Global Co-ordination Group on Sustainable Cocoa Economy: Achieving more efficient knowledge transfer

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Abstract

More efficient transfer of technologies, or rather, knowledge transfer is needed to achieve higher efficiency of research efforts into sustainable cocoa production. The classical “top-down” manner of transferring blanket recommendations is being largely discarded with growing attention for farmer participatory models of knowledge dissemination. Examples of successful extension programmes following novel approaches to knowledge transfer are described. Such programmes show that farmer training should take a holistic approach to the farming system. Research needs to be focused on farmer problem-solving and effective research – extension – farmer partnerships need to be developed. Besides farmers and farming support systems (extension and research), policymakers have a role in

raising the farmers' benefits and interests in a sustainable cocoa economy. It is concluded that re-education and re-organisation are seen as the most promising way forward, e.g. through participatory approaches towards knowledge transfer.

1. Introduction

Over the last few years, several initiatives have been taken to develop a co-ordination mechanism that would contribute to a more sustainable cocoa sector. This was expressed in the "Declaration of Intent" signed by a broad range of stakeholders in Paris in March 1999. The spirit of the declaration asserted that all stakeholders of the cocoa sector share a common interest for Sustainable Cocoa Economy and that the cocoa community (producers, industry, research, etc) would benefit from a co-ordination of their efforts and the possible synergies in a Global Co-ordination Group.

The Paris meeting was followed by a series of other meetings of stakeholders, representing farmers, researchers (both national and international), NGOs, extension agencies, trade, processors, chocolate manufacturers, cocoa boards/government bodies through ICCO, consumers and donors. At the most recent meeting, in Brazil in September 2001, nine topics were identified as being the perceived needs of the cocoa sector by stakeholder representatives. At this meeting, CABI *Bioscience* was identified as the lead facilitator, with CIRAD, CEPLAC and CNRA, to take forward Topic 6 – Achieving an efficient transfer of technologies, re-baptised by the authors into the more up-to-date terminology 'Achieving Efficient Knowledge Transfer'.

This report focuses on Knowledge Transfer, the current situation in important cocoa producing countries, and potential future strategies. Even though the document draws heavily on information gathered in current and past CABI, CIRAD and CEPLAC experiences, mainly on Integrated Pest[1] Management (IPM), links are made to post-harvest management and other cocoa project activities and the perceived strategies needed are proposed in a global context.

2. Background

In West Africa, cocoa is a major cash crop with roughly 95% of its production coming from smallholders. The cocoa farmer population is ageing, with young people leaving rural areas due to the lack of profitability of farming, the absence of alternative means of livelihood as well as social amenities for the youth. Nevertheless, cocoa is still a fundamental component of the rural livelihoods system, with farmers committed to the crop. Cocoa cultivation is a 'way of life' and farmers are very much attached to the crop socio-culturally.

In accordance with the principle of sustainable production, the general emphasis of recent and on-going cocoa studies in the region is on stimulation of intensification of existing cocoa production rather than clearing new ground. However, there has not been any culture of returning to the soil what has been taken away in terms of agricultural output. Main production constraints mentioned in relation to crop health are mirids, black pod, cocoa swollen shoot virus (CSSV) and mistletoes. Labour is costly and often unavailable when needed as a consequence of urban migration, and thus activities such as weeding and pruning may be neglected.

[1] Throughout this document, 'pest' stands for any organism that causes crop injury, including diseases, weeds, etc.

In West Africa, low farm-gate prices are caused by complex marketing systems with many intermediates (middlemen) and significant taxation. Various land tenure systems further constrain farmers' incomes. Wider objectives of development programmes therefore have to focus on the improvement of cocoa farmers' incomes. Due to removal of subsidies, farm input costs are high which farmers regard as the main cause for low income. Lack of rural credit and its high price further constrain farmers to purchase inputs.

Lack of implementation of generally known crop management practices by farmers also shows the need for additional extension activities. Current extension services are often de-motivated due to reduced capacity and poor pay. Research - extension linkages are generally weak. Additional extension could work well through farmers societies with specific roles for farmers (farmer-led extension). Extension messages should provide farmers with the correct information to make their own judgements rather than try to change farmers behaviour.

The above West African background information, gathered in an analysis of socio-economic and other studies on cocoa production in the West African region (Vos, 2000a), leads to the conclusion that enhanced sustainability can only be achieved through an improvement of farmers crop management knowledge through a farmer-participatory training model, accompanied by other activities to alleviate labour constraints, low farm gate prices and to allow access to credit. Linking in with existing or new co-operative initiatives is perceived to be strongly desirable.

In Central / South America and Asia, much of above background information applies. Special projects are carried out to strengthen extension with the ultimate goal to improve farmers' livelihoods in a sustainable way.

An example of a large-scale extension project is the EU cocoa development project in Ecuador (1996 – 2000), which focused on group training events in association with validation and demonstration plots in distinctive ecological zones. The focus of the training was primarily to disseminate information and know-how in the areas of post-harvest methods in relation to cocoa quality and phyto-sanitary methods to manage the potentially devastating diseases Frosty Pod and Witches Broom. During the project, almost 8000 farmers were trained.

Another very impressive South American example is the government-funded CENEX (Centre for extension and education, Brazil) success in Bahia, in Brazil, which resulted in the upgrading of cocoa plantations from a production level of 100,000 ton/year in the early 60s to a four-fold production level in the 80s through technology transfer aimed at modernising cocoa cultivation. Training included substitution of planting material with hybrids, improving agronomic practices, management of shade and pests, and introducing soil sampling procedures and fertilising practices. CENEX's mandate is to transfer knowledge through technical assistance, rural extension and formal or informal education in cocoa production, but its approaches are holistic. It aims at diversification to wider numbers of crops and bi-products of cocoa, supports other agricultural enterprises such as animal raising, improves capacity through formal education at technical assistant level at colleges, organises / stimulates the organisation of farmers into co-operatives and looks into land reform issues. Their extension tools include annual farmers' days, meetings, courses, field days, excursions, campaigns, observation or demonstration plots / farms, and various mass communication activities such as special early morning radio programmes and contributions to newspapers, bulletins, folders, posters, etc.

In Asia, reference can be made to the USDA-ACRI-BCCCA-World Cocoa Foundation supported ongoing sustainable cocoa extension services for smallholders (SUCCESS) project in Indonesia, which targets its training to management of cocoa pod borer through proper pruning and frequent harvesting and to crop improvement through fertilisation. In each training village, a *Demplot* is set-up where

Farmer Field Schools[2] are carried out. The field school approach employs non-formal education methods, through which the farmer is facilitated to identify the pest problems on his/her farm, understand pest ecology and experiment with potential solutions. Farmers thus actively conduct research themselves, either together at the project training farm, or by themselves in their own groves. The analysis of the 2001 results show that the cocoa pod borer losses are reduced from average 40 to less than 15 %, and that the pod sizes are improved through better crop management. Having started in 2000, 8,500 farms were covered by the training by the end of 2001. The estimated extra harvest has been calculated at US$ 540 / ha / year (Mumford, 2002).

3. Knowledge transfer and sustainable cocoa production

In complex, diverse and risk prone situations, traditional ways of extension hit the limits. Traditional extension approaches, which accompanied the Green Revolution, were characterised by:

- Technologies developed by researchers on research stations
- Top-down transfer of technology by researchers to extensionists, and from these to the farmers
- Blanket recommendations for large areas

The classical "top-down" view is that innovations are generated by scientists, passed on to extensionists, and transferred to farmers. For many years, scientists and policymakers have put the blame of low adoption rates at farmer level on the poor efficiency of the extension services, due to lack of facilities, inadequate organisation and / or low levels of training. But it is now widely acknowledged that low adoption is firstly due to inappropriate research results, top-down approaches to extension and lack of integration of research, technical training, extension and farming knowledge, viz. farmers' constraints and indigenous technologies.

Since the transfer of technology model of top-down dissemination was largely discarded as not being effective in the early 70s, efforts have been made to develop models of technology development and dissemination that would involve the intended beneficiaries of these processes. The low level of adoption by farmers of the innovations developed by research centres is nowadays perceived as being caused by lack of real "integration" between "generation" and "transfer" of technologies. A cocoa example of integration between research and extension can be found in Ecuador where farmers were associated with a new germplasm collection initiative by INIAP (1998-1999). Not only did farmers respond with enthusiasm, helping INIAP to collect elite trees for agronomic and flavour characteristics within a limited time and budget frame, the project helped to raise farmers' interests in their traditional varieties and improvement of cocoa bean quality. This facilitated subsequent adoption of improved post-harvest technologies.

A cocoa survey in Ghana (Vos, 1999) revealed that farmers' knowledge of pest ecology, pest management, crop nutrition and cocoa product quality were extremely poor, with the exception of those farmers who had been actively involved in on-farm research by the national cocoa research institute (CRIG). Farmers' major problems were the cost and non-availability of inputs (labour, equipment, agro-chemicals). They were well aware of the main extension recommendations on planting distances, levels of shade, pesticide applications, etc. However, implementation appeared poor and farmers are therefore often seen as 'reluctant' to adopt research recommendations. On the other hand, during a vegetable farmer field school evaluation mission in the same country in 2000, farmers who had

[2] Farmer Field Schools are regular farmer group training sessions over a crop season that focus on discovery-based learning and make use of non-formal education approaches.

participated in a season-long vegetable IPM Farmer Field School showed to be adopting Integrated Crop Management (ICM) practices such as pruning and line planting in cocoa, because they now understood the benefits of doing so (Vos, 2000b). The conclusion is that the traditional methods of top-down technology transfer need to be revisited in order to achieve more sustainable production.

Box 1: Some CIRAD experiences in farmer participatory training

The chosen approach is educational and participatory. Based on observations carried out in cotton, coffee or plantain plots, farmers describe what they see: the insects present, damaged plants or wilted leaves. The observations are then transferred to a diagram, which is used as the starting point for an analysis and discussion. They are ultimately intended to incite farmers to make their own decisions, and act in accordance with their observations. It is no longer a matter of using phytosanitary products and following and instructions, but of being able to adapt the response to each type of aggression. According to Moïse Kwa, from CARBAP, "O*nce farmers understand what is happening in their fields, they can interpret the situation. During these training sessions, we help them to parameterise what will enable them to reach a decision".* And such an approach brings instructors face to face with numerous questions they are not used to hearing. Likewise, using a simple magnifying glass was a revelation for some Dominican coffee producers, who were able to see one of the pests they were studying, the Coffee Berry Borer. "*They saw the tiny insect, made the link with the information sheets that had been provided, and related causes and effects"* (Pedro Alcides-Morales, Codocafe).

4. Inventory of on-going research

In West Africa, the traditional model of top-down dissemination is currently being debated at the national research level as not delivering the desired farmers' adoption of novel approaches to pest management: Poor adoption of research outputs through the current extension system were quoted by most leading cocoa scientists (Vos and Neuenschwander, 2002), but without identifying clearly the causes for such low levels of adoption. In response, various activities in the region are being developed to investigate novel approaches to cocoa research and extension. In Nigeria, farmer participatory learning activities are in a testing phase with farmers in pilot areas learning about the principles of pest identification, monitoring and management practices through field schools, demo-farms, radio and television programmes and dissemination of leaflets and posters. In Ghana, the success of farmer field schools in rice, vegetables and plantain has led to an interest in replicating these experiences for cocoa, with an initiative being developed around Kakum National Park focused on farmers' discovery-based learning about ecological cocoa production. In Côte d'Ivoire, farmer field schools are being developed with the industry, focusing on identification of pests and timely application of appropriate products for management. At the recent West African cocoa IPM workshop (Vos and Neuenschwander, 2002), it was decided that these experiences should be exchanged and that a regional effort should be made towards validation of best-bet IPM options with farmers, taking both novel technologies and farmers' current problems and management practices into the equation.

In various countries in Africa, Latin America and Asia, CIRAD developed research and development activities to generate novel technologies. The main lessons learnt in these projects, such as the EU cocoa development project in Ecuador, are as follows:

- Effective extension tools are validation / demonstration plots, field days and workshops, training of farmers on agronomic practices and economic evaluation;
- Training should take a holistic approach to the farming system and include not only crop production technologies, but also marketing, farmers' organisations and capacity building;

- Work programmes must be efficient with clear objectives and include targets, methods, indicators of progress, etc. for all stakeholders.

5. Research needs

In the broad area of ICM, traditional pesticide and fertiliser approaches are still being emphasised in agricultural training institutions in many countries (both developing and developed), leading to a continuation of technology transfer practices in line with the Green Revolution concept. This is despite the recognition that knowledge intensive technologies, such as integrated crop / pest management, are particularly unsuitable in top down dissemination programmes. What will be needed therefore, is a blend of more holistic approaches to problem-solving research, married with a feedback system that would warrant due attention to localised farming community problems and priorities.

In West Africa, since the world cocoa price declined (not taking the recent upsurge into consideration), smallholder farmers have put less effort into it's production, concentrating on the cultivation of food crops instead. Various alternative methods for crop protection, which can be seen as components of more sustainable cocoa production, are currently under development at research institution level: E.g. selection and breeding of black pod and mirid resistant varieties (Ghana, Nigeria, Cameroon, Cote d'Ivoire), bio-control of black pod (Cameroon, Ghana, Cote d'Ivoire) and mirids (Ghana), improvement of cultural practices in the management of black pod and mirids (Nigeria) (Vos and Neuenschwander, 2002). The recently developed cocoa IPM initiative for West Africa calls for a regionally co-ordinated effort towards the most pressing pest problems, whilst farmers are included as partners in testing technologies, to improve the applicability of technologies. Locally validated technologies would then feed into up-scaled farmer training.

In addition, compatibility issues of IPM technologies in organic cocoa production will need to be investigated in a holistic manner, looking into multiple, simultaneous pest control and focusing on the entire cropping system rather than an individual cocoa problem. Again, farmers must be seen as valuable research partners and where possible, pilot farmer training will need to be included in research proposals.

At the same time, socio-economic studies will be needed to better understand local bottlenecks in achieving desired adoption rates of developed technologies. Such studies should focus on understanding the farmers decision making processes, describing the farming systems, including its most important problems and local remedies (Hanak Freud *et al.*, 1996), and understanding the rural society, in order to improve the development of effective research – extension – farmer partnerships.

6. Development needs

In West Africa, the need for farmer participatory training is being acknowledged by a select group of development scientists as well as by some potential donors (BCCCA, STCP). For widespread implementation of such a programme, the buy-in will be needed by all stakeholders, including not only farmers and extension agencies, but also scientists across the board (including resource persons from industry), and national and international policymakers, in order to ensure a conducive policy environment. Stakeholder workshops will therefore be needed to precede pilot site training where curricula will be developed based on best-bet baskets of technologies. Extensionists will have to be

trained in sustainable cocoa production technologies as well as non-formal education techniques. Scientists will need to be trained in farmer participatory approaches in order to play an efficient role in the scientific underpinning of field-based solution development to actual problems. Last, but not least, policy will need to be reshaped to support research and development for plant protection strategies that support international agreements (Agenda 21, Montreal Protocol, Kyoto, Convention for BioDiversity, etc) that protect farmers livelihoods and the environment.

In Central and South America, combinations of on-farm research with farmer participatory discovery learning have been piloted to introduce sanitation of Frosty Pod infected pods for effective management (Peru), whilst such approach would be expected to work as well in Brazil for management of Witches Broom. Key to the success of this approach is the local investigation into epidemiology, cultural practices and economics of pest management to find a science-based method of keeping an aggressive agent such as Frosty Pod in check, whilst taking environmental issues and farm profitability into consideration. Other technical development needs in Central and South America would be in the areas of rehabilitation techniques and grafting, nursery establishment and management and post-harvest processing. Experiences have taught that farmers easily pick-up on adapted post-harvest processing technologies that result in better quality produce than conventional methods of cocoa fermenting and drying. Such training would be most attractive if farmers would be paid a premium price for high quality produce and more appropriate than the buyers' impractical alternative of centralisation of fermenting and oven-drying. A Central American example of an up-scaled farmer participatory training programme is the CATIE / MIP-NORAD coffee experience in Nicaragua, which adapted the Asian model of weekly farmer field school meetings into a crop-stage field school with sessions during specific seasons and/or crop development stages. Farm management is key in this on-going programme, which has thus far trained some 10.000 farming families.

7. Conclusions

Re-education and re-organisation are seen as the most promising way forward for smallholder farmer groups to compete more successfully in the global economy. Both are being addressed in the pilot participatory approaches towards knowledge transfer described in this paper. For efficient implementation, the most important stakeholders will need to support the adaptation of such successful experiences.

Farmer organisations are already in existence in many cocoa producing countries and links are being made with fair trade / organic institutions. It is the experience that such organisations lack training in basic agronomic solutions to pest and other problems, which can be resolved through farmer-driven training programmes conducted by extension or through other mechanisms (e.g. farmer-to-farmer training, field days, mass media), supported by resource persons from research institutions or others.

The problem of low efficiency of extension-type agencies is generally perceived as caused by lack of appropriate funding for training of staff and extension activities and/or inadequate organisational structures. Training programmes will also have to take into consideration the capacity of extension to conduct sustainable farmer training within the national / local policy framework, as well as search for alternative methods to scale-up the transfer of successful training experiences to as many farming communities as feasible.

Efficient feedback from producers to researchers and vice versa is key to appropriate knowledge development. This two-way communication is currently often hampered by researchers' agendas being set by policymakers as well as their traditional education system, which trains agronomists in a single

disciplinary way. There will be a need for training of researchers in farmer participatory approaches for them to become more skilled in their role to support farmer-led knowledge development.

More fundamentally, conventional research and extension systems have never been designed to accommodate multiple feedback mechanisms that allow for two-way communication between all stakeholders involved. The re-designing or re-focusing of such systems does not occur overnight, and can't be achieved through extra funding to continue current systems. Serious attention will be needed for adequate training curricula in participatory and multi-disciplinary approaches both for current and new generations of researchers and extensionists.

Last but not least, without an enabling policy environment and a co-ordinated effort to benefit smallholder cocoa producers, any training programme would fail to sustain itself after project completion. It is up to local and national policymakers to ensure the maintenance of extension budgets, revisit pesticide policies, etc. for a sustainable cocoa economy at the smallholder farmers' level. Linking the policy with consumer stakes, a development need across the globe would be the in-country certification according to the different consumer country guidelines (most importantly US, EU, Switzerland, Japan). National / local policy should consider fair trade principles to ensure premium payments to the producers rather than intermediaries and hereby raising the producers' benefits and interests in a sustainable cocoa economy.

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