Increasing the Impacts from Soil Fertility Research in Southern Africa

Report No. 1

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS
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1. Synthesis

There have been massive investments in agricultural research in sub-Saharan Africa in the last 50 years. Despite this fact, smallholder farmers in this region remain among the poorest people in the world. A major reason for their poverty is that, with few exceptions, these farmers have not effectively adopted many of the technologies and innovations they have been exposed to, probably because they deem them irrelevant or they were not introduced to them in the right manner. Most of these smallholder farmers remain engaged in low intensity production only loosely informed by market opportunities. In trying to break out of this mold to intensify their production and orient it towards promising markets, they confront their own extremely limited resources, an almost complete absence of formal seasonal production credit, difficulty in accessing needed inputs at reasonable prices, and highly variable output prices. The result is that most smallholder farmers are unable to access high value markets and they remain poor.

The research problem is two-pronged. First, while farmers in southern Africa have been relatively responsive in adopting new early-maturing varieties, adoption in improved soil fertility and water management-based practices has remained low. Even if this were to be resolved, the second part of the problem arises from the fact that for many decades, agricultural research in Africa has concentrated on the supply side, pushing farmers to adopt high-yielding varieties but with no concern about facilitating the creation of a vent for the surplus arising from this adoption. It has often been assumed that the invisible hand, a typical characteristic of competitive markets, would operate to facilitate the balancing of the demand and supply market forces for both inputs and outputs. However, given the reality of the African situation – thin markets, dispersed and unorganized farmers, extremely poor infrastructure and underdeveloped market information – it is unrealistic to expect the invisible hand to operate here. Smallholder farmers have therefore remained divorced from markets that are essential for them to remain in business. There is therefore a need to first assess and improve the pathway for technology development and dissemination and then look for practical solutions to address the missing link between farmers and input and output markets.

This project aimed at three objectives which were to: (i) promote the uptake of improved soil fertility and water management-based technologies through identification and assessment of the constraints and challenges that farmers face in the adoption of these technologies; (ii) evaluate alternative extension methods and attempt to link technology adoption and dissemination with improved market support in input and output markets in targeted

communities; and (iii) draw lessons for strengthening the impacts of national research and extension services and share with key stakeholders.

A variety of methods and approaches were used to carry out the different activities to fulfill the project objectives. They ranged from literature surveys to determine the types and kinds of soil water and fertility-based technologies that had been developed in last 20–30 years in the three project countries – Malawi, South Africa and Zimbabwe; carrying out soil water fertility participatory farm trials with farmers to learn about the constraints and challenges farmers face; conducting farm surveys to assess the farmers' perception of participatory methods used by development agents and determining ways in which they could further be improved; carrying out farm surveys to evaluate the uptake of different fertilizer packs and surveys to establish the constraints and challenges faced by farmers in the marketing of their products with specific reference to groundnuts in Malawi. To a large extent, the project engaged the private sector of input and output markets to explore innovative models of strengthening smallholder farmers' access to these markets. This was done by holding focused business dialogues and reaching agreements on initiatives to assist smallholder farmers in accessing input and output markets. Due to a number of reasons (see details in appropriate sections), not all of the aforementioned activities were conducted in all the three countries.

The project developed some interesting findings that can either be applied on their own or can become inputs in subsequent interventions:

1. The review of soil fertility water management-based technologies (soil and water conservation, soil fertility management) in the three countries of southern Africa revealed that many of the technologies developed before the 1980s were not adopted because they were irrelevant and inappropriate for smallholder conditions (Nyagumbo and Rusike 2005; Odhiambo 2005; Kabambe and Kadyampakeni 2005).
2. Participatory technology development and dissemination is beneficial as it increases the chances of sustained adoption through increasing farmers' ability to experiment, query and improve as she goes (Ashby 1990). Farmers revealed having made several adjustments based on labor constraints, ease of application of the technology, and affordability (Pedzisa et al. 2007). However, this is a road still half traveled as there are clearly a number of areas that need improvement in participatory research including more convincing quantification of the value added in attributes such as yield.
3. With regards to efforts to increase farmers' access to input markets, small packs (5, 10 20 and 25 kg) were found to be important for farmers who are beginning to experiment with fertilizer use. About 75% of the farmers who bought the 10 kg pack had less than 5 years experience with using fertilizer and the majority of those who bought 50 kg bags had more than

5 years experience in using fertilizer. In this case, the small packs were used to reduce the risk associated with use because for poor farmers the invested capital would be smaller than the investment needed for a 50 kg bag (Minde et al. 2007).

4. Despite many years of groundnut production in Malawi, farmers were found to be very weakly connected to markets. Poor price information and lack of formal coordination between farmers and buyers were the main contributors of this weak connection. Prices of groundnuts increased by more than 33% within 6 months and price formation was quite crude as groundnut assemblers simply discussed the price they are willing to pay with village chiefs and farmers just have to accept it. This contributes to farmers receiving less than what they would have otherwise realized from the product and they remain poor (Minde et al. 2008).
5. Project efforts were instrumental in building public–private–farmer partnership with the largest success achieved in South Africa (fertilizer availability, distribution and access), followed by Malawi (groundnut marketing), and Zimbabwe (for availability of small packs of fertilizer). Through these partnerships, the industry agreed for the first time to experiment with the production and distribution of small packs of fertilizer to areas where fertilizer had not been available before.

The project results will go a long way in causing real impact in the future. For example, the information on the status of soil fertility and water management technologies in the three countries provides a good basis for gauging the entry points on soil and water management research in southern Africa and in particular in the three study countries. It depicts what has worked and what has not worked and why and sheds light on key factors that need to be considered – farming systems, labor availability, cash availability, and ready access to markets for the product. These reports have a high potential for guiding future investment in the region in soil fertility and water-based technology developments.

The survey results on farmers' perception of participatory agricultural technology development and transfer offered many lessons that can be heeded by researchers and development agencies in making their interventions more rewarding and hence causing more impact. Through this process, for example, farmers were able to provide information about what they consider to be the most important welfare-causing factors – yield increase, access to free inputs, ability to plant on time, etc. Farmers also expressed areas that they thought could improve technology adoption such as providing inputs on time, using bigger plots for trials, and the need to reach more farmers. They also suggested areas in which agents of technology change could improve on. Examples included the approaches, behavior, farmer involvement, tools used, etc.

The project has successfully demonstrated that it is possible to nurture functional and effective public–private–farmer partnerships which can be very beneficial in enabling resource-poor smallholder farmers gain access to input and output markets. Notably, the following relationships were established and they are working: in South Africa, Sasol Nitro, Progress Milling and the Limpopo Department of Agriculture (LPDA) in the supply and distribution of fertilizer; in Zimbabwe, ICRISAT, Zimbabwe Fertilizer Corporation (ZFC) and several NGOs for the supply of small packs of fertilizer to marginal areas. Through these arrangements, Sasol Nitro supplied 96 tons of fertilizer in 2005/06 and 140 tons in 2006/07 in small packs to Progress Milling depots for distribution. ZFC supplied 39 tons of fertilizer in small packs between 2004/05 and 2006/07. To begin with, the private sector may not quickly see the benefits because of low market demand which is characteristic of dispersed smallholders in marginal environments. However, gradually this demand will be created and in the medium and long run there is huge potential for a win–win situation as the market expands because of increased demand, the private sector benefits through increased sales and the smallholder farmers benefit through increased incomes from the higher yields.

Partnership building is a long process and we need to continue with these efforts. The process of building these partnerships has just begun and needs to be maintained. Overall, in the study areas, smallholder farmers were found to have very weak linkages to input and output markets and this defeated the whole purpose of adopting high-yielding varieties. Improvement in market information and empowering farmers to form various types of farmer organizations and hence increase their bargaining power in negotiating with the industry would go a long way in enabling them to get better prices from their produce and increase their incomes and livelihoods.

Key words: *participatory research, linking farmers to markets, building partnerships, southern Africa*

2. Introduction

Southern Africa continues to be severely affected by chronic vulnerability and continuous food insecurity that extends for periods of several years (Haile 2005). For example, since the start of the southern African food crisis in 2001, families, households, and whole communities across the region have been subjected to a variety of natural disasters and socioeconomic shocks, which have undermined their ability to obtain sufficient food and income on a regular basis. The 2001 food crisis left 15.3 million people in six countries (Lesotho, Malawi, Mozambique, Swaziland, Zambia, and Zimbabwe) in need of food aid (FFSSA 2004).

Food insecurity stems from long-term policy failures and declining investments in agricultural research and development, resulting in the inadequate growth and productivity of the agriculture sector (NEPAD 2006). Farmers in southern Africa face many constraints: (i) over-dependence on maize, a moisture-sensitive and therefore high-risk crop; (ii) declining soil fertility; (iii) difficulty in obtaining inputs such as fertilizers and seeds; (iv) water shortages; (v) limited access to new productivity-enhancing technologies; (vi) lack of credit; (vii) inadequate extension services; (viii) weak market integration, preventing the transfer of food from surplus to deficit areas at affordable prices; (ix) insufficient market information; and (x) poor linkages between producers and buyers.

One of the major factors contributing to food insecurity in southern Africa is the existence of long-term environmental threats. Land degradation – a decline in the productivity of crop land, pastures, and forests used in agriculture due to poor land management – threatens food security and will increase poverty in certain 'hot spots'. In southern Africa, soil, water, vegetation, landscape, and local climate conditions collectively influence land productivity (FAO 2004). Damage to these resources decreases the ability to produce crops, grow trees, and support grazing cattle.

HIV/AIDS is another factor threatening the region's food and nutrition security. HIV/AIDS and food and nutrition insecurity are linked through a two-way interaction: AIDS may exacerbate and worsen food insecurity and malnutrition, which in turn may increase exposure to the HIV virus, because the increased food insecurity often results in the adoption of riskier, less healthy livelihood strategies (Verheijen and Minde 2007). These interactions are becoming clearer as research fills knowledge gaps. However, more and better action-oriented research and a shift to learning-by-doing are needed. By mainstreaming HIV/AIDS into food and nutrition-relevant policies, researchers and practitioners are building evidence of what works. As a consequence, learning is enhanced and people are ultimately better equipped to address the multiple threats of the pandemic.

The International Development Research Centre (IDRC) agreed to fund a 3-year project beginning July 2004 with the goal "to improve the water- and nutrient-use efficiency, productivity and incomes of small-scale farmers in drought-prone regions of southern Africa."

The gist of this project was to link the adoption of soil fertility and water-based technologies and high-yielding varieties with the development of factor and product markets. The questions were: what can we learn from participatory technology development and transfer and how can such lessons be applied to improve interventions by researchers, extension agents as well as the private sector which would then involve doing business differently for

the benefit of farmers and other participants? The next stage was also to ask if this "participatory research" is to promote increased adoption leading to increased productivity to what extent can we ensure availability of necessary inputs as well as vent for any market surplus? And how can this be better facilitated so that farmers get more firmly linked to markets?

3. The Research Problem

There are two sides to the research problem. First, participatory technology development has been on board for quite sometime now. However, little is known about how farmers perceive the participatory methods and processes. What and how can we learn from farmers in order to improve on our participatory methods? The more we learn from farmers the more we are likely to improve our knowledge on how to deal with them. The result of this knowledge would be more sustained technology adoption. Second, agricultural technology development and transfer efforts have not correspondingly matched with attempts to link productivity gains to income via markets. It was assumed that once farmers select and adopt the 'best' technologies, they would then automatically be linked to the market through the invisible hand that is supposed to guide the supply and demand forces. With time it has become increasingly clear that in order to translate productivity gains into incomes, smallholder farmers need better access to information and input and output markets. This is particularly true for small-scale farmers who are working on crops without well-defined market links. These farmers are often thinly dispersed making it unattractive for the private sector to move in due to high transactions costs.

Figure 1 depicts a typical journey in agricultural technology development and transfer which starts with participatory identification of constraints facing the farmers followed by their prioritization. On-station and on-farm experimentation then follows and farmers adopt the technology. However, one weakness, which we call a missing link in the figure, is that most smallholders are left alone after this stage with no help in terms of market links. When these links are missing, productivity gains from the improved technologies are shattered.

There has been little research on what market innovations are needed to link research and extension with increasing competitiveness in local, regional, and international markets (Birthal et al. 2005; Delgado 1999). The packaging of the technology, for example, seeds and fertilizer, may not be in a size affordable by low-income smallholder farmers with small farm sizes. It is equally possible that the necessary institutions – such as grading systems, standard weights and measures, legal codes governing rights and obligations

under contracts – may be missing. The price mechanism may not induce individual firms to establish complementary services or procedures because the benefits accruing from such efforts are diffused and are not necessarily appropriate to the innovating firm.

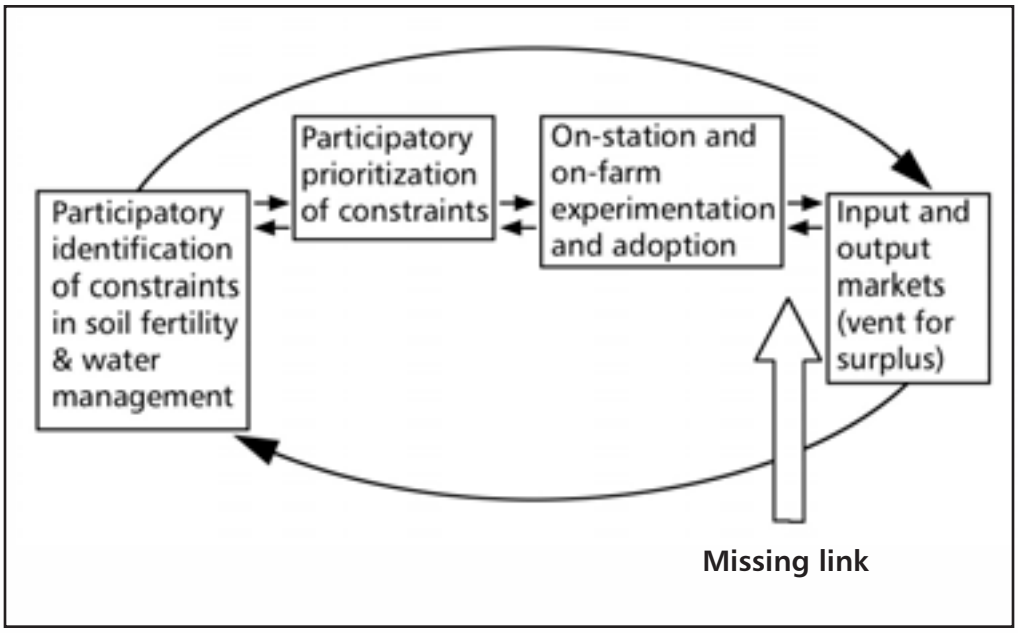

Figure 1. The missing link in the technology development to market continuum

4. Objectives

There were three objectives for this project:

1. to promote improved soil fertility and water management through the design and delivery of diverse technology options suited to the needs of farmers with varying resource levels and farming objectives (this is the way it was stated but slightly changed in the implementation) (see section 5)
2. to speed up the adoption of technological options by testing alternative extension methods and linking technology dissemination with improved market support in targeted communities
3. to draw lessons for strengthening the impacts of national research and extension services

The following section provides the degree of fulfillment of the objectives judged by the project team. Reasons and explanations are also given where some slight alterations were made in the implementation of the objectives.

Objective 1. The initial activity was a comprehensive review of soil fertility and water management research in the three project countries – Malawi, South Africa and Zimbabwe. Elaborate reports are available for this review. The second activity was participatory soil fertility and water management trials conducted in Malawi, South Africa (partially with funds from Australian Center for International Agricultural Development (ACIAR) project), and Zimbabwe (within the Protracted Relief Programme (PRP) supported DfID and spearheaded by some members in the IDRC Project Team). An evaluation of the effectiveness of participatory technology development and transfer was carried out in Zimbabwe with a view to learn from farmers on the improvements that future interventions can make. A part of this project included "design and delivery of diverse technology options suited to the needs of farmers with varying resource levels and farming objectives." Due to changes in project leadership, change in project staff composition and the consequent loss of time in these changes, we ended up not really designing technological options suited to various circumstances. Instead, we evaluated the impact of different participatory approaches and documented the challenges faced by farmers in experimenting with soil fertility and water management-based technologies and determined the nature and level of farmer participation during the implementation of technology development. However, despite these changes, this objective was attained at about 60% level.

Objective 2. In this objective, given the previous activities that had been conducted in the region and especially in Zimbabwe on testing alternative extension methods, this project did a review of these tests to determine which methods work under what circumstances and the reasons thereof.

The main activities for this objective, however, were assessments of alternative models of linking farmers to input and output markets. In this regard, facilitating the provision of different size packs of fertilizer to farmers in South Africa and Zimbabwe was accomplished through the use of a web of key stakeholders in the public and private sector. This was followed by an evaluation of the entire process to determine the merits of different size packs of fertilizer particularly as regards the promotion of the use of fertilizer by smallholder farmers. Identification of constraints and opportunities of linking farmers to product markets was carried out in Malawi. The degree of achievement of this objective can be rated at 70%.

Objective 3. The main activity in this objective was the sharing of the project findings with the research and extension systems among others in the individual countries through well-prepared workshops.

Key stakeholders attending the workshops were research and extension administrators, NGOs, academia, donors and the private sector. At the

workshop issues emanating from the research such as (i) the effectiveness of participatory research, (ii) current status of soil fertility and water management technologies, and (iii) alternative models of linking farmers to factor and product markets were tabled. Participants discussed the agricultural research recommendations and their relevance to date in an open and frank manner. Where current recommendations did not make sense, research administrators agreed to take the issues on board for re-examination. This objective was fulfilled to a level of more than 80%.

5. Project Design and Implementation

The project proposal was developed with an ICRISAT team of researchers who were already working in the field of water, soil, and agro-diversity in Zimbabwe. The proposal was submitted with a view to seek additional resources to consolidate the outputs originally planned for the area of soil fertility and water management; hence the title "Strengthening the Impact of Soil Fertility Research". The types of soil fertility and water management research had a focus mainly on conservation farming and microdosing. It is worthwhile mentioning here that when the term 'water management' research is referred to in the IDRC proposal, in the minds of the research team it meant 'soil water' and not just water. In conservation farming, the management of soil water is a key issue. Also, microdosing, the precision application of small doses of fertilizer to plants, has a bearing on the management of soil water in the sense that even in marginal rainfall areas, application of small doses of fertilizer will enable the plant to escape the effect of drought (Dimes 2007). The team then decided to include three countries in the implementation of this project – Malawi, South Africa and Zimbabwe.

The project was originally under the leadership of Dr Joseph Rusike. However, in August 2005 Dr Rusike left ICRISAT. For a period of about 7 months, project activities were almost at a standstill. The new Project Leader, Dr Isaac Minde, came on board in late January 2006 and started getting involved in project activities by February 2006.

In the process of implementing this project close horizontal linkages with existing projects funded by different donors were established. The linkages were mainly through the sharing of research information. For example, in Malawi, particularly in the first year, there were strong links with International Soil Fertility Development Center (IFDC), National Smallholder Farmers Association of Malawi (NASFAM), ICRISAT-Malawi as well as the Soil Fertility Network of Eastern Central and Southern Africa (SOFECSA), particularly in the review of soil fertility and water management technologies. In Zimbabwe, there were links with the PRP funded by DfID, which has been working on conservation

farming and microdosing. In South Africa, the project maintained links with ACIAR activities, which had been conducting on farm trials on variety × fertilizer × soil water management trials before the beginning of this project.

Apart from linkages with on-going research projects, the project was multi-institutional in orientation – ICRISAT, NARS of Malawi, South Africa and Zimbabwe, farm groups, farmers, processors (RAB Processors of Malawi), Progress Milling of South Africa, Agricultural Seeds of Zimbabwe, TA Holdings, ZFC, SASOL Nitro, and the Limpopo Agricultural Strategy Trust (LIMPAST). The involvement of businessmen and women, research and extension – agronomists, breeders and social scientists – ensured that the team had the necessary disciplines to handle multi-faceted types of issues.

The project also paid special attention to gender by ensuring that instruments such as questionnaires, analytical methods, survey teams, farm household survey supervision were gender sensitive. For example, we had the following females in the field teams: Malawi – Abiba Ngwira; Zimbabwe – Tarisai Pedzisa; and South Africa – Rudzani Mathobo and Jean Simpungwe. In addition, five of the eight interviewers in the South African field survey were women. Admittedly though, the design phase could have been more categorical in ensuring that the gender factor was built in the proposal more strongly. More could have been done in this area.

The project maintained very good links with partners in sharing survey instruments, survey design, and intermediate research products. Our key partners by country were:

Malawi: ICRISAT Country Office, Department of Agricultural Research (DAR); NASFAM, RAB Processors

South Africa: SASOL Nitro, LIMPAST, Progress Milling, and LPDA

Zimbabwe: Agricultural Research and Extension (AREX), now AGRITEX, ZFC, and five NGOs: CRS, CAFOD, OXFAM, World Vision, and CARE.

6. Project Activities

Reading the project proposal one may get the impression that each objective and each activity would be carried in each of the three countries. However, this would not have been possible because the total time required would have been more than the 3 years initially permissible for the project. In addition, it would have been quite complex in terms of project management. Policy and institutional arrangements in some of the countries could not have permitted some activities to be carried out. For example, these were the years when the Government of Malawi was engaged in heavy fertilizer subsidies and it would not have been wise to intervene with a different experiment at the same time

on linking farmers to fertilizer markets. Also, in terms of timeliness, it is not realistic to move from *participatory identification of constraints→participatory prioritization of constraints→on-farm trials→adoption of best situated varieties→ linking these farmers to input and output markets* in each of the three countries. This path cannot be completed in a span of 3 years. It is for this reason that we opted to choose specific countries for specific activities. In South Africa we made use of the earlier interventions of ACIAR which had been carrying out on-farm trials in some selected villages and in Zimbabwe project activities were built on the work of the PRP, funded by DfID, which has been working on conservation farming and microdosing. The lessons learned from each country were shared in each of the national consultative workshops. Table 1 depicts the specific activities of the project which were carried out in different countries with funds from this project.

Table 1. Distribution of activities funded by the project by country

Objective	Activities	Country of operation
1	i. Diagnostic reviews of soil fertility and water management practices, productivity constraints and opportunities for improvement	Malawi, South Africa, and Zimbabwe
	ii. Participatory technology development – trials carried out with farmers	Malawi
	iii. Participatory technology development and transfer: Lessons from farmers	Zimbabwe
2	i. Evaluating strategies for disseminating technical advice on soil fertility and water management-based options	Zimbabwe
	ii. Pilot testing retail trade development strategies for fertilizer	South Africa, Zimbabwe
	iii. Linking farmers to markets – the case for groundnuts	Malawi
3	Stakeholder national workshops to assess project outputs, outcomes and impacts	Malawi, South Africa, and Zimbabwe

Below we describe these activities including the methods used, time dimension and investigators who were involved:

Objective 1

1a). Diagnostic reviews of soil fertility and water management practices, productivity constraints and opportunities for improvement

The objectives were to (i) carry out a review of literature and discussions with key informants (especially current and past research and extension staff) about the origins of current soil fertility and water management recommendations targeted for application by smallholder farmers in Malawi, South Africa, and Zimbabwe; (ii) conduct reconnaissance surveys and focused group discussions among research managers, agronomists, extension agents, fertilizer companies and selected smallholder communities to elicit perceptions of adoption levels and constraints to adoption of soil fertility and water management recommendations in the three countries; (iii) identify strategies and willingness of key stakeholders to invest collaboratively in the implementation of research and development activities to increase the impact of soil fertility and water management technologies.

One to two experts, with MSc or PhD degrees, were engaged in each of the three countries for a period of three months to carry out the work. Due to the size of the area to be covered, South Africa had two separate teams. These reviews were presented at national stakeholder workshops in the three countries to discuss the findings and chart out future directions.

1b). *Farmer participatory soil and water management trials for groundnuts*

This was carried out in Malawi in 2006/07 season using 36 farmers with a view to establish the difference in performance of key groundnut yield components (seed yield and shelling %) between tied and untied ridges. Ridges were aligned at 75 cm apart. Within ridge spacing was 15 cm apart and one seed was planted at each station. These were basically two treatments but with the farmers serving as replicates. Each treatment had 10 ridges. All activities – design, ridging, planting, weeding, harvesting and data collection were carried out jointly by the researchers of the Department of Agricultural Research, Chitedze, Malawi, and the farmers. Weeding was done twice and harvesting was done at optimum maturity; this was signified by brown spot formation on the pods. Data was collected on pod weight per plot and the pods were shelled and seed weight per plot was recorded.

1c). *Participatory technology development and transfer: Lessons from farmers*

The objective was to understand the participatory approaches used in

disseminating various types of technologies and to gauge what we could learn from farmers. Farm level interviews were conducted in two wards of ten districts that were drawn from four provinces in Zimbabwe. A total of 231 farmers who experimented with different versions of conservation farming and microdosing were interviewed for the study. Farmers were observed to have shifted focus from soil conservation options to those technologies that were rainwater-use efficient. The participation of NGOs in technology development at the grassroots level greatly complimented the work of local agricultural extension services especially among poor and vulnerable farmers. The major findings from the study indicate that farmers implemented trials as individuals, using the lead farmer as a reference point. However, those who worked in groups (11%) thought teamwork was very effective and efficient especially with conservation farming. Use of demonstration trials encouraged greater farmer participation and subsequent adaptation of the technologies to suit specific needs. The participatory nature of the process encouraged more sharing among farmers and gave them greater confidence in the technology.

Objective 2

2a). *Evaluating strategies for disseminating technical advice on soil fertility and water management-based options*

The project recognized the numerous dissemination strategies that have been used by various agents and initiatives in the eastern and southern Africa region. It was thought that the project would add value by doing a comparative analysis of the various techniques with the intention to: (i) identify and critique different forms of information communication available in the literature from 1960 to date, (ii) describe communication and information strategies for disseminating technical advice on soil and water management options, (iii) evaluate the extension methods in terms of how useful they are in providing relevant information and how effective they are in providing new knowledge to farmers, and (iv) recommend improvements to be made to the extension methods as a way of overcoming constraints and limitations. Theoretical developments in extension worldwide were reviewed (King 2000). Strengths and weaknesses of various types of media such as leaflets/brochures, posters, field days, radios, filmstrips/slide series, video, drama/songs and storytelling (Scarr et al. 1999) were reviewed. The initial draft raised a lot of debate regarding the pathways to select a particular model. Admittedly this work has a great potential for improvement and would serve a useful purpose to development partners and collaborators in knowing what works and what does not work and under what conditions.

2 b). *Pilot testing retail trade development strategies for fertilizer*

This activity was carried out in South Africa and Zimbabwe. We first describe this activity in South Africa and later in Zimbabwe.

2(b) i. *South Africa*: The motivation for this activity was based on earlier work from fertilizer trials indicating that farmers are likely to have high pay-offs from application of small quantities of fertilizer even under drought conditions (Ayisi 2004). This project attempted to develop a strategy to make small packs of fertilizer available to smallholder farmers in the Limpopo Province first by facilitating the creation of a consortium of relevant partners. The partnership comprised the following:

Limpopo Department of Agriculture (LPDA) – this is a government institution responsible for improving agricultural productivity in the province through research and extension.

Limpopo Agricultural Strategy Trust (LIMPAST) – this is a local NGO supported by Progress Milling with close links to farmers and with a good track record of organizing farmers.

Progress Milling – this is a private company with more than 100 depots across the province and with a large fleet of vehicles that supplies agricultural inputs and collects agricultural produce, mill grain, and delivers mill meal back to the depots. In the process, Progress Milling distributes the fertilizer and stocks them in their depots in the countryside.

SASOL Nitro – this is a private company that among others, manufactures fertilizer. Based on the agreements in the consortium, SASOL Nitro manufactured and packed some of the fertilizer into packs that held less than the traditional 50 kg and sold the fertilizer to Progress Milling for subsequent distribution to depots at an agreed price.

ICRISAT – charged with the provision of international public goods; to this end, ICRISAT provided a facilitating and a coordinating role as well as a monitoring function.

Stocking of small packs of fertilizer (with some fertilizer application information) in some strategic depots belonging to Progress Milling was done. To the extent possible, areas where some fertilizer trials had been successfully carried out through efforts of the ACIAR project were targeted. This was meant to provide an environment of access and affordability to farmers who had been exposed to these technologies so that they could make decisions on their own to purchase and apply the fertilizers. The objective of availing small packs of fertilizer to farmers was two-pronged: (i) to enable farmers with cash constraints to be able to access small packs of fertilizer as opposed

to the conventional 50 kg bags; (ii) to enable first time fertilizer users to begin testing the use of fertilizer by making it possible for them to purchase smaller packs and in the process begin creating a demand for fertilizer. The provision of these fertilizers and evaluation were carried out in South Africa in 2005/06 and 2006/07 seasons using the resources from the IDRC project. The evaluation was done through a farm survey involving 75 farmers in 2005/06 and 180 farmers in 2006/07 in three districts of the Limpopo Province.

2(b). ii. *Zimbabwe*: Initial efforts to supply different pack sizes of fertilizer to smallholder farmers in the marginalized semi-arid areas began under DfID-supported PRP managed by an ICRISAT team. The PRP facilitated provision of fertilizer to selected smallholder resource-limited farmers through arrangements with ZFC in the 2004/05 and 2005/06 season. In 2006/07 resources from this project made it possible to continue with this activity with a view to collect further evidence about the role of different size fertilizer packs and specifically to test the extent to which this process was motivating farmers to begin demanding fertilizer. It is important to note that this technology was linked to the microdosing technique which requires precision application of small quantities of fertilizer and which was also included in the package of technologies promoted by the ICRISAT team in collaboration with a series of NGOs. The process involved engaging ZFC to supply an ICRISAT-determined tonnage of fertilizer in different size packs – 5, 10, 20, and 50 kg. ICRISAT would then distribute this fertilizer to retail shops in specific project villages. Farmers would be informed of the availability of the fertilizer. ICRISAT would set the price as close as possible to the cost price. Because of the seemingly extraordinary market distortions inherent in the country at the time of this exercise, it was very difficult to get reliable data with regard to how the farmer would have behaved without these distortions. For example, ICRISAT would set the price based on actual fertilizer cost and transport but the government would come up at the same time with heavily subsidized fertilizer, almost free to the farmer. In this case, the fertilizer provided by ICRISAT would turn out to be very expensive to the farmer and she would not buy it. The results and implications of the uptake of small packs of fertilizer is handled in section 7.

2(b). iii. *Malawi*: Whereas in South Africa and Zimbabwe the focus was on input markets, in Malawi attention was directed toward the product market. The activity in Malawi is related to diagnosis constraints and opportunities for expanding the groundnut market with specific reference to linking farmers better to markets. The objectives of the study were to (i) identify and assess production and marketing constraints and challenges for groundnuts in Malawi; (ii) explore opportunities and options for more firmly linking

groundnut farmers to input and product markets for sustained adoption and improved incomes. Several research questions were addressed such as: what are the productivity gaps in groundnuts among smallholder farmer groups in Malawi and what are the opportunities for closing those gaps? To what extent are current research efforts tuning and tuned to the farmer and market preferences for groundnuts? What are the key farm household characteristics driving the production of groundnuts in Malawi? How much of the produced groundnuts are consumed by farm households and in what forms? What are the main pathways and magnitudes of groundnut marketing in Malawi and who are the key marketing participants? What are the factors determining the pricing of different types of groundnuts? What are the spatial and temporal dimensions? How can price volatility be minimized? How can price efficiency be improved? What are the export destinations of Malawi groundnuts and the factors determining the direction and magnitude of these groundnuts? And how have these trends fluctuated in the past 20 years? What are the potentials for improved policy and institutional arrangements (formation of farmer groups, farmer associations, collective action enhancement, contracting, etc.) in improving the production and marketing of groundnuts? What is the potential for increased dialogue between farmers and processors and long-distance exporters?

In August of 2006, a farm survey involving 90 smallholder groundnut farmers was conducted along the lakeshore in Malawi with a view to understand production and marketing constraints and challenges. This was followed immediately with a traders' survey. About 30 traders of different commodities were tracked for about one month in the peak of the groundnut marketing season. It was not possible to segregate groundnut traders because usually traders deal with multiple commodities. The interest was to assess the different marketing functions from the farm gate to the trader to the processor or exporter and evaluate the pricing and quality control dynamics including price determination at different levels. An investigation of the policies, rules, and regulations affecting the groundnut trade was also carried out to determine the extent to which they facilitate or constrain the viability of the groundnut sub-sector. The roles of the private sector – wholesale buyers, processors, and exporters – were also investigated by visiting and discussing with prominent firms in Lilongwe about their functions in the marketing chains and to determine areas and ways in which the two could be more amicably linked. The results are reported in section 7.

3). *Stakeholder workshops to assess project strategies and impacts*

One-day national workshops comprising 30–40 participants from a cross section of different stakeholder groups were held in the three project countries

(Malawi, Lilongwe, 8 November 2007; South Africa, Polokwane, 29 November 2007; and Zimbabwe, Harare, 10 January 2008) to discuss project outputs and establish future strategies. Through the presentations, key lessons learned from all the three countries were shared at each workshop. Stakeholders attending these workshops comprised farmers, agricultural research and extension administrators, NGOs, international agricultural research centers representatives, policy makers and the academia.

7. Project Outputs (Results)

This section presents results (outputs) from the project. As these outputs get shared with stakeholders, it is expected that they will make use of them and take an additional step on the impact chain. There were four output or result areas:

The results are organized along the three objectives:

Objective 1

1. Documentation of the development of and the rates of adoption of soil fertility and water management technologies (SFWMT) in Malawi, South Africa, and Zimbabwe

Malawi: A very extensive review of SFWMT covering almost a century, 1907 to 2004, was documented (Kabambe and Kadyampakeni 2005). A number of interesting issues are noted in this review. Over time, there was a very clear shift of focus in terms of the mix of the SFWMT, the type of R&D used and the main institutions involved. It would appear that in the early 1900s there was a lot more emphasis on organic manures than inorganic fertilizers. In terms of drivers of the technologies, in the early 1990s technology development and transfer was essentially the business of the government department of agricultural research and extension. In the 2000s, there are a lot more actors, NGOs as well as international agricultural research institutes. On-station and on-farm demonstrations have been in place throughout the period from the 1900s. Blanket recommendations have been in place since the 1970s. Some sort of area-specific fertilizer recommendations for nitrogen, phosphorus, potassium and sulfur were published by the Ministry of Agriculture and Irrigation in 1999 and went to the extent of making recommendations for maize meant for home consumption and that meant for sale. It is not clear though the extent to which these recommendations were adopted. Today, we believe that the right question to ask in fertilizer recommendations is not how much to apply but how much can the farmer afford. However, the

review indicated that there was more adoption of technologies of cash crops such as tobacco than maize. The review concludes by noting however that the adoption of all the technologies has generally been low due to various reasons. The review provides a list of constraints to increasing technology adoption; the notable reason is due to inappropriateness of the technologies which includes, among others, unaffordability, unfit in the farming system, etc. Water management-based technologies related practices were ridging, flat planting, tied ridging and pot holing.

South Africa: The review on SFWMT carried out by Odhiambo (2005) and Ayisi (2005) focused on the Limpopo Province. During the apartheid, much of this province belonged to the former homelands which means that advancement in agricultural research was relatively limited compared to the more white-dominated provinces where large-scale commercial agriculture prevails. The review classifies the research done according to the institute involved – Department of Agriculture, University of the North, Agricultural Research Council and ACIAR. Specific research on water management was documented. In summary, the reviews noted that smallholder farming systems in the Limpopo Province are characterized by poor soil fertility; very limited research has been carried out to address soil fertility problems in the province. Research results that exist are fragmented and have not been collated or made easily accessible. Recent attempts to address this constraint are based on improving farmers' understanding of soil fertility problems. The major causes of soil degradation include: monoculture maize and sorghum, minimal or no use of external fertility inputs, general lack of awareness among smallholder farmers on soil conservation and degradation and water management research is limited to irrigation schemes. These schemes have suffered major setbacks in the past due to a top-down approach to management. The report recommended using a holistic approach to address soil fertility problems including attention to the habitat aspects of the farming system as well as developing market channels to create economic incentives for smallholder farmers to use mineral fertilizer.

Zimbabwe: This review was carried out by Nyagumbo and Rusike (2005). The review showed that while significant technical research was conducted from the early 1900s to the early 1980s the bulk of this research was not relevant to smallholders in semi-arid areas. The technologies were high-input practices targeted at maximizing biological yield and were a poor fit to small-scale farmers' objectives, investment priorities, opportunities and constraints. Starting in the early 1980s researchers pursued Farming Systems Research (FSR) approaches based on the assumption that there was technology on the

shelf waiting to be transferred and set out to fit the pieces of the technology into farming systems. However, the FSR approach failed to induce widespread adoption of soil fertility and water management technologies because of price, market, input, and policy constraints.

Beginning in the early 1990s researchers and extension agents have pursued farmer participatory technology development. Dissemination is based on the assumption that currently available technologies are a poor fit, participatory research is required to enhance co-learning among farmers, researchers, extension agents, NGO officers, agribusiness managers and government policy makers. Participatory learning and action focus on information farmers use when making decisions to invest in new technologies. They also focused on methods of learning to adjust advice to obtain a workable fit to their evolving circumstances and build capacity for the future and ways to accelerate learning.

Researchers, representatives of farmer organizations, NGO officers, and agribusiness managers reported that the main constraints on technology adoption included poor technical information, dissemination and follow-up to ensure that soil fertility and water management technologies are efficiently applied; non-affordability of technologies because of the lack of agricultural input and output markets for farmers to make profits in growing crops; lack of coordination among farmer organizations, public research and extension organizations, agribusiness firms, NGOs and government policy makers; and lack of financing mechanisms. Respondents suggested that priorities for change be placed on improving the efficiency and evaluating the cost effectiveness of alternative technologies; cost-benefit analysis of alternative dissemination methods; developing models for improving coordination among public research and extension organizations, NGOs, agribusiness firms, government marketing boards and parastatals; and developing agro-dealer networks for delivering technologies and advice linked to producing quantity and quality of products for increasing competitiveness in domestic, regional and international markets.

2. Farmer participatory soil and water management trials for groundnuts (Malawi)

Although the trials involved 36 farmers, good and reliable data was finally obtained from only three farmers. This is because the farmers bulked the harvests from different treatments before taking the data. These results show that water conservation by tied as opposed to untied ridges resulted in increased yield of groundnut (Figure 2). In fact, for two farmers the yields were doubled. On the contrary, the results on shelling % (Figure 3) did not

differ implying that the shelling % was not affected by the moisture regime in this season. In normal circumstances, lack of moisture at pod filling is supposed to lead to lower shelling % due to incomplete filling of the kernels. Therefore, the lack of differences between the treatments may be attributed to the fact that the moisture difference did not affect pod formation.

3. Participatory technology development and dissemination: Lessons learned

The main output was a report that underscored the fact that participatory technology development and dissemination with farmers and participatory learning and action do provide efficient and effective means of adopting agricultural technologies and innovations (Pedzisa et al. 2007). These approaches are also useful in the design of practical and technically sound technologies for soil fertility and water management. Success in participatory technology development came about mainly because of the following characteristics: (i) they work under smallholders' diverse conditions; (ii) they address farmers' priority needs; and (iii) they provide incentives for widespread adoption. This report identified three priorities for change: (i) increasing efficiency through participatory technology development; (ii) building farmers' ability and willingness to experiment, learn, and share technologies; and (iii) improving marketing channels to permit smallholders to turn productivity increases into incomes, thereby creating incentives and generating income to further increase adoption.

The comprehensive ex-post participatory technology development and transfer evaluation that was carried out in Zimbabwe in 2006/07 involving 231 farmers revealed the following:

1. Farmers picked up techniques that they found to be useful and appropriate.
2. Farmers gained more confidence in the use of the technologies with which they had the opportunity to experiment.
3. It was apparent that every farmer who hosted a trial managed to change his/her practices and managed to learn and adapt certain aspects of the technology.
4. Participatory techniques provided farmers a chance to own the process of technology development through their own modifications.
5. Farmers' meetings, shows, and field days were important platforms for showcasing the technology and were efficient ways for farmers to share experiences and knowledge.

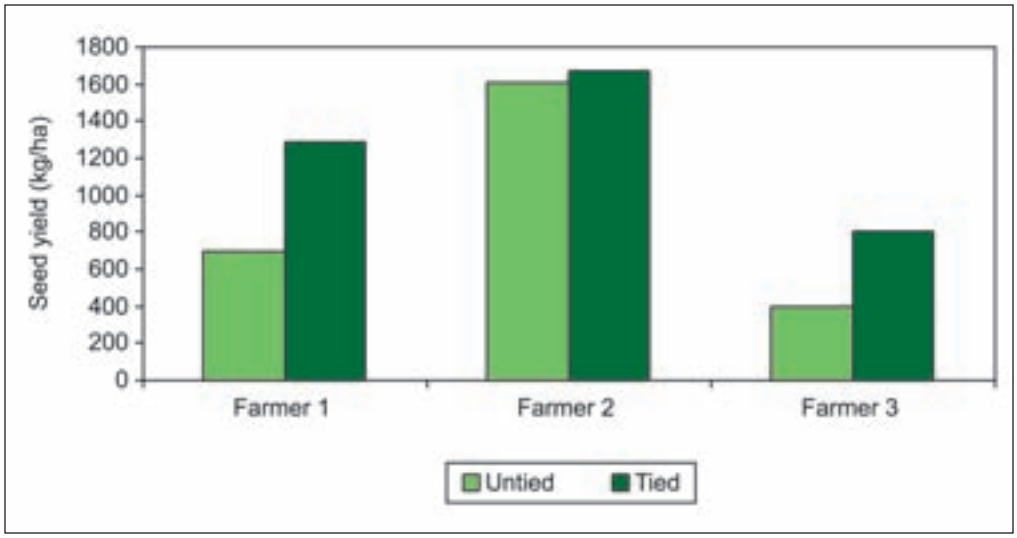

Figure 2. Effect of untied and tied ridges on seed yield of groundnut in Mchinji, Malawi

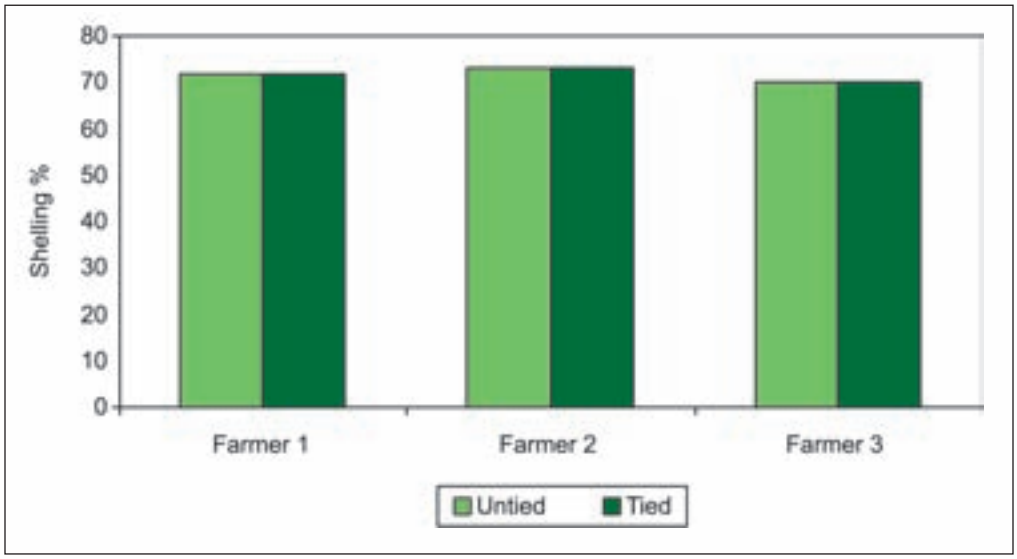

Figure 3. Effect of untied and tied ridges on shelling % of groundnut in Mchinji, Malawi

6. In order to improve participation, more technology options should be made available to farmers and feedback loops are essential to allow improvements and modifications to be made to the techniques.
7. Farmers should be encouraged to work in groups in order to promote group learning and encouragement so as to ensure higher adoption rates and wider discussion and access to knowledge. This survey also depicted the value of participatory research in getting information from farmers that can be used to improve on the technologies being disseminated. Table 2, for example, shows changes that farmers are demanding to be made in trial implementation. A key observation here is that site selection should be centrally placed.

Table 2. Suggested changes to be made during trial implementation

Task	Changes to be made	Number of farmers (n=194)
Site selection	Select site central to group members	25
	Choose plot with poor soils to see impact	6
	Increase spacing for maize	5
	Encourage to work as a group	2
Measuring plot	Use tape measure	3
	Increase spacing for maize	5
	Encourage to work as a group	9
	Pacing is faster than tape measure	2
	Getting assistance from school children who are literate	6
Managing the plot	Encourage to work as a group	30
	Select site central to group members	3
Data collection	Select site central to group members	16
	Modify record book to be in calendar format and in vernacular	13
	Getting assistance from school children who are literate	10
	Extension/NGO to visit frequently as an encouragement	4

Source: ICRISAT survey data: (2006)

Table 3 shows the changes that were made because of hosting the trials and proportion of farmers involved. The point is that there are so many hidden areas that may not be immediately visible as the technology is being developed. However, as soon as farmers are provided with the opportunity to participate and express their views, such concerns are revealed.

Participatory technology development and transfer also enables problems encountered and solutions sought to be widely shared (Table 4). About one quarter to half of the farmers were able to find solutions to reducing a problem; for example, 17 out of 37 farmers who had experienced a problem of stray animals adopted protective fencing as a measure.

Table 3. Adopted changes brought about by hosting trials

	Proportion of farmers implementing the change (%)	
Changes in farmer practice	**Conservation farming (n=194)**	**Microdosing (n=37)**
Use of bottle cap to apply fertilizer	36.1	62.2
Use of fertilizer as fertility amendment	9.8	24.3
Targeted application of plant nutrients	27.3	35.1
Timely planting	17.5	N/A
Minimum tillage	79.9	N/A
Mulching using maize stover	4.6	N/A
Winter weeding	1.5	N/A

Source: ICRISAT survey data (2006)

Table 4. Problems and solutions for the trials hosted

Problems encountered during trials	Number of farmers (n= 150)	Measures put in place	Number of farmers (n=150)
Problem of rodents/ termites due to crop residue	39	Used traditional practices (sand, ashes, treated with certain plants)	15
Stray animals	37	Protected the plot by fencing or guarding	17
Labor constraints	36	Pooled labor by working in groups	10
Problem of invasion by worms/birds (seasonal)	30	Used traditional pesticides (special ashes, wild plants)	15
Lack of fertilizer	24	Used manure instead of fertilizer (farmers allowed to choose between manure and fertilizer)	9
Too much rain/wind	17	Replanted destroyed crop	10
Various problems	123	Unresolved	123

Source: ICRISAT survey data (2006)

Objective 2

1. Reviewing strategies for dissemination of agricultural technologies

Agricultural extension can be described as the process of introducing farmers to information and technologies that can improve their production, income and welfare (Purcell and Anderson, 1997). Strategies for technology dissemination were developed in Zimbabwe with a view of sharing the results with the rest of the region. Two types of reviews that were inextricably bound were carried out – dissemination approaches and media of transmission. These two go together and are dependent on each other. The dissemination approaches that were reviewed from 1948 included: group development approach, master farmer training, radio listening group, training and visit system, farming systems research and extension approach, and the commodity-based approach. New

agricultural extension approaches include participatory extension approach and farmer field schools (Rusike et al. 2006). In terms of media, about seven types were identified and their strengths and weaknesses determined (Table 5).

Table 5. Media analysis

Media	Strength	Weakness
Leaflet/ brochure	Stores information, can be used repeatedly	Not accessible for illiterates
Poster	Reaches illiterates, good for raising awareness	Short-term access to information
Field day	Reaches illiterates	Only few people reached at any time, information cannot be stored
Radio	Reaches many people, raises awareness, changes attitudes	Expensive, one-time broadcasts, not suitable for skill development
Filmstrip/ slide series	Reaches illiterates, develops skills, can be shown in rural areas	Relatively expensive if processing lab is not available
Video	Raises awareness, changes attitudes, develops skills	Expensive, limited access in rural areas
Drama/ songs/ storytelling	Raises awareness, changes attitudes	One-time performances, not suitable for skill development, cannot last longer than half an hour

Source: Adapted from Scarr et al. (1999)

Quite a number of lessons can be drawn from this review. First, there is no one-size-fits-all solution. There is a relationship among the types of technology (eg, microdosing), the dissemination strategy (eg, farmer participatory approach), and the media to be used (eg, flyers, drama, songs, etc.). Second, social, economic, institutional and policy environment may significantly affect the choice of the media. Relatively high-income farmers, for example, may afford radios but relatively poor ones may have to depend on posters hung at the door of the stockist selling fertilizer, etc. We conclude this section by pointing out that the type of strategy and the media to be used must be carefully chosen to match with the circumstances at hand.

2. Pilot testing retail trade development strategies for fertilizer

In this section we describe the outputs obtained from these activities that were carried out in South Africa and Zimbabwe

South Africa: This study focused on the Limpopo Province. Based on the public–private partnership that had been built, this study embarked on the evaluation of the uptake of different size packs of fertilizer by smallholder farmers in 2005/06 and 2006/07. Findings from the 2005/06 season which were based on interviews of 75 farmers (of which 71% were female) who had participated in the purchase of various packs of fertilizer showed that about one-fifth of the farmers only started using fertilizer in 2005/06. The major constraint facing farmers was cash followed by information about where to find fertilizer. There was a belief among several farmers that the soils were inherently fertile and the use of manure would suffice. However, there is no scientific backing to this. First-time users of fertilizer bought 5 and 10 kg packs whereas the more experienced farmers bought the traditional 50 kg pack. Local extension officers were the most important in informing farmers about the availability of fertilizer.

In June 2007 another follow-up survey was conducted in Capricorn, Mopani, and Vhembe districts of the Limpopo province. A total of 180 farmers comprising 126 buyers and 54 non-buyers of fertilizer were interviewed. Non-buyers of fertilizers were introduced as a control group to determine which factors caused some farmers not to buy fertilizer when all other factors were equal. Many of the households (70%) were female headed and levels of illiteracy were high (57% had never been to school) among the survey participants. On average, these households have been farming for 17 years.

Ownership of land was 1.63 ha for the buyers of fertilizers and slightly lower (1.38 ha) among non-buyers. The most common assets within the households were TV sets and/or radios. Notably absent within most households were assets that have a bearing on agriculture such as livestock and farming implements. Few of the farmers owned motor vehicles and almost every household had access to cash in the form of pension grants, child support grants, or disability grants from the government.

According to the study findings, there were no significant differences between buyers and non-buyers of fertilizer in terms of the age of the household's head, the farming experience, household size, and number of cattle owned. Factors which were found to significantly influence fertilizer use were levels of education, extent of contact with extension workers, and level of cereal production in the previous season. The reasons given by farmers for not using fertilizer were related to affordability, information constraints, and use of alternative organic fertilizers. Most of the farmers relied on inorganic fertilizers for soil fertility management and only 35% of the sample used other soil fertility enhancements such as cattle or goat manure and crop residues.

Survey results show that 40% of the sample applied topdressing, mostly on maize (88%). The most common method of applying topdressing was spot application used by 90% of the farmers and the rest was equally banded or broadcast. The margin between a 50 kg bag and 10 kg bag of fertilizer on a cost per unit basis was about 10%. However, the total investment required to buy a 50 kg bag was three times as much, making it unaffordable compared to the 10 kg bag. Farmers with more experience in fertilizer use bought 50 kg bags whereas those farmers with less experience bought 10 kg bags. Fertilizer bought from the Progress Milling depots would be cheaper and more convenient because of the distance and availability of smaller bags.

Most farmers found out by themselves that they could purchase fertilizer from the local depots. The extension agents were equally important in spreading the message. Extension advisory services have been rated as the most important source of information on fertilizer use. The level of farmer involvement in trials and training in soil fertility management is still very low (15 farmer trials and 23 farmers trained) but there has been an upward trend since 2001. Farmers requested timely delivery of fertilizer and advocating for promotional activities. It would be an advantage if depot managers could be trained so that they could advise farmers on fertilizer use especially in terms of making recommendations on the correct type of fertilizer to use.

Zimbabwe: Initial efforts to supply different size packs of fertilizer to smallholder farmers in the marginalized semi-arid areas began under DfID-supported PRP managed by an ICRISAT team. This started in the 2004/05 season and was repeated in 2005/06. In 2006/07 resources from this project made it possible to continue with this activity with a view to collect further evidence about the role of different size fertilizer packs and specifically to test the extent to which this process was motivating farmers to begin demanding fertilizer. It is important to note that the technology in the use of this fertilizer was linked to the microdosing technique which was included in the package of technologies promoted by the ICRISAT team in collaboration with a series of NGOs. The process involved engaging ZFC to supply an ICRISAT-determined tonnage of fertilizer in different size packs – 5, 10, 20, and 50 kg. ICRISAT would then distribute this fertilizer to retail shops in specific project villages. Farmers would be informed of the availability of the fertilizer. ICRISAT would set the price as close as possible to the cost price.

The following is a summary of the findings from three seasons of supply of different fertilizer packs in Zimbabwe. There was a clear buying pattern in terms of pack sizes. Most buyers who bought 50 kg packs had experience with fertilizer use. First-time users were mainly buying 5, 10 and 25 kg packs.

During the 2005/06 season, all the fertilizer supplied in the higher rainfall areas was sold out on the first day of delivery. This was partly because the season had good rains. Sustainability in the use of fertilizer in remote semi-arid locations will be based on whether the supply constraint is successfully addressed. Likewise on the demand side, smallholder farmers in these drought-prone regions need to have sufficient information on the payoffs from fertilizer application and the likely contribution to increased food production. We believe that this information may not still be fully abundant and this may constrain supply for some time. The main reason cited for not buying fertilizer was poor rainfall. When the rainfall season starts late and/or is unreliable farmers decide not to buy fertilizer. Other reasons included: lack of knowledge about fertilizer availability and high cost. In the future, efforts are required to provide extension services training on fertilizer use and demonstrate potential yield gains that are likely to lead to increased payoffs to fertilizer investments. During the 2005/06 season, for example, 35% of those who bought small packs of fertilizer also received relief from fertilizer programs, which was almost at no cost.

The results are still not able to show whether a potential market exists for small and large packs of fertilizer in semi-arid regions. This study ought to continue in subsequent seasons to further stimulate demand. Fertilizer companies will be encouraged to make provisions for smaller packs of fertilizer that can be sold to retailers in semi-arid regions. It is expected that farmers will purchase more fertilizer when this is made available to their local retailers as they will be able to save on high transport costs when they purchase the smaller packs from distant urban markets. NGOs involved in the relief programs are also encouraged to shift from direct fertilizer distribution to voucher-based distribution through retail shops. Pricing of fertilizer packs should be based on competitive market rates that take all costs associated with deliveries to remote locations into account. The regulatory environment should allow prices to be set at levels that ensure profitability and viability of a commercial fertilizer industry. The greatest challenge is to provide incentives to the private sector to supply fertilizer to rural outlets at a price that is within acceptable ranges while not discouraging farmers and also at a price that enables them to make reasonable profit margins. In our discussions with the industry we insisted that in the immediate run profit margins should be less of a concern as this would be large once a demand is created. There is extensive knowledge about fertilizer application in all places; however, the prevailing belief is that fertilizer burns crops if there is no rainfall. Farmers will not risk storing fertilizer. This explains why they do not invest in buying fertilizer to stock. They only buy when they know that they will immediately apply it to the field. This is where rainfall – whether there is rain or not –

really affects fertilizer uptake. The challenge then becomes who will stock the fertilizer and under what terms and conditions so that s/he can purchase it as s/he requires it.

Malawi: The project focused on the diagnosis of constraints and opportunities for expanding groundnut marketing with specific reference to linking farmers better to markets. Towards the end of the 2005/06 season, 90 smallholder groundnut farmers were interviewed along the lakeshore in Malawi with a view to understand production constraints and how these are linked to marketing. Marketing challenges facing groundnut farmers were also investigated. This was followed immediately with a traders' survey. About 30 traders of different commodities were tracked for about one month in the peak of groundnut marketing season. It was necessary to deal with traders of all types of commodities, not only for groundnuts, because the latter hardly exist. The interest was to assess the different marketing functions from the farm gate to the trader to the processor or exporter and evaluate the pricing and quality control dynamics including price determination at different levels. An investigation of the policies, rules, and regulations affecting the groundnut trade was also carried out to determine the extent to which they facilitate or constrain the viability of the groundnut sub-sector. The role of the private sector – wholesale buyers, processors, and exporters – was also investigated by visiting prominent firms in Lilongwe and discussing their place in the marketing chains and determining areas and ways in which the two could be more amicably linked. Key findings were as follows:

- Most farmers maintained less than one hectare of groundnuts; some of them raised from improved seed provided by ICRISAT. Yet, yields were low, averaging about 400 kg of shelled groundnuts.
- Price establishment was poor and farmers seemed to be facing a big price risk at marketing time. In the first place, a significant amount of groundnuts is sold on the farm before harvest, mainly because of hunger. Farmers needed money to buy food and other essential commodities before the groundnuts matured. Given the circumstances, they would be willing to accept any price the buyer declares because they are desperate at that time.
- At normal harvesting time, farmers are invaded with a swarm of 'buyers' or practically assemblers who would have been sent with cash from big traders and transporters or processors from the cities of Lilongwe and Blantyre as well as from the border posts.
- Price negotiation was conducted through the village headmen, but the ceiling would already have been set by their masters. It appears that the lower the price they set, the more credit they receive from their masters. It is envisaged that these prices are normally lower than they would be under normal competitive conditions.

- The margins were likely to be quite big between farm gate and export prices even after taking transportation costs into account.
- It was concluded that the first step in improving the pricing situation is to empower farmer groups at the village level to negotiate for better prices as well as train them to recognize that better quality groundnuts can also obtain a premium price from the processors.

Objective 3

This objective focused primarily on holding national stakeholder workshops to discuss the results of the project with key stakeholders and to seek solutions and possible pathways to overcome some of the constraints and challenges as well as sharing some of the opportunities that exist and are not yet known to all development practitioners. The description of the activity was already discussed in the "Project Activities" section. The major output of the workshops are the workshop proceedings which will be shared with all the participants for them to know what was agreed on and implement as per action points.

In all the three countries, we adopted one title for the workshop and this was "Linking Soil Fertility and Water Management Research to Markets". The following are the results of the three national workshops in the three countries:

Malawi: Seed was cited as a great constraint to groundnut production. The ICRISAT revolving fund for groundnut seed seemed insufficient in supplying seed to meet the increasing demand. There was a mention of contract farming between the private sector and farmers. Stakeholders believed that since it is working for cotton it should work for groundnuts. Unfortunately, the information available indicates that there are certain fundamentals that need to be met for contract farming to work. Most important is the fact that there should not be many potential buyers, otherwise the problem of side markets will emerge (Tshirley et al. 2008). Another problem is that groundnut is not so unique in the types of inputs required. Therefore, binding factors to make the contract effective may not be easily apparent in groundnuts.

Proper records for the groundnut sub-sector was pointed out as a problem. The issue is if there is no reliable data, it is not possible to plan for sub-sector improvement. The statistics currently available on groundnut was subject to a lot of queries. The importance of the groundnut sub-sector in the food system was highlighted. It was mentioned that groundnut is a primary source of income in areas where there are no other cash crops. Participants contributed significantly towards the reasons behind various trends in the groundnut

sub-sector. For example, it had not been possible before the workshop to understand the reasons behind the drastic fall in groundnut exports from the late 1980s (Figure 4). Collective wisdom was able to bring to bear the reasons: inability to maintain consistent supply to the UK markets and unfriendly export routes to the Mozambican coast because of the protracted civil war in Mozambique in the early 1980s.

Participants also heard about the practice of microdosing, conservation agriculture and provision of small packs of fertilizer from the other two project countries.

South Africa: A key point of discussion was the need to be realistic and redefine fertilizer recommendations in a way that is practical in terms of economic and current farming systems. It was emphasized that, by and large, the fertilizer recommendations remain in books and on shelves because they are not practical. The use of simulation models, such as the Agricultural Production Simulation Model (APSIM), could go a long way in quickly and efficiently coming up with more area-specific fertilizer recommendations.

There is need to change the mindset of farmers with regard to soil fertility in order to increase/promote nutrient-use efficiency by crops in smallholder farming communities. Extension should be actively involved because the use of nitrogen fertilizer, among other inputs, is best disseminated through extension.

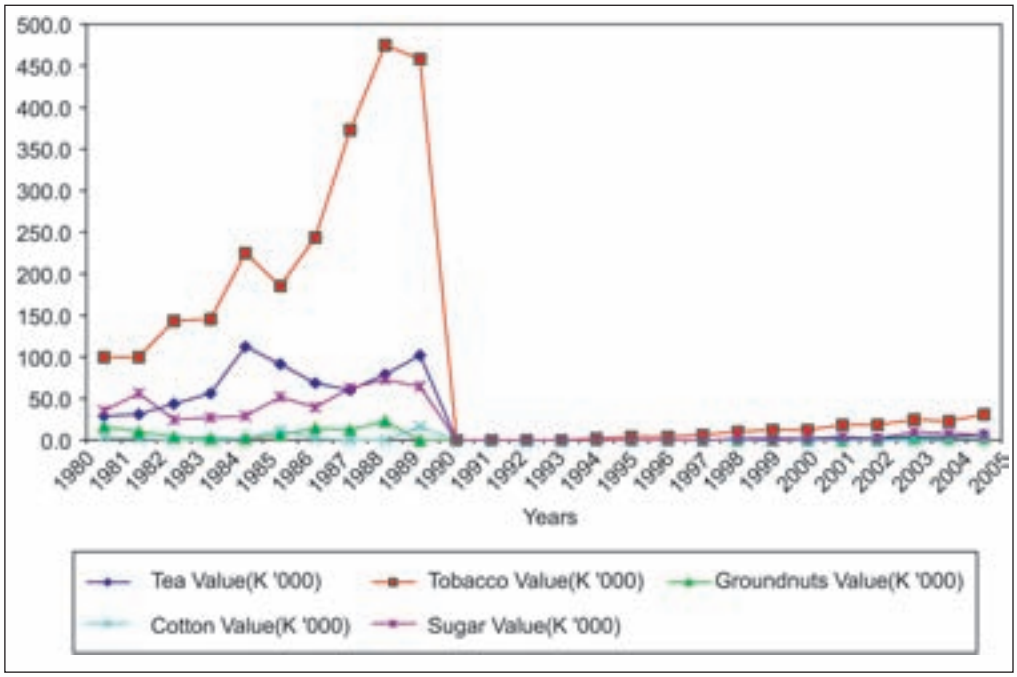

Figure 4. Trend of groundnut exports in Malawi in relation to other agricultural exports

The microdosing aspect was introduced and discussed in the context of fertilizer-use efficiency. It was noted that microdosing can be applied even prior to doing soil analysis. Extension officers need to promote N fertilizer first, and then worry about soil analysis instead of using the unavailability of the fertilizer as an excuse for not giving advice. The research and extension administrators took note that farmers and extension officers need to learn more on the value of soil analysis, application of water harvesting techniques, and on the use of low doses of N fertilizer, or microdosing. A key recommendation from the workshop was that extension officers should send the correct message to farmers. This means that they need adequate training themselves. Moreover, there has to be follow-up workshops to ensure that extension agents/officers understand the shifting focus on soil fertility. Technical persons can be invited to the workshop to ensure that the correct technical information and practices are imparted to the extension officers.

Zimbabwe: The aim of the workshop in Zimbabwe was to delineate lessons for strengthening the impacts of national research and extension services and share findings from the surveys done in Zimbabwe on soil fertility and water management-related research as well as evaluate the uptake of small packs of fertilizers. The workshop observed that although it is generally said that 'good' farmers do not need extension, the need to train farmers on new technologies should not be sidelined. NGOs and organizations such as ICRISAT should continue to give technical support to AGRITEX to ensure continued adoption of conservation farming and microdosing through participatory technology development and transfer.

The major challenges facing agriculture were the low adoption rates and a lack of scaling out demonstrations of promising technologies. Smallholder farmers were relying on mineral fertilizers in an economy characterized by numerous production constraints. It is imperative to seek other alternative fertilizers to counter the non-availability of inorganic fertilizers. The idea of linking farmers to markets remains a dream in the pipeline for Zimbabwe given the problems with transport, price distortions, hyperinflationary tendencies, and poor product quality.

It was agreed by workshop participants that soil fertility interventions have the largest impact on crop productivity and hence they should be a major preoccupation for researchers and extension agents for some time to come. The need for teamwork was encouraged among NGOs as a way of avoiding duplication and confusing farmers.

8. Project Outcomes (Discussion and Implications of Results)

This section discusses how project investments have been able to make a difference to the behavior and attitudes of people, how through the outputs individuals involved in smallholder farmer development have been able to increase their relationships and be able to do more for the farmers than they could have done alone. For some outputs, the potential to transform them into outcomes is there but the time for them may not be ready.

Scientific research, knowledge and innovations: The knowledge from the diagnostic reviews of soil fertility and water management-based technologies provided some new knowledge about where the countries are in this area. These reports have been already discussed at workshops and in so doing helped shed some light on the current state of knowledge as regards these technologies in southern Africa. In addition, these reports will be circulated to future researchers for them to determine the most efficient entry point as they think of what to do where. The effect of all this is more efficiency in the delivery of research results.

The participatory technology development farm survey was instrumental in bringing to bear areas where improvements need to be made in interacting with farmers. Increased knowledge about how to approach farmers and giving them the opportunity to provide feedback reveals what they like and what they do not like. This will help change the behavior and attitude of actors as they continue to promote participatory technology development methods and tools.

The research partnership that was facilitated by the project between Progress Milling, Sasol Nitro, and ICRISAT was selected as an ICRISAT 2006 Performance Indicator to the CGIAR Science Council review process. The project has raised awareness among LPDA, ARC, and LIMPAST agents on the potential of appropriate fertilizer use and general agronomic improvements to increase food security in drier areas.

In the course of the 3 years, a significant amount of knowledge was imparted to teams that participated in the farm and trader surveys in Malawi (10 persons) and South Africa (12 persons). In Zimbabwe individuals who were previously engaged in other projects were used. The project leader exposed these individuals to skills of interviewing farmers and other partners and specifically on how to ask the right questions. This will be useful to them in subsequent projects as well. The three national workshops provided an opportunity for stakeholders to meet and share knowledge. In Malawi, workshop participants benefited from the contributions made by World

Vision in terms of how they are linking vegetable farmers to markets. The same platform was used to showcase some implements which can be used to process groundnuts such as hand-operated shellers and peanut butter making machines. The knowledge from the Zimbabwe experience on small pack fertilizer market development generated a lot of interest in Malawi. The project has therefore been catalytic in sharing knowledge on project and non-project based activities across national boundaries.

Formation of functional partnerships: This project facilitated the move from theory to practice as regards public–private–farmer partnerships. We consider the bringing together of several partners – farmers, NGOs, and industry – to define and agree collectively on common approaches to help farmers improve their incomes and livelihoods through access of inputs and selling of their produce as the beginning of real impact. Notably, the following relationships were established and they are working: in South Africa, Sasol Nitro, Progress Milling and LPDA in the supply and distribution of fertilizer; in Zimbabwe, ICRISAT, ZFC and several NGOs for the supply of small packs of fertilizer to marginal areas. Through these arrangements Sasol Nitro supplied for distribution to Progress Milling depots 96 tons of fertilizer in 2005/06 and 140 tons in 2006/07 in small packs whereas ZFC supplied 39 tons of fertilizer in small packs between 2004/05 and 2006/07. Influencing agricultural research and extension to adopt and agree to apply the findings of this project is another important outcome from this project.

Change in behavior of actors: The project has added value in improving the way researchers do business by interacting with farmers, the private sector, and expanding their role in linking farmers to markets. There are, however, several challenges that similar interventions have to face in the days ahead as we continue to look for innovative and sustainable partnerships that are essential for linking farmers to industry. Each partner in the consortium for providing agricultural inputs to farmers (ICRISAT, ZFC, Agricultural Seeds, SASOL Nitro, LPDA, LIMPAST, and Progress Milling) has an objective function which is different from any other; some are for profit maximization, some are for the provision of national public goods, others for the provision of international public goods, etc. The challenge is to focus the consortium on the common objective of improving farmers' income and livelihoods. To do this, there was a need for the facilitating organ (this project) to demonstrate to everyone that there is a good reason for being in the loop and working together.

Some additional profitable outcomes from this project from the smallholder farmers' perspective are:

In Zimbabwe there was an effort by ZFC, a private company, to supply fertilizer in small packs though the risk was not on their part. Rural retail shops were selling fertilizer, some of them for the first time, and this created a relationship between local farmers and the retail owners because some of the farmers had to be convinced to buy fertilizer. Through their marketing efforts and with the aid of flyers most retailers were able to promote and improve the access to fertilizer in the local communities.

In Polokwane, South Africa, the development of the fertilizer market is now being incorporated into the normal business of Progress Milling; there are many incentives for the company to ensure that they receive fertilizer because any increase in productivity will result in the company having more maize for milling. The project, through the national workshops, availed an opportunity to bring together key stakeholders and, in particular, decision makers in one place and time to deliberate and agree on the major agricultural research and development issues. In the workshops of Malawi, South Africa, and Zimbabwe as will be seen from the list of participants, we had all the individuals who matter in deciding the direction agricultural research and extension would follow. Key decisions were made at these forums and this was a real big bang for the project. For example, the project provided opportunities for agricultural research and extension administrators to think more realistically on how meaningless blanket recommendations can be. There was a clear demonstration that there was a need to do business differently.

Participatory research skills: ICRISAT increased its awareness in elements of participatory research by sharing all types of relevant information ranging from proposal development to results with team members.

Strengthened capacity in linking farmers to markets: The project has assisted in keeping the concept live within ICRISAT as well as sharing the concept with partners. The project has also introduced some new dimensions that are important but are not captured by the neoclassical theory of demand and supply. The concept of collective action has been put into more practical use in the distribution of inputs to farmers and procurement of produce (groundnuts) from farmers.

Undergraduate training: In Zimbabwe two undergraduate students benefited from the project during their respective internships at ICRISAT-Bulawayo. They had an opportunity to go through the process of coding data, data entry, and cleaning as well as basic statistical analysis. As a result, one of the students used part of the data for his final year project.

Information sharing and dissemination of reports: So far annual reports as well as trip reports have been broadly shared with partners and collaborators for them to read and comment on the future course of action. This has helped cement partnership within the consortium. Publishing articles in media most read by partners, for example, publication in "LIMFO", a South African partners' newsletter (Annex 1), was one such example of sharing knowledge.

9. Overall Assessment and Recommendations

The project progress was undermined by various impediments along the way. But still, one can safely state that overall the project achieved its objectives at almost 70%.

Although not carried out systematically in all the three countries, the project pioneered in attempting to thread technology development and transfer with markets, basically endeavoring to fill some critical knowledge gaps as well as technically trying to organize public–private–farmer partnership to practically fill such gaps by supplying the necessary inputs. The challenge now is how to maintain these partnerships for the common objective of improving farmers' income and livelihoods through sustained supply of needed inputs.

There is need to nurture the consortium of partners (private and public sector) in the Limpopo Province so that they can continue making fertilizer and other inputs available to the marginalized communities. It is perhaps too early to determine whether or not there is effective demand for fertilizer. At the moment therefore the challenge is to continue to create that demand. Seeking sources of funding to keep the momentum going would be a good idea. Gradually, the lessons learned from this consortium can also be transferred across to neighboring countries. There is still room to improve on the participatory methods and approaches that have been on board for several decades now.

The situation is confusing in Zimbabwe because of conspicuous market distortion in the factor and product markets. Further experimentation with input markets (provision of small packs of fertilizers) may not be a wise investment at the moment.

There is a great potential in Malawi for improving productivity, incomes, and food security for smallholder groundnut producers. Promoting non-traditional approaches such as collective action through various forms of farmer groups and associations will assist farmers in accessing technologies and market information at low cost. A functioning market information system is excellent ammunition in enabling farmers to make key decisions in the production and marketing of alternative commodities. There is definitely room for small packs

of fertilizer, particularly for farmers in the more arid environments where the element of risk of crop failure is high. One size does not fit all and therefore technologies need to be divisible and flexible so that farmers can fit at different points on the purchase scale based on their level of income.

Looking at the value of the activities carried out vis-à-vis the resources spent in terms of money and time of researchers and administrators, we conclude that the investment was worth the products produced. One thing to remember is that the project has focused attention on smallholders in marginalized communities. In South Africa, for example, the farmers that the project has been dealing with belong to the former homelands which for a long time have had no access to modern technology. The project has gathered scientific knowledge and evidence about soil fertility and water management research and practices in three countries and discussed the results with key stakeholders; it has designed and conducted participatory research with farm communities and has began to test alternative models of linking farmers to factor and product markets. This is a great achievement but needs to be continued for meaningful impact to be realized in the future.

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LIMFO
Development Cooperation Newsletter
Issue Number 2. May 2007

Development cooperation grows from strength to strength

The initiative that begun in August 2006 among Progress Milling, SASOL, Pannar and LIMPAST to join hands in the Limpopo Province to ensure successful agricultural development in local communities has been growing from strength to strength. The successes that have been scored during the partnership of six months include:

- The development of a central database on Progress milling depot information.
- A monitoring system of depot supplies.
- Coordinated supplies of seed and fertilizers to depots
- Monthly development cooperation meetings that provide inside information on partners and coordinate activities and
- a newsletter that informs partners about each others activities and general agricultural issues in the Province.

ICRISAT has recently indicated its interest in participating and supporting the cooperation. ***Editor***

A group of Eldorado farmers showing off Pannar Calendars received after a meeting

Consortium to evaluate the uptake of different packs of fertilizer by smallholder farmers in the limpopo province

(By Dr. Isaac Minde - ICRISAT)

In the Limpopo Province, a good mix of four partners—private sector (SASOL Nitro and Progress Milling) and public sector (Limpopo Department of Agriculture—LPDA and ICRISAT) came together to put the theory of public-private partnerships into action. The main objective was to establish whether farmers could sustainably increase the use of fertilizer if more affordable packages were made

available to them. For the last three seasons—2004/5 to 2006/7 SASOL Nitro, Progress Milling, Limpopo Department of Agriculture and ICRISAT joined hands to supply different packs of fertilizers—especially ammonium nitrate to farmers in the Limpopo Province. Each of the aforementioned partners has had a key role to play. SASOL Nitro, fertilizer manufacturer, supplying the fertilizer at cost; Progress Milling buying the fertilizer and distributing it to its depots for farmers to buy; LPDA facilitating the process by advertising and using its crew of extension to advise on how the fertilizer should be used for optimum gain and ICRISAT facilitating the monitoring and evaluation of the process.

In 2005/6, different fertilizer packs were distributed to 22 depots within the Limpopo Province. A survey of 13 depots was conducted in August 2006 to establish 1) the type of farmers buying different packs of fertilizer as well as whether the market is large enough to attract fertilizer marketing agents to continue supplying the fertilizer at their own free will. A total of 78 farmers were also visited to determine the kinds of variables affecting the amount and pack size of fertilizer purchased. The results, though preliminary, they were quite instructive: The results showed that:

- Access to fertilizer has been improved through deliveries to local distribution depots – owned by Progress Mills
- Provision of small packs of fertilizer improves affordability by poorer farmers
- Farmers with less experience in fertilizer use can experiment with smaller quantities of fertilizer
- Farmers with experience in fertilizer use have consistently applied fertilizer
- Some farmers with experience in fertilizer use, occasionally, apply fertilizer because:
  - No money to purchase fertilizer
  - "Soil is fertile enough"
  - Prefer manure
- First time fertilizer users were mostly buying from these local depots and in fact they only bought smaller packs of 5 and 10 kgs. This means that first time fertilizer users have options to experiment with smaller packs.

A second survey to capture the effects of 2006/7 fertilizer distribution is planned for May 2007. This survey will be more structured and will also have a larger sample size than last year. The objective is to more effectively be able to answer the following questions:

1. Factors affecting the uptake of fertilizer as well as different fertilizer packs
2. Is there sufficient demand of fertilizer in general and for small packs of fertilizer in particular to stimulate the industry to

continue supplying fertilizer to the Progress Milling depots?

3. What are the lessons learned in enhancing private–public-partnership in technology change?

Limpopo department of agriculture introduces the agribusiness academy

In its endeavours to continue seeking for solutions to poverty, the Limpopo Department of Agriculture (LDA), in partnership with the Flanders International Development Cooperation (FICA), has introduced the Agribusiness Academy which is a programme intended to support and complement on-going farmer development efforts in the province. The central purpose of the Agribusiness Academy is to develop capacity and mentor small-scale commercial farmers, agribusiness entrepreneurs and introduce Agritourism in the province.

LDA has observed that the single most important bottleneck to the development of small-scale commercial farming and agribusiness is the existence of low competence and experience in farm management, value chain analysis and marketing. It has recognized that Agricultural colleges, other training institutions and service providers, including advisory extension service agents have limited capacity to deliver services to emerging black farmers and agribusinesses in these fields of post-production management. The Agribusiness Academy has emerged as one of the options in resolving this problem.

The Academy will operate from Madzivhandila and Tompi Seleka Agricultural Colleges which have been earmarked as Centres of Excellence for Skill development in the Province. The Academy intends to focus on Skills development programmes for farmers and agro entrepreneurs, a mentorship programme, Agritourism development and leadership and management workshops for managers, business people and farmers.

The Agribusiness Academy is seen as an exciting concept that will plug the gap that still exists in the poverty alleviation equation. In his State of the Province Address, the Premier alluded to the Academy as an initiative that demonstrates that the leadership of the Province are keen at resolving the poverty alleviation problem and are geared towards meeting the millennium development goals.

INform

This section of the newsletter brings information on some notable activities being undertaken by each of the four partners of the development cooperation.

Progress Milling

To solve the problem of shortages in maize transport, Progress Milling has established a procedure that will allow private contractors to transport maize from the producers to the depot. The Group Risk Manager has provided the following procedures for doing this:

1. Responsibilities of the transport contractor

The contractor should buy himself a triplicate book. This book should be used whenever customer's maize is to be transported to a depot.

The procedures that must be followed by the contractor are as follows:

- The customer name and certificate number must clearly be noted on the page.
- The quantity of bags that are loaded must be clearly noted.
- The customer must accompany the contractor to the depot with his\her ID book and grinding certificate.
- The contractor is not allowed to take the certificate on behalf of the customer.
- When the depot is reached, each customer's maize should be weighed separately.
- The total weight should be written on the triplicate book.
- The contractor should fill in a single triplicate page for each customer.
- The contractor must make sure that the customer signs the triplicate page.
- The original page should be given to the depot controller to ensure that he gets paid and must be signed by the contractor.
- The duplicate must be handed to the customer, who then must hand in this document to the depot controller to write it in on the customer certificate.
- If no documents described as above are received, the contractor will not be paid
- The transportation cost will be determined by the management of Progress Milling.
- No deviation on the above procedures will be allowed.
- The contractors have to buy their own books and stationary.
- The contractor must provide Progress Milling with a Bank account number wherein his money will be transferred.

2. Responsibilities of the depot controller.

- No maize will be taken in unless the customer is there with his/her ID book and grinding certificate.
- Progress Milling will take no responsibility for any losses that occur during the transport process.
- The original page that is received from the contractor, must be kept in a safe place and handed over to the auditor, who will bring it to Progress Milling to be processed for payment.
- If these documents are not handed over to the auditor, the contractor will not be paid.

- No maize will be taken in unless the customer accompanied the contractor.
- Only platform scales must be used and the depot controller must ensure that they are in good working order.
- Only depot controller must write the certificate number on every bag and ensures that there are no stones in the bag.
- Empty bags will be given free.

Prospecting contractors can contact Mr. Noci Tolmay at Progress Milling Offices in Polokwane

(Tel. 015 297 3452).

Sasol

Mr. Jaco has finally left Sasol. He was a greatly supportive of the development cooperation. We thank him for all his contributions to the Progress Education Trust. He will surely be missed. His position has been occupied by Mr. Koos Beets. We welcome him in the development cooperation and wish him all the best. He will also serve as a trustee for the Progress Education Trust.

With regards to fertilizer, it is expected that the distribution to the depots will start early this year. This is because the requirements for each depot have already been determined. We can all look forward to a successful 2007/08 season.

Limpast

Limpast trials experienced crop failure virtually in the whole of the Limpopo Province and Mpumalanga due to poor rainfall. Very little training of study groups could take place since all of the demonstration material died.

However, Limpast reports that it recorded some achievements during 2006/07 season in (i) assessment of agro-economic potential (ii) provision of training and information (iii) establishment of service providers and (iv) facilitation of group empowerment. [Information from Dr. Cronje's report]

Pannar

Pannar's distribution of Caps, T-shirts Calendars, catalogues and Growers' guide was greatly appreciated by the agricultural community in Limpopo and Mpumalanga. These promotion materials were appropriate especially because they were also presented in local languages. We shall look forward to similar promotions in the future.

ICRISAT and economic sense

This noteworthy trial on the use of suitable fertilizer packages by farmers that could make economic sense did not go well due to the drought of last season. Most farmers did not make use of fertilizer. The experiment is intended to be continued in the coming season.

Events

Field day at ARC (Potchefstroom)

On Wednesday 28th February 2007, the ARC held a Field day to show the performance of different crop varieties. It was well attended by the farming community throughout South Africa. A number of Extension officers from Limpopo province attended the Field Day. I was also one the luck ones to be found there. I consider myself lucky because there was a lot to learn. The ARC demonstrated how well traditional crops such as cow peas, groundnuts, pearl millet, bambara, maize and dry beans can performance with little husbandry hence showing that our farmers can successfully produce these crops. The picture below shows ARC staff explaining a maize demonstration plot to field day participants.

South African International Business Linkages (SAIBL) staff visit Limpast trials

A group of employees from SAIBL paid a visit to Progress Milling during their familiarization tour of Limpopo Province. They were taken on a tour of the Progress Milling Plant. There was extensive professional interactions over crop production and agricultural management between the visitors and staff of Progress Milling. Below, Mr. Masenya Masenya explains the operations of the Progress Milling to the visiting team of SAIBL.

PANNAR Field day at the University of Limpopo

On 27th March 2007, Pannar held a field day at the University of Limpopo Farm. There were over 250 farmers who attended the field day. The field day was held to show the farming community the performance of the different crops which included maize, sorghum and beans. There was a slot for the Development Coordinator to make promotion speech and distribute promotion items such as T shirts, calendars, catalogues and crop grower's guides donated by the four development Cooperation partners.

Farmer's day at Mashamaite Village

Mashamaite Village was a hive of activity on a Thursday 12th of April 2007 as farmers gathered to discuss the best ways of controlling insects and pests on Maize crop. The focus was on the use of local herbs as pesticides. For instance, one specific local pesticide mentioned to be potent was a combination of one part of cow urine to two parts of water used to control all kinds of insect attack on crops.

Feature article

preserving biodiversity – What local organisation can do

(International Institute for Environment and Development Briefing 2007)

In 2002 the Convention on Biological Diversity adopted a target to significantly reduce biodiversity loss by 2010 'as a contribution to poverty alleviation'. In 2005, the Millennium Ecosystem Assessment offered compelling evidence of the positive links between biodiversity conservation and human well-being. In practice, however, biodiversity conservation and local people's livelihoods often compete – particularly in some 'top-down' approaches to conservation such as certain national parks.

A recent review shows that community-led conservation can contribute to human well-being and to the achievement of many Millennium Development Goals, but in the majority of cases, it remains small-scale, isolated and not integrated within the formal conservation sector. Given appropriate support, community conservation could achieve much more for poverty reduction.

Biodiversity loss is occurring at an unprecedented rate. It is evident every where even within many communities in Limpopo Province where natural vegetation is disappearing quickly and soil erosion is rampant. Ecosystem goods and services provide security, health, basic material for a good life, good social relations and freedom of choice and action, and are particularly important for the poor and vulnerable who do not have access to alternatives.

In the face of disappearing biodiversity, what is the answer to securing human well-being in rural villages?

It appears that decentralisation and community management is the answer. Local groups need to get involved in short-term restoration and prevention activities. Some strategies in achieving this include:

Small, local enterprises can be developed based around biodiversity – ecotourism/Agritourism, making of handicrafts, etc. Where these can be integrated with well-established markets, returns can be substantial.

Jobs associated with community conservation are limited in number

but may often be the only formal employment opportunities available in remote rural areas.

Food security and nutrition can be sustained by many wild plants and animals, which often play a critical role for the poorest groups, particularly during times of drought or food insecurity.

Water and soil fertility can be secured by revitalizing those traditional practices of land and watershed management that sustain both high biomass and high biodiversity.

Communities can be empowered by devolving authority over resource management to the local level – strengthening local organisations and empowering previously marginalised sectors of society.

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About ICRISAT

ICRISAT
Science with a human face

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT belongs to the Alliance of Centers of the Consultative Group on International Agricultural Research (CGIAR).

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