstacles to sustainable agricultural intensification and agricultural sector development. The focus on these problems enables innovation platforms to widen their mandate, to bring in innovative solutions that are not prescribed and go beyond technological fixes. Innovation platforms are instruments to reduce barriers to innovation in the agricultural sector. Low adoption rates of CA are not the issue, but the underlying problems and constraints that farmers face are. Solutions may include farming systems that are based on elements of CA, but do not adhere rigidly or exclusively to all CA principles.

The complexity of the challenge means that, despite many efforts, Conservation Agriculture (CA) has not been embraced on a large scale by African farmers. Such a broad set of changes is not suited to a top-down, linear approach of technology transfer, but **IF innovation platforms are applied fully and supported over an extended period by a dynamic enabling environment**, they would seem to be a valid instrument for experimenting and adapting CA systems, within a broader sustainable intensification agenda.

However, establishing, supporting and maintaining innovation platforms is very resource-intensive, and there is not enough skilled capacity available in most countries to coordinate and facilitate them as a public good (as in the case of conservation agriculture, which enhances the environment) where there is no commercial driver bringing in service providers and providing an economic incentive to farmers to change their practices.

The experience of the five ABACO countries suggests that it is possible (as in the case of Zimbabwe and Burkina Faso) to build on existing farmer group structures, and, with intensive external support, to change farming attitudes and practices, at least among some farmers and in some ecological situations. But the impacts of the innovation platforms has remained limited to the localities of the platforms.

Some of the issues to be considered when using IPs for sustainable agriculture are:

- Identification of suitable themes for IPs;
- The influence of different starting points and structures that are used for the set-up of IPs;
- The use of external resources and facilitation in establishing and maintaining the IPs;
- Opportunities and constraints to foster autonomous and sustainable IPs;
- Relevant criteria for measuring success of IPs.

A major constraint to adoption has been the inadequate linkage of farmers to CA service providers for production inputs, output markets and financing. The design of the ABACO innovation platforms has failed to deliver as expected because they were anchored on the delivery of *knowledge* to farmers, rather than the tangible *services* demanded by farmers.

Discussions in Zimbabwe and Madagascar in particular have crystallised the opinion that IPs should be broader-based than CA, and that they should be "an innovation space" looking for value chain opportunities, with CA being integrated into those value chain activities.

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