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# **FARMER PARTICIPATORY RESEARCH IN CONSERVATION TILLAGE; APPROACH, METHODS AND EXPERIENCES FROM AN ADAPTIVE ON-FARM TRIAL PROGRAMME IN ZIMBABWE**

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## **ABSTRACT**

A farmer-centered research approach was chosen to test and further develop conservation tillage systems under smallholder farmers' management. The approach is based on active farmer participation.

The research concept consists of testing one new technique (tied ridging) in comparison to the traditional technique (moulboard ploughing) and analysing the results from a farming systems perspective.

A methodology to activate farmer participation was developed and implemented in farmer workshops. Farmers, extension workers and researchers were invited for three-day workshops moderated by a local facilitator. Critical awareness raising techniques (based on the philosophy of Paulo Freire) were applied to catalyse participation and to break the hierarchical structure. Methods based on a problem analysis provided for a deep insight into farmers' problem perception and enabled the researchers to better understand the problems.

Group discussions revealed major social problems arising from social change. A leadership and cooperation crisis in rural communities was identified. Related to the trials, a 'social risk' in experimenting was identified: farmers feared being laughed at if a technique were to fail.

The workshop methodology had positive impacts on farmer participation (women's participation in particular), on cooperation among farmers and on the commitment to technology development through self-initiated farmer experimentation. However, farmer participation and farmer-based experimentation have proved to be gradual processes more than methods. Farmers need to gain self-confidence to develop the initiative required to generate their own solutions. Active farmer participation is not necessarily a consequence of a participatory approach, it also requires "participatory" personalities of researchers and extension workers and democratic communication structures in the communities; - factors which are often overlooked but on which the success greatly depends.

The paper concludes that the development and adoption of technical innovations can only be successful if the social environment is supportive and therefore should be complemented by 'social innovations'. It further concludes that with the approach taken, it was possible to obtain scientifically valid data and to link research and extension through 'farmer to farmer' extension.

## **1. INTRODUCTION**

### **1.1. BACKGROUND**

In recognition of serious erosion problems in smallholder areas in Zimbabwe a collaborative conservation tillage project was established between the Department of Agricultural Technical and Extension Services (AGRITEX) and the German Agency for Technical Cooperation (GTZ). The project goal is to test selected animal powered conservation tillage systems with regard to development and promotion of sustainable crop production systems.

The project started in 1988 with the establishment of two research sites for testing five tillage systems on-station (Vogel, 1992). Once the two on-station sites were fully operational, adaptive on-farm trials were initiated in 1990 to interlink technical and socio-economic aspects of agricultural production systems. In 1991 a full setup with 64 adaptive on-farm trial sites in northern and southern Zimbabwe was installed.

A participatory approach was taken for the development of conservation tillage techniques. The paper will describe the approach and some methods which were applied to activate farmer participation. Some major results and experiences on socio-cultural aspects and on the implementation of the participatory approach are highlighted.

## **2. OBJECTIVES, APPROACH AND CONCEPT OF THE ADAPTIVE TRIAL PROGRAMME**

### **2.1. PROGRAMME OBJECTIVES**

The overall objective of the adaptive on-farm trial programme is:

to assess the feasibility of certain conservation techniques under farmers' management, to develop them further and to adapt them to the farming system of smallholders in various Natural Regions.

To reach the programme objective the following sub-objectives have to be achieved and results must be combined and analysed in view of a farming systems approach. The sub-objectives 1 to 6 are listed in a sequence which should be considered as chronological:

1. Assessment of the technical and environmental feasibility of the new technique under farmers' management.
2. Assessment of farmer adaptations to the technique.
3. Assessment of the farming system within its socio-economic environment.
4. Identification of socio-economic, technical and environmental constraints and farmers' priorities leading to an adoption/rejection of the technique.
5. Improvement and further adaptations of the technique with farmers' participation, considering the identified constraints and the adaptations farmers made.
6. Development of an appropriate extension message with a view to effective transfer of the technology.

## **2.2. PROGRAMME APPROACH AND CONCEPT**

### **2.2.1. Overall approach**

The approach is based on the hypothesis that that only the farmers themselves can develop/adapt a technology to their specific needs and requirements.

The trial programme uses adaptive trials on conservation tillage techniques as a basis for farmer participatory research. Smallholder farmers test a new technique (no-till tied ridging, Elwell & Norton, 1988) and compare it to the conventional practice (mouldboard ploughing) in farmer managed/implemented trials. As farmers participate out of their own interest, they provide their own resources (seeds, fertiliser, draught power) and take the major risk involved in the testing of the new technique. During experimentation farmers are expected to adapt the tested technique to their specific needs and their environment.

The first technique to be tested serves as an inspiration to initiate farmers' own experimentation on this technique and on other aspects in crop production found relevant by them. After farmers have become familiar with experimentation, the research process becomes farmer-driven and the role of researchers is to facilitate this process. This role requires a good relationship between researcher and farmer, based on mutual reliability, understanding and willingness to learn from each other. Farmers and researchers monitor and evaluate the results of the farmer experimentation using their own criteria and perspectives and plan a research agenda together before the start of a new season. The interest and the participation required for this process of technology development is mainly generated during farmer workshops.

### **2.2.2. Research concept and methodology**

The research concept and methodology are derived from the six sub-objectives. Only the main points are outlined. The detailed methodology is described in Hagmann, (1992).

Trials are carried out in clusters of eight farm households, located in eight different communal areas in northern and southern Zimbabwe. This provides for a great variety of agro-ecological and socio-economic features influential for technology development. Representative farmers are proposed by the extension workers and collaboration between the farmers and the researchers is envisaged for the whole programme phase.

The general weakness in farmer selection in farming systems research (Merrill-Sands et al., 1989, Ewell, 1988) is applicable in our case as well. A major reason is the desired involvement of several agencies (e.g. extension service, local institutions) whose interests have to be appreciated in order to obtain their participation. A sample drawn on scientific criteria alone would have contradicted a participatory approach in our case. Nevertheless, trial farmers range from resource poor farmers practicing low technology levels to relatively wealthy smallholder farmers with high levels of technology and innovation, both under different soils and climatic conditions. This wide range enables researchers to understand the constraints of the different wealth and technology levels and to formulate extension messages corresponding to those different levels and physical conditions.

Each farmer uses a simple paired treatment design (conventional tillage side by side with tied ridging), testing only one variable (tillage). To allow for collection of reliable labour requirement data, the areas to be covered are at least 0.1 ha per treatment. The major comparisons to be made between the treatments are: yield, soil and water conservation benefits and labour requirements.

The reliability of trial results under farmers' management is increased by the implementation of a set of five paired checkplots (5x5m) at each trial site (see Fig. 1). These plots with the two treatments are closely spaced in order to compensate for high variability in soils and fertility. Yield, soil moisture and soil strength measurements are carried out in the checkplot-pairs which are marked three weeks after emergence, and where plant populations are adjusted as they are to be equal in both treatments. For statistical analysis, each farm is treated as one block and the checkplot-pairs as replications.

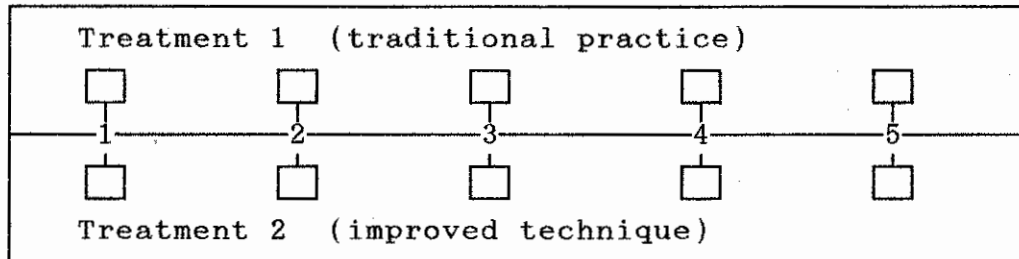


Figure 1: Paired treatment design with 5 plot pairs. The two plots of one pair are closely spaced to avoid high variabilities in soils and fertility.

For the assessment of the farming system within its socio-economic environment, a combined analysis of formal socio-economic surveys, records from informal observations and discussions with farmers during the weekly visits, joint evaluation tours (where farmers and researchers go around all trial sites, present, and evaluate the results) and farmer workshops provide for the required data.

### **3. METHODS TO ACTIVATE FARMER PARTICIPATION AND EXPERIMENTATION**

Active participation of farmers in a trial programme as well as the initiation of farmers' own experimentation are still rather rare in the Zimbabwean context. Therefore, a greater context with a philosophic framework was required to stimulate action and to encourage a change of the presently hierarchical roles of researchers, farmers and extension workers.

In farmer workshops, which were designed to catalyse participation and the spirit of experimentation and to gain a greater understanding of the farmers' problems, such a philosophic framework was introduced in form of the "Training for Transformation" approach (Hope & Timmel, 1984). This training programme was developed in Kenya in 1974, adapted to Zimbabwean conditions by Hope & Timmel (1984) and presently promoted by 'Silveira House', a local NGO. It is based on the philosophy of Paulo Freire (Freire, 1973). Freire developed a pedagogy built on conscientisation through participatory education, where learning is based on experience in the own living world of the actor. Teaching, therefore, consists of problem posing and not on teaching of 'foreign' knowledge and realities. Training for Transformation provides concrete methods to implement Freire's approach and to empower local people to control their lives through active participation in their own development. It stresses the importance of participation and cooperation in organisational development in order to build structures which enable people to become self-reliant. It aims at strengthening people's confidence (e.g. "nobody knows everything and nobody knows nothing") and integrates social analysis to help groups find the root causes of problems (Hope & Timmel, 1984).

In the workshops another principle was added: only through the trying out of ideas and through the development of innovations can farming (and life in general) be improved.

Three-day workshops with farmers (husbands and wives), extension workers and researchers were organised and the moderation was carried out by a local community facilitator, trained in the above described methods.

Participants (maximum 40 people) were invited to a training center where they could fully concentrate on the workshop. Project staff had worked out an agenda and agreed with the facilitator on the implementation thereof. The facilitator encouraged the process of group dynamics and - except for a few technical sessions - moderated the workshop. Researchers, extension workers and farmers took part as ordinary participants.

The workshop programme consisted of four phases. At the beginning there was a 'warm-up' phase to create an atmosphere wherein participants felt free to air their views. In the second phase, participants were to analyse their problems and elaborate solutions. In the third phase the link between farmers' problems analysis and the need for experimentation was identified. The last phase consisted of a workshop evaluation and field demonstrations.

***Phase 1: A 'warm-up' to catalyse participation***

After the objectives and the expectations of the workshops were clarified participants were to be familiarised with key elements of the 'Training for Transformation': communication, perception, feedback/criticism and transformation. The objective was to break down social barriers in communication, to increase self-awareness, openness and to indicate the role individuals should play towards personal and community development.

***Phase 2: Farmers' goals, problem analysis and solutions***

A combination of different methods was utilised to obtain a deeper insight into the farmers' perception and understanding of their socio-cultural environment and of the farming system: definition of a common goal (adapted from Savory, 1991), problem analysis and elaboration of solutions (both elements of the objectives-oriented project planning methodology, GTZ, 1987) and problem ranking (adapted from Crouch, 1991). Participants went into small workgroups for discussions and presented their visualised results in the plenary.

***Phase 3: Clarification and evaluation of the research concept of the trial programme***

The objective of this phase was to create a link between the problems and solutions identified in the previous phase and the need for experimentation to find solutions and overcome some of the problems. The trial programme was put into this context, the research concept and the roles of farmers, researchers and extension workers in adaptive research was clarified. Basic principles of small-scale experimentation were explained. In addition, activities of the previous season were evaluated and a research agenda for the following season was agreed upon.

***Phase 4: Closure of workshop with participants' evaluation and with field demonstrations***

Field demonstrations were carried out to stimulate farmers' ideas and to link the theoretical discussions with practical issues.

The methodology used in the workshops consists of a set of flexible methods (including group discussions, role plays, codes, poems, exercises on perception, etc.) which can be adapted to many different situations and requirements. Some components are also utilised in joint evaluation tours and informal discussions. A more detailed description of the methodology is described in Hagmann et al., (1992).

A total of four workshops were carried out with farmers from seven Communal Lands. Methodology and results presented in this paper are based on the first workshops, held one year after initiation of the trials.

Participation, however, is not only generated through the workshops, but also through farmers' full involvement in the choice of the technology, in the planning

and in the evaluation of the trials and through frequent visits of the researchers on the farms where a stimulating exchange of ideas takes place.

#### **4. RESULTS/LESSONS LEARNT**

The presentation of results and experiences is restricted to the main points in the non-technical fields. Major findings in regard to a problem diagnosis, to farmer participation in the trial programme and to research and technology development are presented. Technical experiences on the conservation tillage system are discussed in Nyagumbo, (1992 & 1993).

The results and experiences emanated from farmer workshops and informal discussions and observations during the first two years of trial implementation in southern Zimbabwe (Gutu, Zaka and Chivi Communal Lands).

##### **4.1. A DIAGNOSIS OF SOCIO-CULTURAL PROBLEMS**

The problem diagnosis is mainly based on the farmers' perception of their non-technical problems which have an impact on technology development. Most of the aspects emanated from the farmer workshops. A combined analysis of the defined goals, the results and discussions of the problem analysis and the elaboration of solutions provided a deep insight into socio-cultural processes as will be shown now. Although some of the social issues were more apparent in the Zaka/Chivi group, discussions in the other groups showed the same underlying patterns and conflicts.

###### **4.1.1. Problems arising due to social change**

###### ***Farmers perceive social problems as more severe than technical problems***

During the early stages of the discussions, problems such as 'lack of knowledge', 'not listening to each other', 'lack of implements' and other, farming-related, problems were often mentioned. However, during problem ranking, 'lack of cooperation' was revealed as a priority problem. Further elaborations indicated that social change is the root cause for most of the social problems arising. The severity of those problems was reflected also in the definition of the farmers' goal as being 'a life in social harmony and in harmony with the environment'.

###### ***Social change causes generation conflicts in the families and has resulted in a leadership/cooperation crisis***

A generation conflict was revealed during long and emotional discussions on 'low rainfall' (Figure 2). One part of the people (mainly the younger and more educated) tried to explain the facts with a 'modern', rational-causal way of thinking (e.g. trees are destroyed, less evaporation...), whereas the older people live in a traditional world of spirituality and spiritmediumship. The elders blame the 'sins' ('not respecting and following the traditional rules') of the younger people for the miserable situation. These two ideologies are difficult to match and as a consequence tensions in the families and a generation conflict arises. The family as a nucleus of society is under pressure due to changing values. This was reflected in problems like 'arguments in the family', 'aggressiveness from children' and 'family members don't listen to each other', etc.

Resulting tensions and conflicts have impacts beyond the families and are about to divide the rural society into two mainstreams: the - mainly younger and more educated - people who want to live a 'modern' life and, the traditional people



who stick to traditional values and rules. As these 'rules' are no longer respected by certain parts of the society, a conflict arises and brings about a change of social structures. Together with an increasing individualisation, this pressure for change creates an atmosphere of mistrust, jealousy and discouragement and as a consequence leads to 'lack of cooperation' (Figure 2).

The change in social structures is further accelerated by stress situations such as unemployment and, as found by Dzingirayi (1992), by drought. Due to the tight economic situation, urban family members were often not able to support their rural relatives with money and food to alleviate the effects of the 1991/92 drought. The network of social security through the family broke apart for the first time and caused major disruptions in the social structure.

These trends have weakened traditional leadership structures and a substitute, being capable of integrating the various social streams and buffering the conflicts, has not been established. Development of new leadership and cooperation, however, is undermined by an individualisation of the society (going along with social change) and by the prevailing hierarchical communication structures. A leadership and cooperation crisis has developed in the rural society resulting in an atmosphere of jealousy and mistrust (see Figure 2.). A solution to this crisis would require a change in attitudes and an identification with a common goal or a common philosophy strong enough to create an endogenous pressure to co-operate.

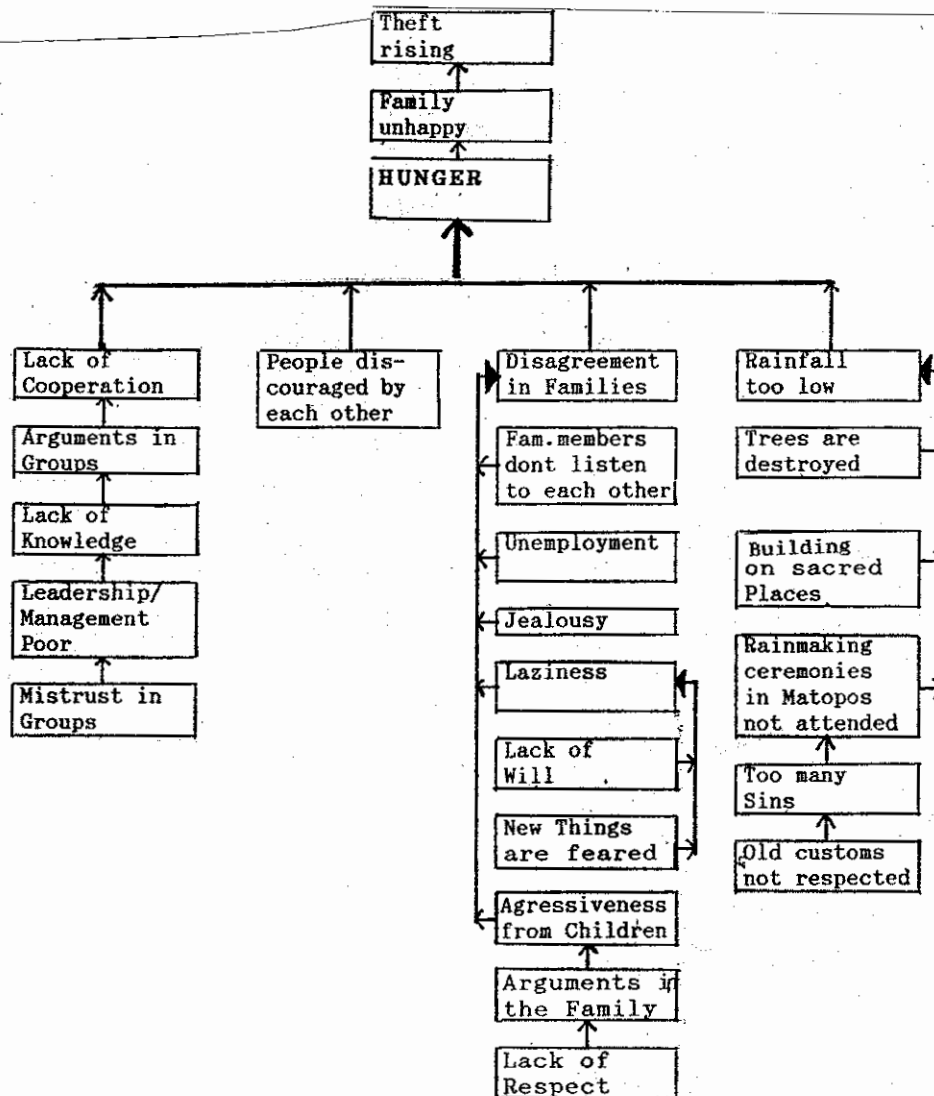


Figure 2: Problem tree (non-technical problems only) as put forward by farmers from Zaka/Chivi Communal Lands. It shows farmers' logic of the cause-effect relationships in socio-cultural issues.



#### 4.1.2. Impacts of social change

***Social problems have a negative impact on development and adoption of innovations***

The tense atmosphere in the communities was given as a reason why 'fear of new things' (see Figure 2.) prevails. Farmers realized the need to generate innovations in order to cope with the change in their environment (due to population pressure, degradation and climatic change), but they are afraid of failures (of 'being laughed at'). In an atmosphere of discouragement a failed innovation attracts all the blame from other people. With a generally negative attitude people prefer to prove that things do not work than endeavour to make things work. A general apathy is the result.

***Leadership and cooperation crisis has negative impact on knowledge transfer and commitment***

Poor leadership/management in groups (Figure 2) was mentioned as being a major reason for the lack of knowledge, as one of the farmers' major expectations from a good leader is acquisition and transfer of knowledge. Some cooperatives were said to be collapsing because only secretaries and chairmen attended meetings and courses and no feedback reached the other members.

A rigidly top-down structured group leadership was indicated by contributions stating: 'people with ideas should also talk to the chairman' or 'leader should respect the members' or 'we should have rights in the groups'. This showed that communication between leaders and ordinary members of groups and cooperatives suffers in the hierarchic structures. This unparticipatory approach creates frustrations and was said to result in the 'lack of will' and commitment (Figure 2.). People do not feel represented by their leaders. Such an atmosphere does not encourage a joint 'learning' process.

***The impact of the leadership and cooperation crisis on resource management is particularly disastrous in communally managed land.***

Despite the severe degradation of the common pool resources, the experience showed that without strong social organisation and leadership individuals are not willing to invest in communally managed land. An evaluation of grazing schemes in one of the trial areas has supported this finding: weak leadership structures were identified as a key factor for failure of the schemes (CARD, 1992).

Environmental degradation on both communally and individually owned lands, further increases pressure for change. An air of discouragement, resignation and jealousy, however, kills off confidence in own capabilities, solutions and in farming as means for sustaining livelihood. It often results in a general apathy and waiting for relief from any 'donor'.

#### 4.2. FARMER PARTICIPATION

During the first two years of trial implementation it was realized that farmer participation is not a method but a gradual process. Constructive participation has to be learned and gradually developed on both sides (researcher and farmer) an experience also found in other cases (Bunch, 1991). A relationship founded on mutual confidence is the basis.

##### 4.2.1. Requirements for an active farmer participation

***Participation and partnership require confident people. A basic requirement to increase participation is therefore development of self-confidence***

Farmers' commitment is required to learn and practise participatory communication structures in their local institutions. In a society which -due to historical reasons- is rigidly top-down structured, where any doubt or contradiction against superiors or formally educated people is 'blasphemous', it is difficult for

farmers to reverse the subservient role and take the initiative. In this respect, participation reaches a social and political dimension.

***Weak communication structure in families requires the family to be addressed as a unit***

Farmers were invited to the research station and introduced to the project with all its activities. Technical issues and desired collaboration were explained. Enthusiasm and commitment emerged, but were undermined by the resistance of the women who had not participated in the visit. In some cases wives were not even informed by the husband about the outcome of the visit and thus boycotted the trial. These weak communication structures in the families were identified in the first year and as a consequence one objective of the farmer workshops was to overcome communication barriers in the families and between researcher, extension workers and farmers. The experience of the first two years indicates that for successful participation the family should be addressed as a unit, without any bias towards men or women. Segregating women and approaching them as a separate group would have resulted in resistance from the men.

***The success of a participatory approach depends largely on personalities of researchers and extension workers and their personal attitudes towards farmers.***

Researchers should have a great ability to empathize, a commitment to share a part of farmers' lives and accept farmers as equal partners. In a society where small-farming is considered the very last resort for people who cannot find a better job this is a real constraint for a - socially high ranked - researcher. Farmers have been looked down upon for decades. Depending on the personalities, this gap in attitudes often cannot be overcome by any training.

#### **4.2.2. Impact of workshops to encourage participation**

***Farmer workshops enabled farmers and researchers to partly overcome the constraints for participation***

Training for Transformation (Hope & Timmel, 1984), in particular, provides a feasible approach to stimulate communication, to bring about a role change, to initiate self-reliant development and to learn participation. As a result of the workshops, participation was boosted and the relationship between researchers and farmers changed into a form of partnership in which feedback and criticism on the tested techniques were voiced openly and without fear. Obviously farmers' confidence was strengthened. This indicates that the approach has addressed the key concerns of farmers and provided the necessary philosophic framework to mobilise them.

***Farmers' commitment and dedication to trying to develop innovations and to co-operating has increased due to the strong involvement of women.***

The workshops took place in September 1992 at the end of the worst drought in a century. In some areas farmers had lost all their animals, had no draught power left and were demoralised. After the workshops trial farmers showed their strengthened commitment by digging tied ridges, even by hoe. In some cases farmers worked together in groups. A major reason for this dedication was that women had started to identify with the trials. In the formal assessment of the impact, women expressed satisfaction in that they were now fully involved in the trials. Their initially negative attitude towards the trials was obviously revised in the workshops and in some cases women have become the driving force. During the weekly visits to the farms women appeared to feel competent and were active in discussions even in the presence of their husbands.

The approach taken in the workshops also had an impact on community activities. As a response to the question on the activities the farmers had undertaken as a result of the workshops, out of 27 participants who were interviewed eight months after the workshop, 8 farmers said that they had self-initiated a club (garden, bakery, broiler, building) with other members of the community. 25 farmers had discussed the workshop with other members in the community. In 10 cases other members wished to join the trial programme. This was reflected du-

ring the weekly visits to the farms when we were regularly approached by people who wanted to join the trial programme or to test tied ridging. Workshops have encouraged farmers to exchange ideas with other members of their communities and to motivate them. The impact on the communities indicates that 'Training for Transformation' has high potential for community development.

A high awareness of the need to cooperate was created during the workshops. In one group it was so strong that, when one member did not work in the fields of the others, all the other members went to work in his field so that he felt ashamed and re-joined the group.

To conclude, the methods which were applied in farmer workshops to encourage farmer participation were highly effective and proved to be substantial in the implementation of the participatory approach.

#### **4.2.3. Constraints in the implementation of the participatory approach with respect to the institutional context**

##### ***Top-down approach practised by the extension workers does not match the participatory approach.***

In the agricultural extension service the participatory approach is favoured and supported by the officers. Field staff (older extension workers and extension supervisors in particular), however, are rather sceptical as they tend to follow a rigid top-down approach. Situations arose, where we encouraged farmer experimentation while the extension supervisor ordered that farmers should experiment only with the approval of the extension worker. In other cases, during evaluation tours, it was revealed that farmers' practical knowledge exceeded the - mostly theoretical - know-how of extension workers. Such incidents make the extension workers insecure and they interpret this active farmer participation as a loss of respect and power, as technical knowledge is their only domain. For better trained staff it is easier to admit to not knowing everything as their larger background provides for enough respect. The clash of the two approaches creates reservations on the part of extension workers as they realize that it needs a change in authoritarian structures to put the farmer in the position of the main actor. Depending on their personality, it is difficult to fully integrate them into participatory research. Their interest in the trials has generally dropped after the workshops.

##### ***A handicap for initiative and active participation is the hand-out policy of various institutions***

Discussions and observations revealed that farmers tend to hand over the responsibility for their lives to other authorities. Whenever severe problems occur, government or 'donors' are expected to help out. These expectations are often met with free hand-outs. The need to maintain or re-establish local community structures which are supportive to sustain a self-reliant survival, is undermined. An example is food aid: farmers reported that traditionally headmen had more land, but were obliged to lend food to kraal members who failed to produce enough. Ever since food relief actions started, the headmen and the whole communities no longer feel responsible to rely on themselves. In discussions, Grosser & Moyo (1993: 22) even found an attitude where not the sustaining of the livelihood was the goal, but the destruction of it: local leaders deduced that *'the earlier the kraal area (village) is desertified, the better; government will then be obliged to resettle us on better and bigger holdings'*.

Participation in self-reliant development and associated experimentation are difficult when trial farmers are receiving free hand-outs from other organisations. It has happened several times already that farmers had been offered a 'better deal' and almost lost them to the 'donor competition'. Such disturbance always requires discussions to convince farmers of the necessity of self-reliance.

### 4.3. RESEARCH AND TECHNOLOGY DEVELOPMENT

To understand the environment in which technology development is carried out, a brief outline of the situation of the technical knowledge in the smallholder sector in Zimbabwe is required.

In Zimbabwe agricultural extension has been very aggressive during several decades (see Madondo, 1992). The extension of plough-based agriculture with maize as the main crop, promoted to replace traditional agriculture since the 1930's by an American missionary (Alvord) (Rukuni, 1990) was so successful that the indigenous farming system was modified to the extent that ploughing is now regarded as the 'traditional' system. Due to the effective extension, indigenous technical knowledge has been largely eradicated and is poor at present. Farmers rely on the extension service which tells them clearly what to do. Research and technology development (even today) is the exclusive mandate of research institutions. Technology development by farmers is looked down upon and has never been as widespread as it is in other agricultural societies.

#### 4.3.1. Farmer experimentation

##### *Initiation of farmer experimentation requires pre-conditions*

Under the conditions described above, it would be unrealistic to expect a sudden change towards initiative technology development through farmer experimentation. This must be considered a process for which - according to our experiences - several pre-conditions must be fulfilled:

- \* the difference between trials and demonstrations must be clarified. In contrast to the well established demonstrations (where farmers are requested to follow the exact recommendations) adaptive trials which require farmers' own experimentation and can imply failures as well are a new concept to farmers and to extension staff. 'Master farmers' in particular tend to be less innovative as they depend too much on the extension worker's recommendations.
- \* farmers must first gain self confidence in their abilities to experiment.
- \* a very high level of participation must be reached to overcome social/hierarchical constraints.
- \* initial stimulation of ideas is required. (It is much more productive to adapt an existing wheel to local conditions than to wait for it to be re-invented).
- \* basic knowledge of methods of small scale experimentation (same technical treatment for new and traditional technique, e.g. planting date, fertilization etc) must be taught.

##### *Farmer experimentation developed in the second year*

The trials started with a tillage system called "no-till tied ridging" (Elwell & Norton, 1988). As a water harvesting system it addresses one of the major problems in crop production in semi arid areas and was therefore considered an appropriate entry point. Farmers tested it, gained self confidence and became more familiar with the approach during the first year. Researchers used the first year to develop close relationships with farmers and to understand the farming system with the prevailing problems and constraints. Real farmer experimentation on the system and on other techniques has only started in the second year after having been stimulated in the workshops and after farmers felt confident.

##### *The 'fear of new things' has decreased*

All the farmers have started their own 'trials' independent from the project and presented them proudly during joint evaluation tours. A total of 36 self initiated 'trials' on 16 farms were counted at the end of the second year. Few innovations (e.g. on the use of implements, planting methods, relay cropping etc) have been generated so far, but participation and the experimental spirit has been steadily

increasing. A major factor in the spreading of farmer experimentation was the exchange of ideas among farmers during the workshops and in joint evaluations. The generally competitive spirit among farmers has supported this process as everybody tries to be innovative. It was a general impression that the new spirit has raised farmers confidence, their moral and their identity of being farmers; all psychological factors farmers need to restore their self-help capacities.

***Farmer experimentation has lead to 'farmer to farmer' extension***

An indication to the strengthened confidence, the initiative and the positive atmosphere which has developed among the farmers was the fact that in one area farmers initiated, organised and carried out a field day for other farmers. They wanted to spread their knowledge and encourage others to try out new techniques. A multiplier effect has started on its own. 220 farmers from the surrounding areas, researchers and extension workers were invited and listened to the trial farmers who proudly presented certain topics of their research and experience. The lively response showed that such an extension by convinced and committed farmers to other farmers is more effective than extension of messages from external agencies; a fact which applies to all farmers, be it small or large scale. This experience shows a similar pattern to that found by Bunch (1991).

**4.3.2. Formal research in farmer experimentation**

***With enough observation and discussions it is possible to match the adaptive research component to quantitative research***

The paired treatment design with only one variable has proved appropriate. Variability in soil and fertility is so high, that reasonable results are obtainable only when closely spaced paired checkplots are utilized. Provided farmers have fully understood the basics of small scale experimentation and provided enough observation during critical times (e.g. planting, harvest) is guaranteed by researchers, checkplots cater for data quality satisfying scientific standards. Data quality in farmer managed/implemented trials without frequent contact with farmers has proved to be highly questionable. The same applies to farmers' records, which are only of reasonable quality if the researcher shows strong interest and requests them on a weekly basis.

***Informal collection of socio-economic data and farmers' problem analysis are indispensable complements to formal surveys in participatory research***

Intensive long term observations of trial farmers (case studies) and farmers' problem analysis have provided a basis for understanding rural dynamics and decision making patterns influential to adoption or rejection of technologies.

***Joint evaluation and planning of the trials enables a link between on-station research and on-farm experimentation***

In mid season evaluation tours, farmers and researchers went around all trial farms and each family explained all their experiments. Discussions among farmers revealed numerous technical and socio-economic features unknown to researchers. Farmers identified problems, exchanged ideas and catered for solutions and advice. A general encouragement of experimentation resulted. Researchers were stimulated to take several farmer innovations back on-station for further research.

In farmer workshops, before the start of each new season, experiments were evaluated and a research agenda for the consecutive season was agreed upon. Farmers were further stimulated by annual visits to the research station.



## **5. CONCLUSIONS AND RECOMMENDATIONS**

From the experience gained during the first two years of the adaptive trial programme conclusions can be drawn on the impact of the social environment on development of innovations and extension messages and strategies.

### **5.1. SOCIAL ENVIRONMENT**

***A positive social environment providing an atmosphere receptive to innovations is the basis for learning about improved technology and adopting it***

Our experience showed that an effective promotion of farmer experimentation as well as promotion of ready-made extension messages does not only require sound techniques but a positive atmosphere and attitudes as well.

***Social problems cannot be solved from outside, but processes can be facilitated***

Society is in transition and must find a new balance on itself. However, this process can be facilitated by the stimulation of methods to overcome existing communication barriers and to strengthen local leadership. An attempt should be made to initiate a community-based 'transformation' process e.g. along the lines of Hope & Timmel (1984). Its long term effects in establishing a social balance and in the encouragement of cooperation among people must be monitored and evaluated.

Institution building on community level going hand in hand with stimulation of democratic communication structures is required to provide a basis for social structures supporting self-reliance, development of self-confidence and to break the vicious circle of discouragement, apathy and donor-dependency.

The experience of the workshops showed that discussions of the problems and their interdependences created an awareness of a strong need to cooperate and of the fact that many solutions are in farmers' hands and can be solved without assistance/donors from outside.

Tackling of these social issues should become a priority for all parties involved in rural development. For adaptive research it is important to consider the 'social risk' that failed innovations can imply in an atmosphere of discouragement. One way to overcome this social risk is to include the entire community in discussions about trials etc., to create an awareness of the necessity of, and to strengthen confidence to develop, test and improve new technologies, implicating failures as well.

***This approach would require a basic change in extension: from technical advice to the facilitation of local institution building and farmer experimentation***

The role of extension workers would be that of facilitators for the strengthening and developing of - the presently poor - local institution/leadership structures in the communities. They should have enough social competence to buffer conflicts arising in and among the groups. The emphasis on technical knowledge would be less than that on the extension of ready made packages currently promoted. The technical knowledge required for promotion of technology development could be obtained by the extension worker and farmer representatives together from research stations and experts directly. This would also ease the pressure to have to know everything.

It is questionable if purely technically oriented extension workers could cope with such a basic change of their position. In the long run, however, as social crisis is likely to aggravate in future, it is questionable whether the segregation between the advising role of extension workers and the social processes can be maintained. Without considering and addressing this social crisis, the goal of sustainable development will remain very vulnerable. Success of technical approaches and innovations will remain limited to certain communities/groups in which the social setting is still functional, e.g. where strong and responsible leaders prevail.

According to the experience gained in southern Zimbabwe it seems that people still have strong roots in the rural society and therefore there is still great opportunity to reconcile the controversial parties in the rural communities under an agreed upon direction of development.

## 5.2. DEVELOPMENT OF EXTENSION MESSAGES

### ***Blanket recommendations are inappropriate for farmers' specific conditions.***

This applies to tillage in particular. Therefore farmers should be enabled to understand technical processes and systems in order to choose and test the most suitable options for their farm and even for each field. The message would then be the experimentation on the options rather than the adoption of single techniques or strict messages.

### ***Promotion of farmer experimentation can result in effective farmer to farmer extension***

Research and extension must play an important role in stimulating farmers with ideas for options in land management and encourage them to experiment on different technologies and to develop their own solutions. Once farmer experimentation has taken off, 'farmer to farmer' extension provides the most successful way of promoting technologies. Farmers could then share the responsibility for extension with the extension worker. It would then be possible to maintain and even strengthen extension in a time where resources of the extension service are decreasing.

### ***Researchers and extension workers should play a facilitator role in the process of experimentation***

They should encourage and enable farmers to adapt techniques to the farmers' needs and to develop new technologies. Assistance in experimenting on their own solutions is required. This will ensure that the messages will correspond to farmers' needs and thus will help to develop client orientated research and extension.

### ***Development of technical innovations/messages should go along with 'social innovations'***

Farmer participatory research and participatory technology development both emphasize technological innovations (Haverkort et. al. 1988, Farrington & Martin, 1987). Considering the social constraints for development identified by farmers, both approaches require complementing by the generation of 'social innovations', e.g. conscientisation, institution building for better farmer organisation and representation etc., a fact equally found by Vel et.al, (1991). Training for Transformation (Hope & Timmel, 1984) has shown high potential in addressing the social concerns of farmers and in complementing the technical side. 'Social innovations' can reach social and political dimensions which go beyond agricultural research and extension, but which are vital if participatory technology development should have an impact.

## 5.3. TRANSFER STRATEGIES AND METHODS

### ***The farming family should be addressed as a unit***

To overcome communication problems in the families and to ensure the same level of information, husbands and wives should be specifically invited to training sessions together.



***Joint learning by experience instead of teaching would be more effective in extension***

The response from farmers to the 'problem-posing' approach in adult training (Freire, 1973) as it has been practised in workshops and in informal discussions has indicated a high potential for the transfer of knowledge. In an evaluation farmers favoured it as it would touch their real concerns and they wished that the same approach would be used in extension training sessions.

***Didactical extension aids for farmers are required to create awareness for options***

It would not be expected from anybody, except from farmers, to adopt a method or a technique without having understood the background and the processes. Great interest in soil and water conservation was created during field days with simple aids demonstrating the processes. Such teaching aids as well as simple handbooks/leaflets on technical options in farmers' language (e.g. site/soil specific conservation tillage options related to farmers' classification of soils) could play an important role in spreading knowledge and initiating farmer experimentation. At present, most of the extension material is meant for extension workers.

#### 5.4. FEASIBILITY OF THE APPROACH

***The approach has shown high potential for technology development and for extension***

Our approach has developed from the initial testing of a technique via technology development to promotion of farmer experimentation. From researchers - mainly trained in single disciplines - this development required a broadening of their scope and familiarising with other disciplines. This, data sets which are often of vague quality, as well as social/hierarchical factors might explain the reluctant involvement of commodity researchers in participatory on-farm research, mentioned in the literature (e.g. Steiner, 1992). The approach and the methods described, however, proved that it is possible to match adaptive research/farmer experimentation with the collection of scientifically sound data. The foundation for success is frequent visits to the farms with discussions, a good farmer-researcher relationship and active farmer participation.

Besides the technical trial results, the methodology enabled an insight to be obtained into farmers' problem perception, the socio-economic and into the socio-cultural environment which is crucial for technology development and which is inaccessible with conventional survey approaches.

***For a large scale adoption of the approach several constraints would have to be overcome***

An adoption of this approach by local research and extension institutions would require major changes in attitudes of the field staff, which would depend on personalities and can therefore not be prescribed but which must gradually develop.

Another constraint is the risk of obtaining data below scientific standards during the first one or two years. This might often discourage researchers from continuing, as they opt for tangible results from the start.

Donations given out by various institutions have proved to be an overall constraint to the approach as they are counterproductive to self-reliant development. As there is no alternative to self-reliance, all institutions and organisations involved in a certain area should apply the same approach, coordinated by one authority.

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