Towards Participation in Technology Development and Technology-Transfer Programmes: A Case from Smallholder Researchers in the Deciduous Fruit Sector in South Africa

Tim Hart
Agricultural Research Council Infruitec-Nietvoorbij
Private Bag X5026
Stellenbosch
7599
South Africa

Abstract

With the 1994 democratic election, the mandate of the Agricultural Research Council (ARC) and its institutes changed to reflect the changes in national agricultural policy, i.e., the provision of services and assistance to all farmers, with a special emphasis on the emerging smallholder farmers and the facilitation of their access to appropriate information and technology relating to sustainable production systems. The inclusion of black smallholder farmers was a new phenomenon for the ARC personnel and required a new approach to service delivery. The ARC personnel were mainly experienced in working with educated white commercial farmers who had access to a diverse range of resources, and who predominantly came from the same ethnic group and therefore had a similar cultural and social background to the researchers. With the change in policy, they were now required to work with farmers who were often culturally and ethnically different and who generally face a number of severe constraints as a result of their being historically neglected by the agricultural research and extension services and restrained by various government policies. ARC Infruitec-Nietvoorbij (one of the institutes of the ARC) focuses on deciduous fruit and vine crops. It attempted to accommodate these changes by adopting a more participatory approach to developing and transferring technology with smallholder farmers in South Africa. Such an approach is known internationally as Participatory Technology Development (PTD). This shift, which is not yet complete, was not without various obstacles and constraints.
Introduction

The Agricultural Research Council (ARC) and the institute ARC Infruitec-Nietvoorbij had to be restructured to accommodate the new clients. Personnel who were willing to participate had to be identified and reoriented by means of training programmes. These personnel at the ARC Infruitec-Nietvoorbij form part of a crosscutting programme known in the ARC as the Sustainable Rural Livelihoods (SRL) Programme. The transformations in the technology development process with the smallholder farmers, a few of the factors that influenced them and some of the constraints are described.

What is Participatory Technology Development (PTD)?

PTD is generally described as a process encompassing “… all forms of interaction that combine the knowledge and skills of farmers with those of outside facilitators in creating sustainable improvements in farming systems” (van Veldhuizen et al 1997: 13). Accordingly, the following PTD framework is suggested:

1. Getting started. This involves establishing contact, allowing the collection of basic information, the clarification of an agenda for and agreement on future collaboration;
2. A situation analysis. Allowing a combined and common understanding of the local constraints and available resources;
3. Identification of activities. Both the outsiders and the farmers look at options to try out or research. This entails the identification of promising solutions or new opportunities for improving agricultural practices;
4. Trying out or experimentation. These activities involve experimenting with and adapting new ideas, which are planned and implemented by farmers who are supported by outsiders. These experiments are designed and evaluated jointly according to previously agreed criteria;
5. The sharing of results both locally and further a-field with other farmers, research scientists and development workers. This is important in that it lets others know what was achieved and how this was done. The sharing process is done largely by means of workshops and farmer-to-farmer exchange;
6. Activities important to sustaining the process that include stimulating local farmer organisations, linkages with farmers and agricultural support services to ensure that the farmer-initiated and directed agricultural improvement is able to continue without the direct support of external facilitation (ibid).

PTD is a process in which researchers and farmers come together to combine their skills and knowledge to develop technology that make sustainable improvements to farming systems. It is preferable that the farmers initiate it but it can be externally initiated as long as it is participatory, empowering and ensures sustainability when the outsiders have reduced their level of involvement (van Veldhuizen et al, 1997). To this end then any externally initiated PTD process must be based on issues that are of concern to the farmers, and are recognised by them as such, to ensure their sustained interest.

Some factors that influenced the movement towards participation with farmers

Initially the researchers at the ARC Infruitec-Nietvoorbij were introduced to smallholder farmers by various non-governmental organisations (NGOs) that had been working with these farmers for a number of years before 1994. One of these NGOs, the Land Development Unit (LDU), trained many of the SRL team members in Participatory Rural
Appraisal (PRA) Tools, giving them the means to communicate with the smallholder farmers. During 1995 researchers only conducted technology transfer activities with smallholder farmers at the request of its NGO partners. In 1996 a Farming Systems Research and Development (FSRD) Coordinator was appointed at the ARC Infruitec-Nietvoorbij and a team was established to provide services to smallholder farmers. This team started getting requests to work in other communities throughout the deciduous fruit producing areas of the Western and Northern Cape Provinces. This exposed the team members more directly to the broader constraints and context in which the farmers were pursuing their agricultural activities. The importance of the social context was realised and an agricultural sociologist was appointed in 2000 to assist with understanding this context.

Since 1995 the manner in which the team members carried out their research and technology development activities has transformed from predominantly on-station trials based on problems identified by the researchers and industry to collaborative on-farm trials, based on problems or issues identified by the farmers. The latter process often developed out of existing projects.

Transformations in the research and technology transfer process
Introducing and adapting existing technology to local environmental conditions

During the past sixty years the ARC Infruitec-Nietvoorbij developed numerous technologies relating to deciduous fruit and alternative crops such as nuts and berries. At the request of farmers and NGOs the need to transfer these technologies to smallholder farmers was identified. Some farmers experienced the following difficulties:

- They were practising inefficient tree and vine management.
- They were using the incorrect pesticides and herbicides.
- Incorrect planting and soil preparation methods had been used.
- The incorrect cultivars had been planted.

The researchers believed that the best method to transfer the correct technology was to demonstrate this to the farmers and allow them to practically experience the cultivation of the trees and vines from planting to the harvesting of the fruit. Demonstration plots were established in a few communities in the Northern and Western Cape at the request of local farmers who undertook to manage and maintain the demonstration plots. In such a project the ARC Infruitec-Nietvoorbij supplies the crops and other agricultural inputs. The farmers supply the labour. The ARC also provides practical and theoretical training in crop production. During the training the demonstration plot is used as the training facility on which the farmers can observe changes and practise techniques.

The size of the demonstration plot is influenced by the following factors:

1. The needs of the farmers with regard to the number of trees or plants required, which is determined from discussions held with the farmers prior to designing the plot;
2. The availability of similar crop species in the area;
3. The availability of land in the area for the purpose of a demonstration plot.

The name demonstration plot is somewhat misleading because the plot also serves a research purpose. The Afrikaans word for a demonstration plot is “proeftuin”. When translated into English this means experimental plot. This suggests that researchers (who are largely Afrikaans speakers) were aware that an element of research was required and carried out on these plots despite the emphasis on training. It is used to determine how well various crops grow in an area and the suitability of the microclimate and physical environment to this
growth. It also serves the purpose of developing new technology with farmers in the area. Such technology development can be prompted by the request of the farmers or by the suggestion of the ARC Infruitec-Nietvoorbij team. These on-farm comparative studies are often conducted in different communities using the same species in order to determine the suitability of a crop across a range of environmental settings. When research is being carried out, the ARC normally bears the cost of the analyses that are required such as soil, water, pests and disease identification. Based on the farmers’ and the ARC team’s observations of the plants on the demonstration plot, the ARC team gives immediate recommendations, where possible. If this is not possible, the information from the demonstration plot is used to inform further research. This information is also used to develop training programmes with the farmers. Information obtained in one area can be used by the team in other areas. The ARC Infruitec-Nietvoorbij has used demonstration plots in the Western, Northern and Eastern Cape Provinces to transfer and adapt technology with local farmers.

Developing technology for farmers

During technology-transfer activities with farmers, researchers have the opportunity to discuss various agricultural issues and needs. Sometimes these discussions can lead to the identification of issues that require research in order to optimise the opportunities that farmers encounter.

While assisting farmers in the Montagu area with their fruit production practices researchers and farmers discussed aspects of fruit storage and local marketing activities. The farmers explained that they stored their fruit in a shed for a few days before taking the weekly harvest to the market. It was preferable to take the entire harvest to the market in one shipment because the price was better and the transportation costs were lower. However, the farmers experienced a problem with this strategy because some of the fruit ripened quicker than others, as it was picked a few days earlier. They realised that a cold storage facility would solve their problem. Unfortunately access to the local facility was impractical because of the cost involved and the relatively small amount of fruit that they were harvesting at the time.

In 1997, engineers from the ARC Institute for Agricultural Engineering and some researchers at ARC Infruitec-Nietvoorbij started designing, building, evaluating and improving an evaporative cooling unit. The design and principles were based on the “evaporative cooling cupboards” used by rural inhabitants in the Northern Cape Province. After on-station trials, an agreement was reached with the Montagu farmers that one such facility would be built on one of the farms they identified and that the farmers would collaborate with ARC Infruitec-Nietvoorbij in carrying out the on-farm trials relating to the use of this facility. These trials and further research will continue until the end of 2002. If the results prove favourable the technology will be distributed to other communities requiring it.

The development of this evaporative cooling unit included long periods of on-station trials. However, it is an example of how researchers attempted to solve a problem identified by smallholder farmers and moved towards consolidating participation in the on farm trials in order to adapt the technology.

Conducting participatory research with farmers

Increasing exposure to the context in which smallholder farmers carried out their practices increased the awareness of the researchers to the constraints and opportunities that
existed in this sector. Of particular interest to ARC Infruitec-Nietvoorbij researchers was the fact that it was impossible for most farmers to establish their own deciduous fruit orchards or vineyards:

- Orchards and vineyards are expensive to establish and most smallholder farmers cannot afford this capital outlay;
- Those who can borrow the money cannot afford not to derive any income from their land for the next three to four years;
- Vegetables provide a regular cash flow for most of the farmers but the rate of return is not as high as that of fruit.

Researchers started to investigate the cultivation of alternative crops, which might be appropriate to smallholder farmers’ agricultural practices and means. In 1997, while other divisions were carrying out research for commercial farmers and processors on the option of the Honeybush plant (*Cyclopia* species) as a commercial crop, researchers within the SRL programme realised that this crop might have potential for smallholder farmers if incorporated into their existing farming system. At this time limited research had been carried out on the cultivation of the crop and there were still some unanswered questions. Researchers held discussions with a number of smallholder farmers and community members in the Western Cape in areas where the Honeybush plant grows and is harvested in its natural habitat. From these preliminary discussions, the following information emerged:

- A number of community members throughout the Western Cape were harvesting the Honeybush plant to sustain their livelihood;
- Natural supplies were gradually being depleted because of excessive harvesting due to the increasing local and international market demand for the plant as a tea;
- It was becoming more and more difficult for the harvesters to reach the plants on the steeper mountain slopes and higher ravines;
- A few of the smallholder farmers indicated that they were interested in planting the crop on a commercial basis;
- One smallholder farmer was actually doing research in conjunction with a retired plant researcher.

During 1998 and 1999, a few trials were started with smallholder farmers in five rural communities. However, by 2000, virtually all of these trials had stopped and the plants had died for various reasons such as neglect, incorrect cultivation practices, climatic conditions, etc. In 2000, the researchers held discussions with some of the farmers involved and it was decided to restart the trials based on further information that had been obtained from the on-station trials during the previous three years.

Friemersheim is a community situated in the Southern Cape District and a few community members had taken part in an earlier Honeybush trial. A group of thirty farmers and community members used the Land Reform Grant of the Department of Land Affairs to purchase a ninety-nine hectare farm in 1999. This farm was subdivided and each farmer received approximately two hectares with the rest being held in trust. In 2000 some of the members of this group decided to start a Honeybush demonstration plot with the ARC Infruitec-Nietvoorbij researchers. As a consequence of the failure of the previous trial in the community it was decided to carry out a participatory appraisal with the farmers. However, this was started at the same time as the demonstration plot was selected and the plants were planted. Preferably, it should have been done before implementation but the researchers wanted to plant before the summer because the plants rely on the winter rainfall for the first
few months. The appraisal process was followed by a planning process, which used the information obtained during the appraisal to formulate plans for implementation and evaluation. The appraisal indicated that Honeybush cultivation could play a role in the current farming system although the ARC Infruitec-Nietvoorbij researchers originally introduced it, i.e. it was externally initiated.

The Honeybush demonstration plot project in Friemersheim involved the same activities that are generally used in demonstration plot projects, such as technology transfer and information exchange. However, in this case it stresses a few other activities:

- It includes a far more predominant research element because of the need to do further research on the cultivation of Honeybush;
- There is a greater exchange of information from the farmers to the researchers because they are participating in the research and are encouraged to contribute their observations and findings with those of the researchers;
- By carrying out a participatory appraisal at the beginning of the process farmers were able to decide if they wanted to get involved and their level of involvement.

In this project participation of the farmers is stressed more than in other projects because they have been actively encouraged to share their knowledge and information. They have also actively participated in the appraisal, the planning of the project and the evaluation steps.

**Incorporating indigenous practices and farmer innovations**

During the participatory appraisal, undertaken by farmers and researchers at Friemersheim in July 2000, the farmers identified the weeds in the area as a threat to virtually all crops grown in the community. The weed causing most of the problems was the ‘uintjie’ or nut-grass. Based on this information and further reinforced by observations that the weeds and weed control practices had been responsible for destroying the Honeybush plants on the demonstration plot a few team members initiated a weed management trial with the farmers who are cultivating Honeybush. The purpose is to develop and test various local and scientific methods of weed management that are the most appropriate, given the local context. The weed threat needs to be controlled before the other cultivation practices can be improved.

The main difference between this research activity and the previous three is that the research topic was identified and initiated by the farmers. While the Honeybush demonstration plot was mainly externally initiated the farmers have taken control of this project and identified areas for local experimentation that they consider important:

- Looking for suitable weed control approaches In early 2002 they identified two further areas for experimentation
- Germination of the Honeybush seeds;
- Comparison of yields and growth rates between a hybrid and a local variety of Honeybush.

This is the first time that Participatory Technology Development in this form has been considered as a serious option in the SRL Programme. The trial includes the use and development of both indigenous and scientific knowledge on the same experimental site. Given the local social, economic and environmental conditions the research aims to uncover which is the most practical and effective weed control method for local farmers. To some extent then, there is already awareness, albeit minimal, that doing research with farmers might have serious merits. There is an impression, based on the increasing interest shown by
farmers in the work facilitated by the ARC in this community, that more of the local farmers are approving of this new approach to research. This is probably because the research addresses local issues that are of immediate concern; the weeds affect them all irrespective of the type of crop and the scale of their agricultural activities. Honeybush production, on the other hand, is probably only relevant to those with enough time, land and adequate finances.

**Opposition to participating in research**

Not all farmers are interested in and willing to participate in research projects, especially those where a significant proportion of research must still be done. As part of the Honeybush demonstration plot project the ARC Infruitec-Nietvoorbij contacted the community of Karwyderskraal and started a participatory appraisal with the interested community members and farmers in late 2000. After a number of problems arose relating to the participation of the community members at workshops and meetings and long delays in putting plans into action, one of the farmers pointed out in January 2001 that it was unfair that the community must be part of a research project in the form of an on-farm trial that might or might not succeed in improving their situation. He indicated that it would be more important if the ARC team offered a project that was based on existing research results and where only the minimum of further research was required. Such research should only relate to local conditions and unexpected issues that might occur during the cultivation of the crop. This is in contrast to the interest shown by the other groups and is possibly explained by the following:

1. This particular farmer and community leader wants to get a community based development project that will benefit all the inhabitants of Karwyderskraal. He is not interested in participating in primary research projects. The need, from the communities perspective, is for immediate development given the current situation and not for research;
2. Farming is the farmer’s and the community members’ primary source of income and they cannot afford to make scarce agricultural resources available for research purposes;
3. The farmer’s initial interest might be due to the fact that he was unclear as to what the process entailed and that given time and further discussions he realised that the goals and requirements were different to his original expectations. This could have been compounded by communication problems and the lack of appraisal data to guide a joint decision making and planning process;
4. There is still a tendency by some farmers to expect the government to supply all the information and other inputs required for agricultural development.

There are also a number of researchers who are not completely satisfied with the participatory approach to research. There is a belief that much of what is taking place with the farmers is not really research and that real research uses traditional (positivist) scientific methods and takes place under completely or optimally controlled conditions. While there is still an argument for research to take place under these conditions and using traditional methods, the following must be recognised:

- Firstly, the farmers must identify the research issue or question if they are expected to participate in the research and use the developed technology – they must need it;
- Secondly, the research activities, including the identification of the research issue, carried out with farmers needs to be participatory if they are to understand the process.
and realise the benefits of the developed technology (PRA tools were developed for exactly this purpose);

- Thirdly, there is nothing to stop the use of the more traditional research methods in a parallel fashion to support and complement the work done on farm. On station trials and laboratory analyses can parallel on farm trials and participatory analysis.

**Conclusion**

To increase the likelihood of farmers participating in agricultural research and development projects, the following points can be drawn from the experiences of the SRL Programme at the ARC Infruitec-Nietvoorbij.

- Agricultural research projects are likely to enjoy more participation and support from the local farmers if they address an immediate and local concern, issue, or livelihood need;
- Farmers should be clearly informed of any research component of a project and must be made aware of the negative and positive implications that such a project might have for them;
- The best way of finding out what these local needs and issues are and to inform farmers of the implications of research is by conducting participatory appraisals and livelihood analyses using PRA tools and qualitative research techniques;
- The participatory planning process is a good way of sharing the expectations of all the stakeholders with one another and ensuring clarity about the purposes, objectives and activities involved in the project;
- Despite the use of participatory techniques not every farmer will want to participate in research or development projects. The use of participatory appraisals and other participatory techniques will allow people to voice their willingness or unwillingness to participate in projects but does not ensure ultimate participation in projects. Research and extension personnel need to be aware of this and be prepared to work with individuals. In fact working with individuals seems to have more success;
- Sometimes the intervention required is outside the role of agriculture and other service agents need to work with the farmers;
- Farmers must be allowed to take control of the research agenda as soon as they are willing to do so, even in externally initiated projects, if they are going to participate in the research in a meaningful manner.

During the transformation of the research process of the ARC Infruitec-Nietvoorbij SRL Programme, participation of the farmers was encouraged to move across a continuum from minimal participation towards full participation with its implications of assuming responsibility and direction.

There seems to be a concerted move towards increasing participation by some of the researchers at the ARC Infruitec-Nietvoorbij.

**References**