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Terms of Engagement: Lessons Learnt from a Comparison of NARS Activities North and South in Sustainable Agriculture

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Abstract

The objective of the paper is to analyse the activities of agricultural research institutions in the development of a more sustainable agriculture. This is done by comparing some lessons learnt in Mexico and in the UK. The contrasts of initial experiences in the UK with some longer experiences in south eastern Mexico allow us to analyse the key components of, and issues arising from, farmer researcher linkages, and to identify common obstacles and some ways forward.

In both cases observed linkages have been developed between agricultural research institutions and farmer groups in order to encourage and facilitate participatory innovation development in the case of Mexico and farmer-led research in the UK case. The ways these linkages have occurred and the methods used to establish them are compared. Identification of some commonalties between the different linkage processes have enabled the construction of a conceptual model the phases of which, are referred to as Appraisal, Convergence, Experimentation, and Reflection.

The attributes of the linkage process model are discussed in terms of its intrinsic features and also in terms of the potential the process has for enabling agricultural research institutions to influence the management of ecosystems.

It is concluded from the comparison of the two processes that optimising the trade-offs between the attributes of a holistic approach, specificity of problem focus, degree of individual's participation, and potential for scaling-up, are important for the achievement of positive impacts on agroecosystem management.

Introduction

Due to the scale and impact of the uptake and use of participatory appraisal and participatory innovation development methods in agriculture by diverse groups and institutions in the South, interest has been shown in the possible adoption and adaptation of these methods in the North (Jiggins, 1994). Tremedous scope exists for the exploration of the complementarity between conventional scientific and farmers' experimentation (van Veldhuizen, Waters-Bayer, Ramirez, Johnson abd Thompson, 1997.)The objective of the paper is to analyse the potential of an alternative approach to research and innovation development by farmers linked with agricultural research institutions for the development of a more sustainable agriculture. We distinguish between participatory innovation development and farmer-led research in

terms of the relative emphasis placed during the farmer / researcher linkage process upon farmer designed and managed experimentation and farmer designed and researcher managed experimentation. When the former is emphasised we use the term participatory innovation development, when the latter farmer-led research.

North/South comparisons of research strategies and modes facilitates the establishment of research networks which help in overcoming the hegemony of Northern research approaches to the potential benefit of famers and researchers in all regions (Alders, Haverkort and van Veldhuizen, 1993.)

Comparing some initial experiences in the UK with some longer experiences in the Mexico allows us to analyse the key components and issues in farmer / researcher linkages, and to identify common obstacles and some ways forward. Firstly, we will describe and compare the contexts of the agricultural systems and the activities of the farmer group / research institution linkages, and then move on to consider ways in which research institutions can influence agroecosystem management.

Contexts Compared

In this section we compare two cases of agricultural systems in UK and Mexico, targeted for research by agricultural research institutions. Boxes 1 and 2 give details of the two contexts of the farmer group / researcher linkages considered.

Four comparison criteria have been selected to contrast the situations encountered in England and Mexico. The two contexts are compared in Table 1, below. Despite the obvious differences between these two agricultural systems we will discuss in following the importance/ function a participatory research approach has in both contexts to create an environment where the different actors/stakeholders can establish a collaborative/collegiate research relationship to negotiate and agree upon a shared research agenda.

Table 1. A comparison of the contexts of two agricultural production systems

Comparison criteria	Semi-commercial maize production - SE Mexico	Dairy production - England
Producer numbers	Increasing	Decreasing
Productivity	Decreasing	Increasing
Main problems	Access to suitable land	Uncertainty of future product prices, quotas & subsidies
	Low prices for products	High input costs
Information sources:		
i. production techniques ii.environmental management	Traditional knowledge (i, ii) NGOs (i, ii)	Consultants (i, ii) Inputs companies (I) Quasi - NGOs (i, ii) Membership organisations (i)

Box 1. Semi-commercial maize production in SE Mexico

This system, known as *milpa*, is a traditional slash-and-burn agriculture with cropping cycles of between 2 and 3 years. Due to the scarcity of fallow areas, innovations incorporating introduced legumes are now being tried that allow a shift towards a permanent cropping system (Gündel and Anderson, 1996).

The Mayan *campesino* (peasant) families have traditionally depended upon the *milpa* to provide their staple food (maize, beans, marrow, etc.). As the soils in the region are very shallow and stony and do not allow mechanisation, the system has remained labour intensive (Anderson and Ferraes, 1997).

At present, the system is suffering socio-economic and ecological crises. *Milpa* production is insufficient to provide for the subsistence of rural *campesino* families. Maize yields are extremely low (750 kg/ha) resulting from the scarcity of land left fallow to propitiate a fertile soil after the vegetation is burned. Fallow periods have shortened from 20 years to a maximum of 5 to 7 years, which results in more weed infestation and lower soil fertility, and consequently, poor yields. As a result of the widespread deforestation of the region rainfall patterns have changed becoming more sporadic and generally less abundant.

Viable production alternatives are not available from national agricultural research institutions. Mexican agricultural policy favours export-oriented and highly productive agricultural systems. Credit, technical assistance and extension services are directed towards modernised agriculture on high potential areas. The *campesino* sector relies upon the natural resources they have access to and their local knowledge in order to adapt their systems to the changing conditions.

In Mexico, as elsewhere in Central America, NGOs have taken important steps to fill the extension vacuum left by the government institutions. Motivated by either the objective to work with the poor and marginalised *campesinos,* or/and the objective of contributing to the conservation of natural resources, they have implemented many projects promoting sustainable land-use practises. Adapting approaches which encourage the information exchange between *campesinos*, the NGOs have partly taken the role of an informal extension service. The technologies promoted in SE Mexico by NGOs are based on positive experiences in Honduras, Guatemala and Nicaragua, where since the '70s the use of legumes as green manure in maize-based systems has contributed to an increase in maize yields and a reduction of slash-and-burn agriculture. Today more than 50,000 *campesinos* in Central America are estimated to use the legume "Mucuna" (*Mucuna pruriens*) (Flores 1996).

Methods Applied

In both the Mexican and UK cases, linkages have been developed between agricultural research institutions and farmer groups. The ways these linkages have occurred and the methods used to establish them are compared in this section. From the comparison it has been possible to conceptualise a model of the linkage process. The model used considers the different aspects of agricultural sustainability important in each context, namely environmental impact in the Northern case and social equity as linked to food security in the Mexican case. As stated by Kaimowitz (1990) models developed for purely technology driven development are inappropriate responses to sustainability questions. The different phases of the linkage process in both cases are referred to as *Appraisal*, *Convergence*, *Experimentation*, and *Reflection*. This linkage model falls within the participatory technology development category as defined by Eponou (1993), as distinct to the linear and chain-link models discounted by Eponou (1993) as inappropriate for sustainable agricultural development.

Box 2. Dairy production in England

The number of dairy producers in England and Wales has halved over the last 20 years to reach a total of 28,033 in 1994. Over the same period, total cow numbers have fallen by 18 per cent. Production per cow has increased on average by 0.9 per cent per year. The net result is that 34 per cent more milk is currently being produced in England and Wales as compared to 20 years ago. Gross margins per cow and per litre are improving for those farmers that are able to remain in the industry (MDC, 1997). Strategies for maintaining a profit making position have included buying milk quota, increasing herd size, improving the genetic potential of the herd, and increasing the quantity and quality of feed intake - largely from bought-in feeds.

Dairy farmers have to pay for all information and advice. The state-run advisory service has been disbanded and government resources are dedicated to funding a research and consultancy institution. Near-market research is conducted by a Trust organisation, the findings of which are available only to its member farmers. The Milk Development Council (MDC), founded in 1995, funds research and development, provides extension information to all dairy farmers and publishes research findings. Dairy farmers have to pay a levy on each litre of milk sold to support the MDC.

Private companies (vendors of external inputs) are attempting to fill the extension/advice gap left by the government agency.

The main problem areas identified in the dairy industry where research institutions are active are: economic feeding of cattle; hygienic and safe food production; productivity losses (reproductive inefficiency, lameness, and mastitis); cattle housing, equipment and environment; and biotechnology tools for genetic improvement.

The conceptual model of the linkage process is illustrated below in Figure 1.

Semi-commercial maize production in SE Mexico: The Autonomous University of Yucatan (UADY) in 1992 initiated a research project with rural communities in Yucatan, SE Mexico, in order to explore together with the *campesino* families alternatives to improve livelihoods based on local resources (Gündel, 1996). The research team considered it important to focus their activities on *campesino* systems as these had rarely been taken into account by other NARS institutions. Information was lacking on the concepts and the strategies for the *campesino* livelihood maintenance so the research was initiated with a series of rapid rural appraisals in order to get insights into the complexities of the agricultural systems and to identify areas for potential innovation development. This phase corresponds to the *Appraisal* phase.

The results of the appraisals revealed the importance of the *milpa* and the homegarden for the *campesino* families, and the desperate need to find alternatives to improve the productivity of these subsystems. The appraisals revealed as well the existence of an important local knowledge of the environment (classification systems for vegetation and soils, ceremonies, etc.).

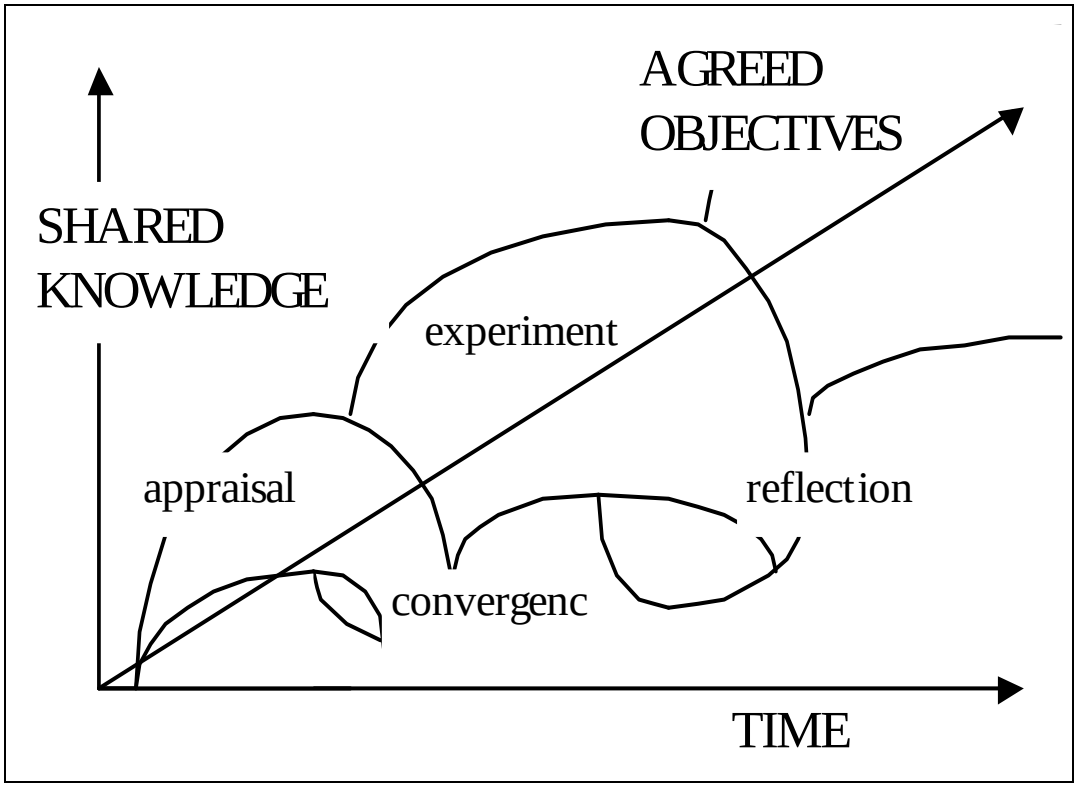


Figure 1. The linkage process for farmer-led research and participatory innovation development

The next phase was one of *Convergence*. Based on the findings of the appraisals the research team discussed with the interested *campesinos* possible management strategies to improve *milpa* productivity and to reduce the deforestation rate. The research team provided information on the use of legumes as green manure in maize production. Exchange visits between *campesinos* collaborating with the researchers and another *campesino* group working with the cover crop system were organised. During the visits not only was information exchanged but also legume seeds were obtained.

The *campesino* group started to experiment with cover crops on a small scale in their own farming system. They modified the new system according to their specific needs, which resulted in variations in the cropping pattern, the species and varieties planted, the mulch management, the sowing and harvest dates, and the use of the crops obtained. This we term the *Experimentation* phase.

Important mechanisms to ensure a joint learning process were the establishment of focus groups for discussion and field observations, workshops with participating *campesinos* from various communities, and further exchange visits. Results were compared between the participants and the *campesinos* established a list of criteria to evaluate the modifications made. These mechanisms provided a phase of *Reflection*.

This whole process is shown diagramatically in Appendix 1.

- The role which the research team took during this process was one of facilitator by:

- creating opportunities to identify with the *campesinos* the constraints, and possible opportunities/solutions, within their farming system,
- providing access to external knowledge, and exchanges between local and external knowledge,
- encouraging the *campesinos* to take control of the experimentation and innovation according to their needs and priorities,
- to provide tools for the *campesinos* to form an analysis and a systematisation process of the findings.

Dairy production in England: In 1996 Wye College, University of London, was approached by the Canterbury Grassland Study Group (CGSG), an informal association of dairy farmers in SE England, with a view to forming a link that would provide the farmers with access to scientific information relevant to their dairying. The inquiry was welcomed by Wye and it was agreed to identify areas of common interest for a collaborative venture.

The first activity proposed was to characterise the CGSG member farms and then to identify the main problems they face (*Appraisal*). This was done firstly by postal questionnaire (farm characteristics), and was followed up by farm visits where semi-structured interviews (history of farm, current problems) were carried out. The responses to the questionnaire and the results of the semi-structured interviews were systematised by the research group. Some of the farmers were then visited again and their information needs were appraised together with their knowledge of information sources. A meeting was then arranged between the farmers and Wye College staff and the information resulting from the previous appraisal activities was discussed. It was agreed that a collaborative research programme would be mutually beneficial. The researchable topics mentioned during the farm visits were grouped, prioritised within groups, and then the groups were sorted into high and low priority by the farmers. The output from this exercise is shown in Table 2., below.

The CGSG/Wye Link then decided to concentrate on the prioritised topics (*Convergence*) and Wye was asked to prepare an outline of a collaborative research protocol which the CGSG members could consider. This was done. A CGSG/Wye Link steering committee was formed. The steering committee reviewed the collaborative research proposal and submitted it to the CGSG members for their approval, which was forthcoming.

At the time of writing the CGSG/Wye Link has agreed to initiate, dependent on funding, several activities (*Experimentation*) which include:

- a farmer designed trial on Wye College Farm to provide a feeding systems comparison,
- trials into high protein fodder production,
- an on-farm monitoring programme designed to provide the information necessary to analyse the interactions of cow genetic merit and management strategy with productivity levels, fertility and welfare status,
- and a review of the feasibility of producing a medium term decision support model for mixed dairy/arable farm management.

Table 2. Researchable topics as nominated, grouped and ranked by dairy farmers (columns are ordered into ascending importance)

LOW PRIORITY TOPICS			HIGH PRIORITY TOPICS		
WELFARE	FORAGES	MANAGE-MENT	FARM ECO-NOMICS	COW NUTRITION	FEED PROTEINS
Lameness	High quality silage	Method for whither height & BCS[a] measure	Whole farm profitability	Nutritional requirement of high genotype cow	Home grown proteins
Cow welfare	Maize silage	Dung & slurry manage-ment	More milk, less fat, stable protein	Energy dense diets	Legume production
Mastitis	Conserva-tion on the farm	Calf rearing systems	Margins per litre through cow productivity	Achieving more persistent yields	
		Dry cow manage-ment - calving problems	Medium term decision support	Fertility problems in high yielders	
			Fixed costs prognosis of changes to mixed farm systems		

[a] = Body Condition Score

Appendix 2 shows a diagrammatic representation of the CGSG/Wye farmer / researcher linkage.

A comparison of both cases in terms of methods used and the degree of involvement of the different actors during the different phases of the process is shown below in Table 3. Criteria have been established to guide this comparison. The order of the actors, farmers group (FG) or researchers (Rs), presents the degree of leadership taken in each activity. The [ ] show where activities have yet to take place.

Table 3. Comparison of the methods applied in two cases of farmer group / researcher linkage.

Linkage phases	Comparison criteria	Semi-commercial maize production - SE Mexico	Dairy production - England
	Who initiated link	Researchers (Rs)	Farmers group (FG)
APPRAISAL	Topics identification methods	Rapid Rural Appraisal, discussion groups	Questionnaires, Interviews and discussion groups
CONVERGENCE	Who chose topics	Rs, FG	FG , Rs
EXPERIMENTATION	Who designed the experiments	FG	FG, Rs
	Site of experimentation	On-farm	On-station, On-farm
	Who manages experimentation	FG	Rs
REFLECTION	Whose evaluation criteria	FG	[FG]
	Who plans further work	FG, Rs	[FG, Rs]

Analysis of Key Components and Issues

Comparing and contrasting the experiences in Mexico and England allows us to identify some of the key components and issues in the linkage process among farmers groups and research institutions. This has been done for each phase of the linkage model and the results are shown in Table 4. The attributes of the linkage process are discussed in terms of the components and issues important at each phase, and also in terms of the potential the process has for enabling agricultural research institutions to influence the management of ecosystems.

Table 4. Analysis of the key components and issues at the different stages of the farmer group / researcher linkage process.

		Semi-commercial maize production - SE Mexico	Dairy production - England
APPRAISAL	Components	Broad initial appraisal - livelihood strategies. Different groups / communities involved. Few other actors present.	Previously established farmers group. Farm taken as unit of inquiry. Business approach. Information sources appraised.
	Issues	Informal inquiry methods. Researcher agenda. Local knowledge valued.	Formal and informal methods. Farmer agenda.
CONVERGENCE	Components	Search for common language. Exchange with other farmer groups. Participatory methods successful.	Participatory methods successful. Technical knowledge shared by actors.
	Issues	Cultural differences between actors. Both actors suggested topics.	Few cultural differences. Farmers suggested topics.
EXPERIMENTATION	Components	Farmers prepared to carry out experimentation. Farmer controlled experiments.	Farmer designed trials. Experimentation started on-station. On-farm monitoring.
	Issues	Risks taken by farmers. Quantification approximate. Conditions recorded, not controlled.	Joint application for funds to industry support body.
REFLECTION	Components	Indicators established. Participatory methods successful. Lead-in to next appraisal phase.	
	Issues	Inter-village exchanges strong; intra-village exchanges weak.	

The characteristics of the linkage process were:

- At each phase of the process in both cases the researchers introduced the linkage methods used (rural appraisal, group meetings, village exchanges and workshops.)
- Both participatory and formal experimentation methods were used successfully.
- The linkage process allowed the establishment of a common language to be developed amongst farmers and researchers - in the case of Mexico this meant using both Mayan and Spanish terms. In this way, cultural differences were bridged and knowledge shared. In the English dairy case, the cultural differences did not exist and language barriers were fewer due to the commonalties between the education and training of both the farmers and the researchers. However, the development through dialogue of a common vocabulary is considered important.

- The linkage agenda was negotiated as part of the *Convergence* phase. Progress in the agenda is symbolised in Figure 1., by the "agreed objectives" axis of the three dimensional diagram. The risks taken by the different actors and the time and resources invested by each was negotiated during the convergence phase and reviewed periodically.
- A full range of research modes were utilised: on-farm research (farmer designed and managed, researcher designed and farmer managed, researcher designed and managed), and on-station research (farmer designed and researcher managed, researcher designed and managed).
- This shows the complementarity among different research modes and the feasibility of combining them to enhance the power of analysis.
- Indicators accessible and useful to the participating farmers groups as well as to the researcher were established in the *Reflection* phase of the Mexican case to analyse the innovative system.
- The process is iterative, the *Reflection* phase leading into the next *Appraisal* phase in the Mexican case, which allows a continuation of the negotiation process between the actors and the inclusion of new aspects which have emerged during the previous cycle, or are introduced by farmers or researchers.

The potential of the described linkage process for joining farmer groups and researchers in projects to address constraints in specific agricultural production systems is demonstrated by the two cases reviewed. However, the question of how this process contributes to the objective of developing more sustainable agricultural systems remains. To what extent can the process enable agricultural research institutions to influence agroecosystems management on a wider scale? How can the knowledge and interest of an individual regarding a specific problem be linked with other stakeholders interests on farm, community, supra-community (e.g. watershed) and regional levels ?

Questions of sustainability: We respond to these questions by considering four desirable attributes of the linkage process that might appear at first glance to be antagonistic, and therefore require trade-offs to be made between them in practical terms. The attributes are: holistic approach, specificity of problem focus, degree of individual's involvement, and the capacity for scaling-up. We use the two cases reviewed already to illustrate these issues. In Figure 2 the attributes have been positioned as poles on two axes and the Mexican and English cases have been characterised by locating points on each attribute axis forming two kite shapes in the diagram.

Specificity of problem focus and a holistic approach are not complementary where technology development is the principle aim (the UK case). However, as shown in the Mexican case where the first step was a broad appraisal and where technological developments are based upon local knowledge, holism can be safeguarded whilst the farmers' demand for specific technological advances are sought. Holism is hence seen as methodology dependent - treating specific problems in wider contexts. We consider a holistic approach to be important if the farmer group / researcher linkage is to consider sustainability aspects of agroecosystem management and not just agricultural productivity issues. This trade-off between productivity and other properties of sustainability has to be negotiated among the stakeholders during the convergence phase of the linkage process.

Two crucial issues here that fall between the holism and involvement axes are those of gender awareness (integral in holism), and the participation of women (degree of individual's involvement). In the Mexican case, during the first iteration of the linkage process the participation of women once the appraisal phase had been completed was negligible. At this point, the agreed research agenda focused upon the *milpa* - a men's domain. However, in the second iteration women became central participants as homegarden practices - a women's domain - were linked to *milpa* production by the use of cover crop products for family and livestock nutrition. In the UK case, women farmers were part of the farmers' group (CGSG). Despite this the linkage agenda has not yet taken gender issues into account. Again, the gender aspect has to be addressed as part of the negotiation taking place during the convergence phase.

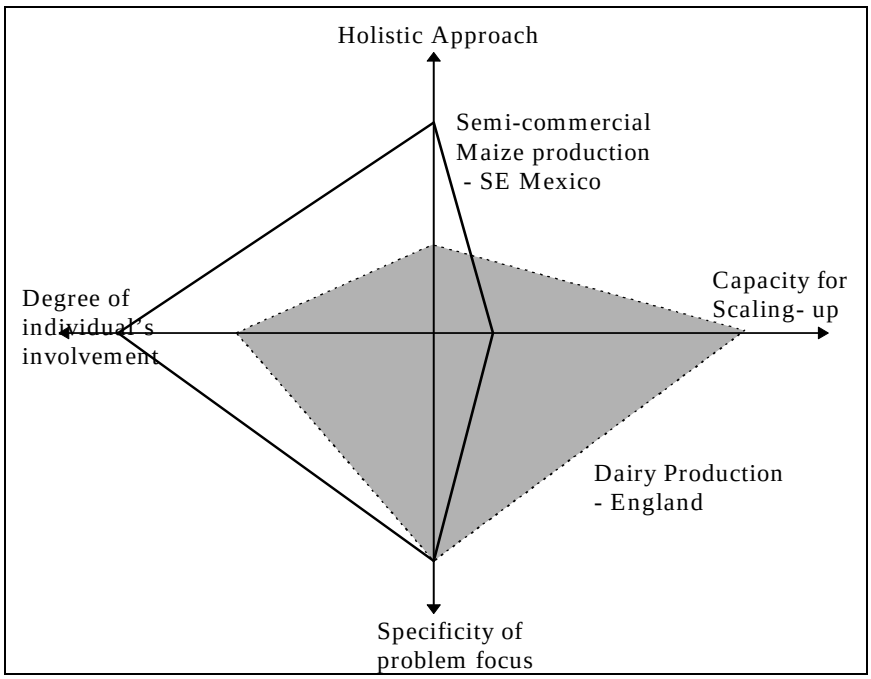


Figure 2. Comparison of the two linkage processes in terms of the achievement of four sustainability attributes

In the both cases reviewed here, the sustainable management of agroecosystems is an objective proposed by the researchers. It was shown in the Mexican case during the *Convergence* and *Reflection* phases of the linkage process, that food security and income generation objectives were of first priority to the farmers, whereas researchers stressed the importance of a sustainable management of the natural resources. However, during the linkage process it became obvious that both objectives could be tackled with the proposed innovation. We can see from Table 2, that sustainability issues such as environmental impact and animal welfare were present but low down on the farmers group agenda. As the linkage process proceeds through further iterations of the spiral, it will be up to the researchers to raise the profile of these issues.

Scaling-up: Figure 2, demonstrates a significant difference between the two cases in terms of the capacity for scaling-up. The high degree of individual's involvement may be lost through

attempts at increasing the numbers of people (stakeholders) involved without sufficient recourse to time and operatives (researchers). In the Mexican case, scaling-up was not attempted until links with the NGO sector had been established and thus the process is multiplied across farmer groups rather than increasing the numbers of farmers in each group. In the UK case, the capacity for scaling-up is high due to the organisation of dairy farmers into formal associations and the existence of national support bodies which provide potential information uptake pathways.

The aspect of scaling-up the linkage process in terms of the total number of people involved as well as the number of different stakeholder groups included with different interests and problems, is of paramount importance for a sustainable management of agroecosystems because of the following points:

- the net impact of the different individual farmers management strategies on the sustainability on the agroecosystem of which they are part can be improved by increasing the number of participants in the linkage,
- some key variables for the sustainable management of natural resources can only be managed at higher levels of aggregation than the farm or the family plot (e.g. management of communal forest areas)
- an early involvement of different stakeholder groups in the negotiation process is required to safeguard the recognition of different interests of the groups regarding natural resource use. Conflicts amongst stakeholders have to be discussed as an integral aspect of the iterative research process.

It is important to clear about what we mean by “scaling-up.” Do we mean taking things from the grassroot level to different spheres within the hierarchies of the social systems of agroecosystems ? Or do we mean multiplying the numbers of actors involved and hence widening the impact of participatory innovation development or farmer-led research. The first is perhaps “scaling-up” whilst the second might be described as “scaling-out.” Both are valid and both contain many pitfalls. In Appendix 3, the product of a brain-storming session on scaling-up (from the 1997 St.Ulrich Group meeting in southern Germany) is presented which outlines some of the desirable features of scaling-up and -out, and some of the pitfalls.

Conclusions

Finally we can conclude that:

- Farmer group / researcher linkages have proved successful in the South for providing the basis for reaching common an agenda on topics for farmer-led research and participatory innovation development.
- Important steps in the linkage process are *Appraisal*, *Convergence*, *Experimentation* and *Reflection*. These steps have been conceptualised as forming a model which when applied to agreed objectives can form a spiral of iterative activities.
- The model for farmer / researcher linkages is being tried in the North. From the comparison of findings in the operating of the model in the South and the North optimising the trade-offs between the attributes of holistic approach, specificity of problem focus, participation of all individuals, and potential for scaling-up, have been identified as key components in the facilitation of a positive impact on agroecosystem management.

References

Alders, C.; Haverkort, B. and van Veldhuizen, L. (Eds.) (1993) Linking with farmers: networking for low-external-input and sustainable agriculture. ILEIA Readings in Sustainable Agriculture, Intermediate Technology Publications, UK

Anderson, S. and Ferraes, N. (1997) Campesino agroecosystems: a summary of findings from PRAs in SE Mexico. FMVZ-UADY Mimeo.

Eponou, E. (1993) Partners in agricultural technology - linking research and technology transfer to serve farmers. ISNAR Research Report No. 1. The Hague: International Service for National Agricultural Research.

Flores, M. (1996) Why do farmers go for fertiliser bean? ILEIA newsletter, March 1996

Gündel, S. and Anderson, S. (1996) Innovations within traditional Agricultural Production Systems to improve Family Food Security: Case studies from south east Mexico.(poster presentation) Proc. International Symposium on Food Security and Innovations: Successes and Lessons Learned, University of Hohenheim, Stuttgart, Germany, 11-13 March 1996

Gündel, S. (1996) Facilitating a joint analysis of change - a case study from south-east Mexico. ILEIA Newsletter, December 1996, Vol. 12 No. 3 (p. 16-18)

Jiggins J.(1994) Foreward to Rural and Farming Systems Analysis: European perspectives. (eds) J.B.Dent and M.J.McGregor, CAB International.

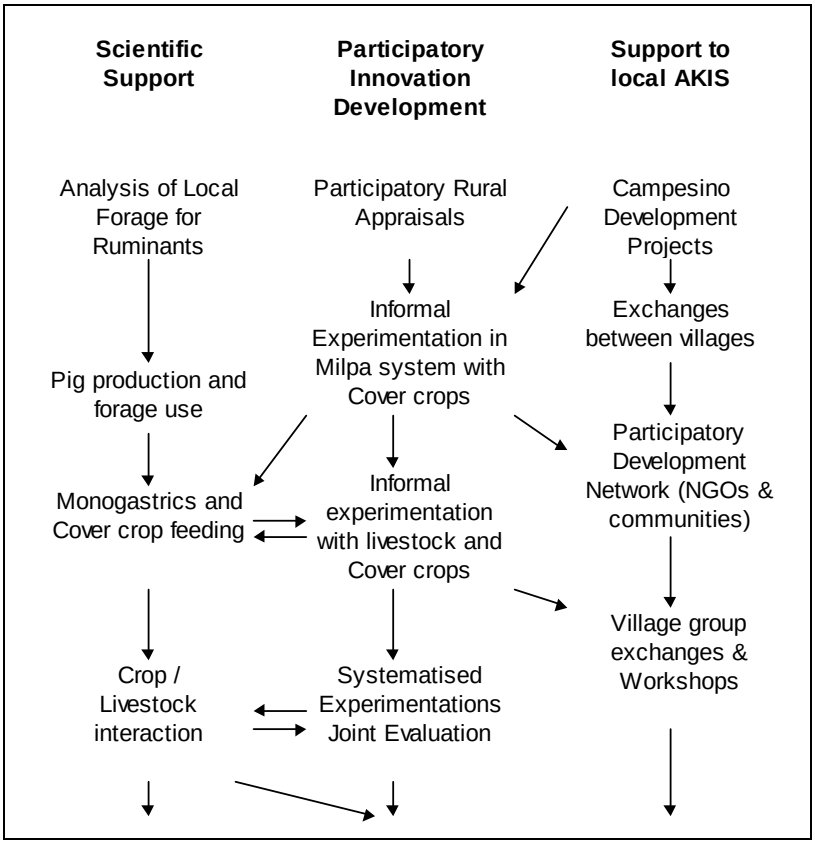
Kaimowitz, D. (1990) Making the link: Agricultural research and technology transfer in developing countries. Published in cooperation with ISNAR, Westview Special Studies in Agriculture Science and Policy, Westview Press

MDC (1997) Planning yourself a secure future - your window on the dairy industry: highlights from Dairy Facts and Figure 1996. Research into Practice Series, Milk Development Council, UK.

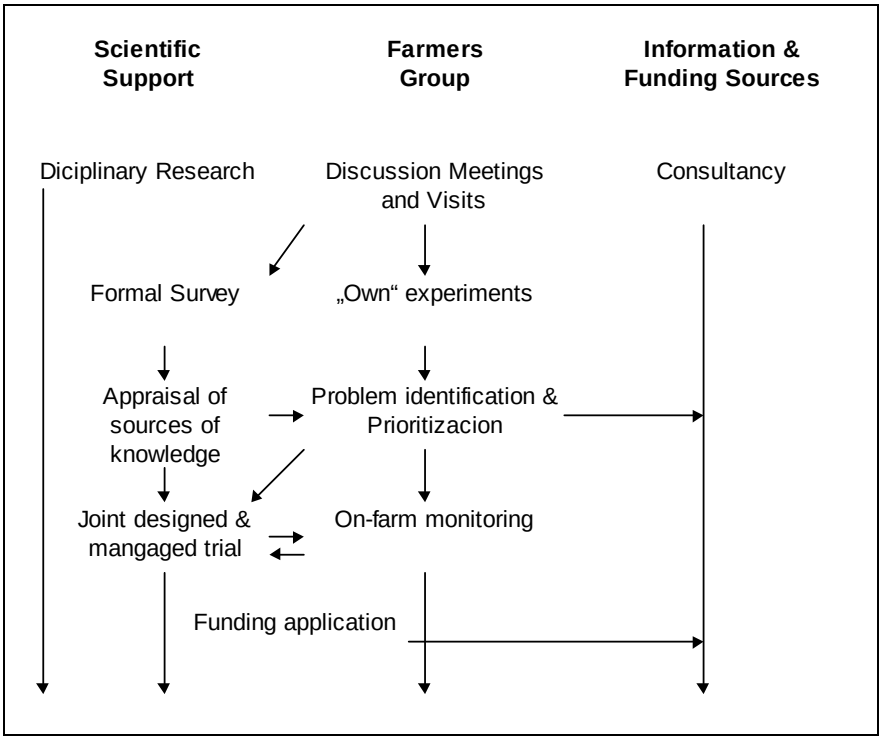
Van Veldhuizen, L.; Waters-Bayer, A.; Ramirez, R.; Johnson, D.; and Thompson, J. (1997) Farmers research in practice: lessons from the field. ILEIA Readings in Sustainable Agriculture. Intermediate Technology Publications, UK

Werner, J. (1993) Participatory Development of Agricultural Innovations. Procedures and Methods of On-farm research. Schriftenreihe der GTZ, No. 234; 1,21,85

Appendix 1 Participatory Innovation Development Process in Yucatan, Mexico



Appendix 2 The Farmer-Led Research Approach in South East England



Appendix 3 Issues in scaling-up Participatory Innovation Development (PID)