36

Linking Research Results with Rural Development Projects: Experiences from Southern Africa

Murwira, H.K.

TSBF, c/o Faculty of Agriculture, University of Zimbabwe, P.O. Box MP228 Mt.Pleasant, Harare, Zimbabwe

Abstract

This paper presents an approach that has been used to translate research results into farm practice within the context of rural development projects in Malawi, Zambia and Zimbabwe. It is an impact oriented approach designed to ensure that research that is conducted with a development focus should take account of beneficiary interests and be able to address problems in a more holistic fashion. Examples are drawn from the work on the crop-livestock systems that are predominant in much of southern Africa. The main conclusions drawn are that soil fertility management is context specific and requiring adaptive responses that consider local knowledge of the farmer as a starting point in addressing problems. Research for development is not just about technologies, it is also about the people and enhancing their decision-making processes. To achieve greater impact of integrated soil fertility management research requires interdisciplinary teamwork, inter-institutional partnerships, stakeholder involvement, participatory approaches and systems thinking.

Introduction

The Context of Rural Development Projects

These are most often investment projects co-financed by governments and development agencies in this case, the International Fund for Agricultural Development (IFAD). These investment projects are varied in their nature but are often aimed at infrastructure development, food security, irrigation and market development. The soil fertility constraint is often ill defined within these projects even for those focussing on food security, yet it is a pervasive issue contributing directly to poor land quality and low productivity (Figure 36.1). The result is that most of these projects do not give soil fertility issues the prominence required nor is there sufficient involvement of relevant expertise. The challenge of linking soil fertility research results to these development projects is therefore great and entails recognizing that needs between projects vary, and that there is a complexity of problems addressed. Relevance of results is dependent on how the research addresses the hierarchy of needs and the multiplicity of objectives of target clients. This is the essence of research for development. This paper is an attempt to show an approach for linking soil fertility research results with development projects using examples from southern Africa.

Research for development is research carried out in response to the needs of the beneficiary communities. It is impact oriented and by design involves participatory evaluation of options. The overall framework includes the whole research continuum from process research to adaptive research and dissemination though with a bias towards the latter two (Figure 36.2). At the process level, the research is designed to generate an understanding of the regulation of nutrient supply, and of local knowledge about farmers' priorities, access and management of resources and how they are socially differentiated. The key challenge is to use knowledge of social and biophysical processes to facilitate the process of change to achieve more impact on livelihoods and on the way that resources are managed. There are different methodologies that can be used to facilitate change in farm practice. They all entail bridging the gap between researchers and farmers through approaches that encourage participatory diagnosis and evaluation of problems and solutions. This whole process is complemented by the use of decision support tools that aid both the farmers and researchers in making decisions.

Figure 36.1: Constraint diagnosis of rural development projects

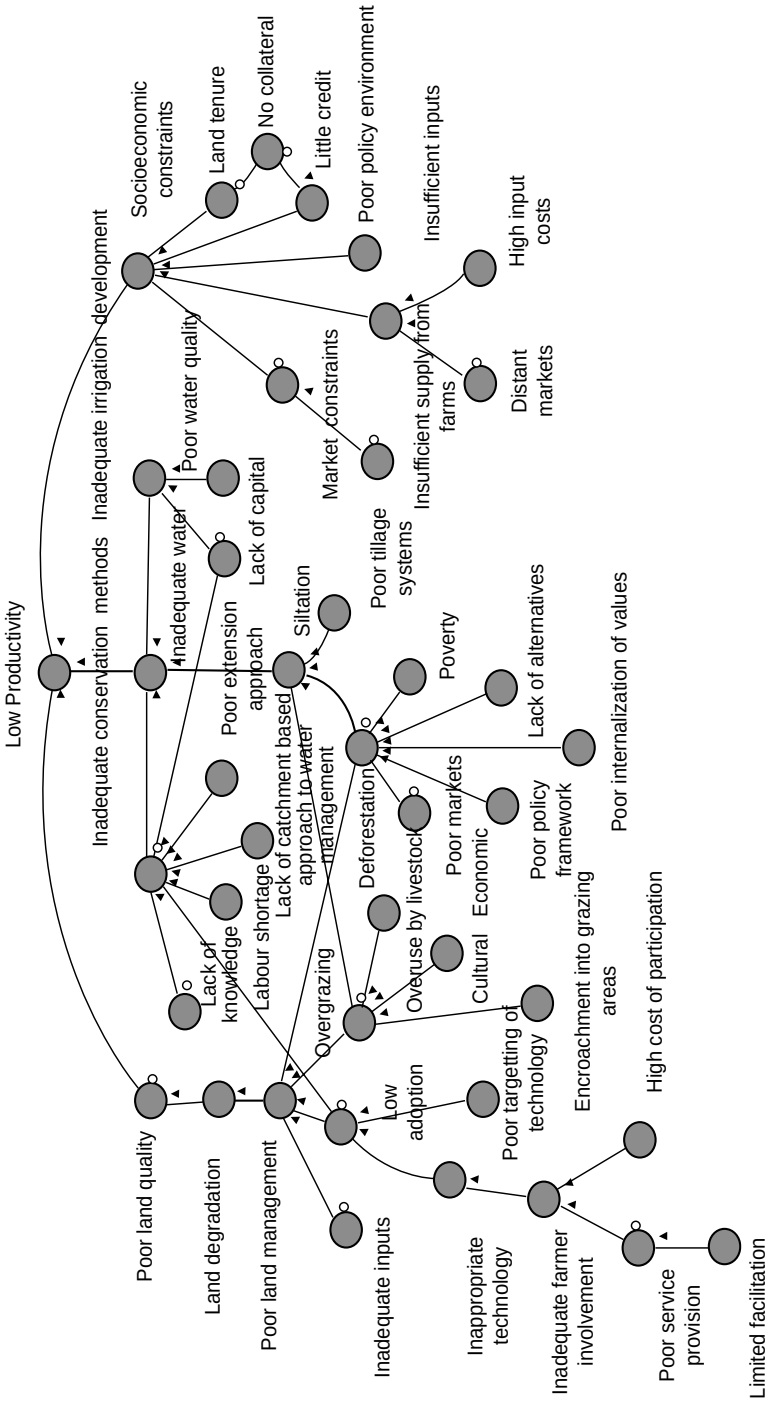
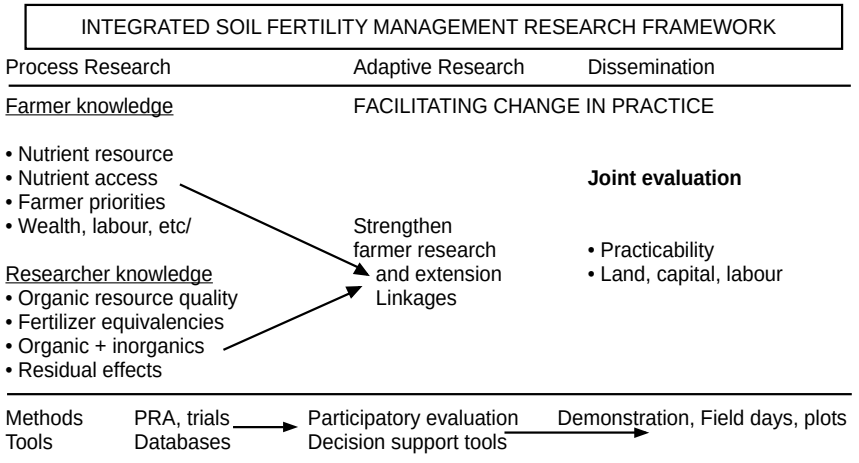
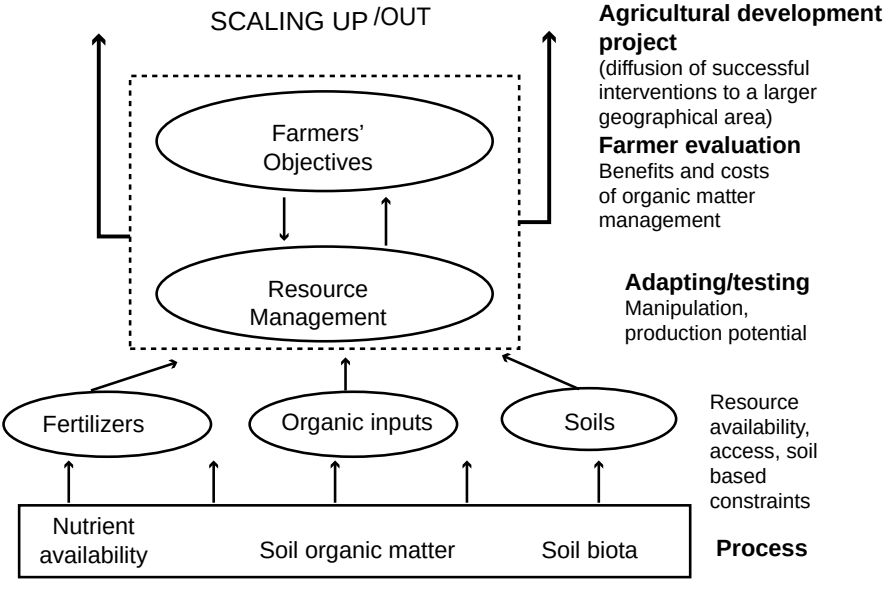


Figure 36.2: A framework for linking integrated soil fertility management research with farm practice



Successful practices can be scaled out with partners within rural development projects but recognizing that the project sites and conditions are not amorphous (Figure 36.3). Soil fertility management is context specific and requiring adaptive responses that consider local knowledge of the farmer as a starting point in addressing problems.

Figure 36.3: Linking research results into the development process



The case of crop-livestock systems

Crop-livestock systems pre-dominate in much of southern Africa and several investment projects are being implemented in the region (eg Southeastern Dry Areas Project and Smallholder Dry Areas Resources Management Project in Zimbabwe Southern Province Household Food security Project in Zambia) to address food security concerns. It is clear from an analysis of the literature that livestock provide an immense contribution to livelihoods and that crop production is intricately linked to the herd size that a household might have (Table 36.1). This is related to both the capacities to produce manure and the provision of draft power from livestock. The sources of manure and the management strategies that farmers use are very diverse (Table 36.2) making prescription of best manure utilization practices difficult. The manure produced is often of poor quality hence options are needed to improve on efficacy of this key resource (Murwira *et al*. 1995). This is not only true from the research perspective, but also from numerous discussions with farmers on their perceptions on how effective communal area manures are (Nzuma *et al*. 1998).

Table 36.1: Grain yield per household and production in relation to the size of the cattle herd in five communal areas of Zimbabwe, 1986

Size of cattle herd per household	Maize grain yield (kg ha^{-1})	Maize grain production per household/year (kg)
0	669	629
1-4	903	876
5-8	1148	1366
9-12	1249	1599
> 12	1831	2362

Source: Adapted from GFA, 1987 (report covering Chivi, Makoni, Nswazi, Chirumanzi and Merengwa communal areas)

One simple approach taken in the study areas was to look at ways in which farmers could manipulate biological processes to enhance quality of the manures. Anaerobic composting of manure in pits, an innovation on the conventional practice of curing manures in heaps, was proved to be a more efficient process that resulted in higher N contents in the manure. The pitted manure produced higher maize yields in the first year of application than heaped manure at the equivalent N application rate of 100kg ha^{-1}.

Table 36.2: Diversity in manure management and fertilizer use strategies for different farmers in Shurugwi District, Zimbabwe

	Manure Management and Use			Mineral Fertilizer Use	
	Rare of application	Method of application	Manure application rotations	Type of Fertilizer	Rate of Application
Farmer 1	4 t ha^{-1} 17th t ha^{-1}	Broadcasted Banded	2 year rotation maize-g/nut-maize	Ammonium nitrate (AN) applied	Uses Coca-cola bottle top for pit stored manure and cup number 2.5 for heap stored manure
Farmer 2	21 t ha^{-1} first season 16th t ha^{-1} second season	Broadcasted	3 year rotation maize-maize g/nut	No mineral fertilizer for pit stored manure Used to apply AN when using heap stored manure	Could not give the rate of application of AN when heap stored manure was use
Farmer 3	3 t ha^{-1} banded and additional 4 t/ha broadcasted	Banding and broadcasting	3 year rotation maize-maize-g/nut	No amonium nitrate applied	Seems application of AN is targeted or done only when crop deserves it
Farmer 4	Banded at 2 cm depth in ridge	Banding	2 year rotation maize-g/nut-maize	No amonium nitrate applied	Seems application of AN is targeted or done only when crop deserves it

Note: Application rates were converted from scotch carts to tonnes per hectare and each scotch cart can carry approximately 400 kg of manure.

Residual yields were however lower in the second and third years in the pitted manure but overall yields after 3 years (including the 1st year) were higher (Figure 36.4). This demonstrates that farmers can benefit from putting science into practice and from the choices provided on how they can maximize on immediate returns or alternatively build on soil fertility and lose on the short term benefits (Table 36.3) (Refer to Mutiro and Murwira in this volume). These results need to be interpreted in terms of the social discount rates that poor people use and the impact it will have on the soil fertility investment strategies (Figure 36.5). Discount rates are quite often higher for poorer households, which might negate on investments with a lower immediate return.

Table 36.3: Overall benefits over 3 years of using pit and heap stored manure

Factor	Control	Pit	Heap
Total harvest (tonnes)	1.83	9.82	8.79
Total Gross Benefit (Z$)	552.24	2835.35	2885.87
Total Variable Cost (Z$)	1748.22	1814.25	1818.32
Total Financial Benefit (Z$)	-1195.98	1021.10	1067.55
Net Present Values (NPV)	-801.46	767.04	497.64

Noe: 1 US$ = Z$ 55

Figure 36.4: Effect of different manure storage methods on maize yield

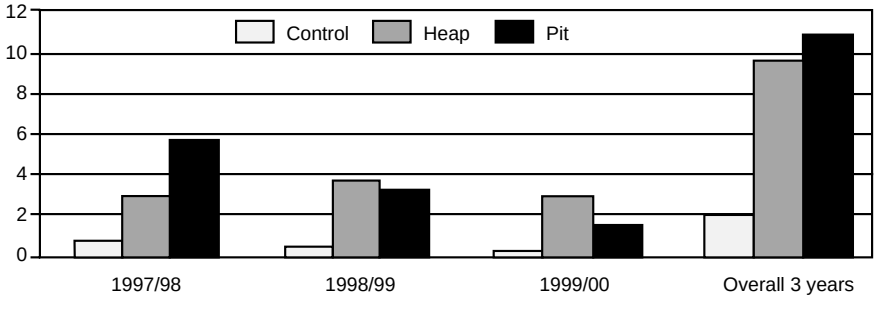
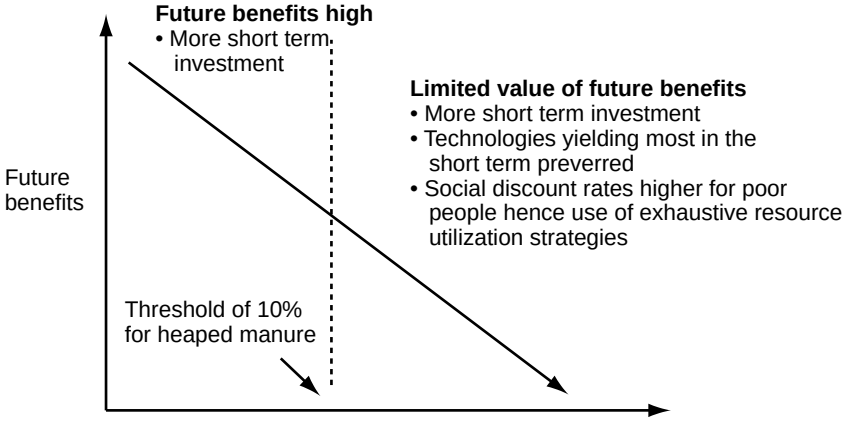


Figure 36.5: Discount rates and their implications on soil fertility management investment strategies



A key lesson from these results is that farmers need to be engaged in a dialogue on how they can arrive at solutions that suit their requirements and circumstances. Developing a framework for such a learning process can be very fruitful but demanding. Attempts have been made to come up with a framework for manure decision making in Zimbabwe (Figure 36.6). The framework looks complex but has been widely tested on its usefulness and it has been demonstrated that it can stimulate discussions on various aspects of manure management and the decisions that farmers take before and after application of manure to soil. It is important to emphasize that the decision tree is more of a conceptual framework for social learning rather than a clear guide for decisions.

The arguments above point to the fact that translating research results into farm practice is not just about technologies, its about people and reinforcing their decision making and their capacity to analyze trade-offs and options. This has to be firmly grounded in their livelihood objectives and aspirations. Livelihood income is diversified and dependent on the opportunities presented to farming households by proximity to markets, crop/livestock productivity and other off-farm activities (Figure 36.7). The contributions (potential and actual) of each of the enterprises needs to be known in order to set priorities for technology testing. It is no point over-emphasizing on manure use and cropping in an environment where farmers can get little recompense from these activities. However opportunities can also be identified where livelihood strategies can be reinforced.

Figure 36.6: Farmer manure decision guide developed using a spidogram analysis

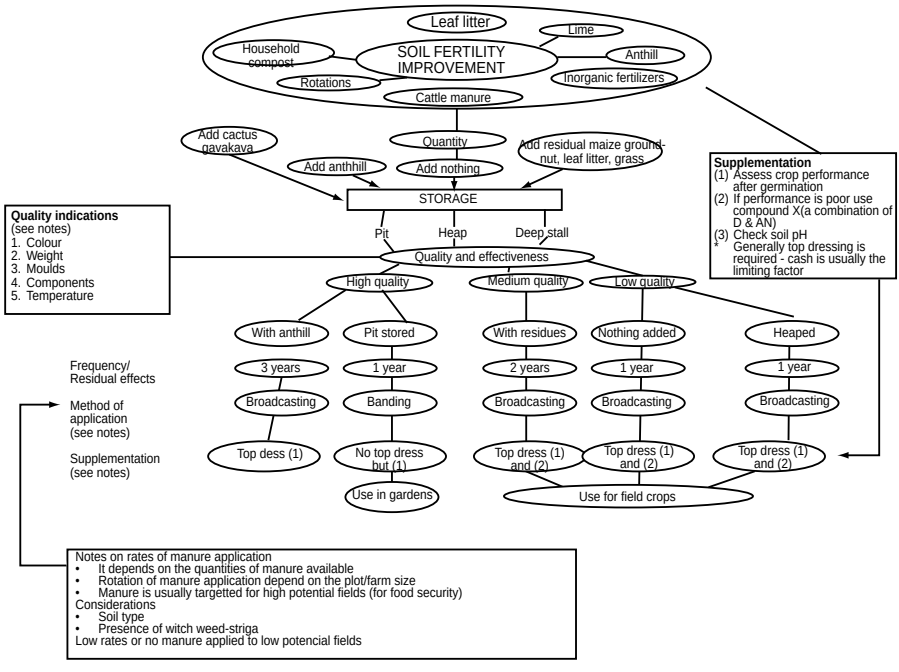
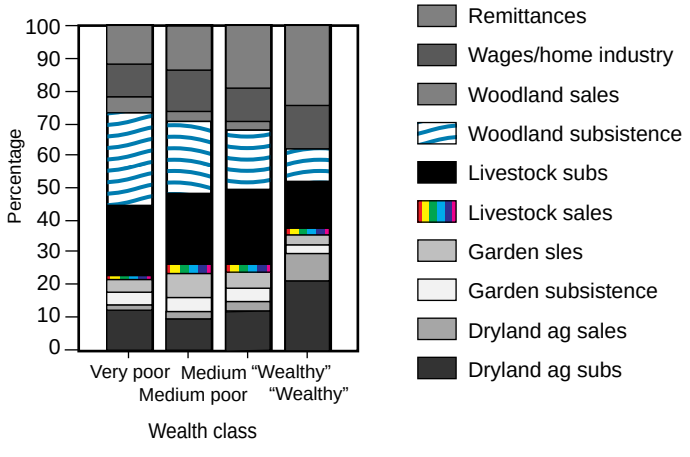


Figure 36.7: Livelihood incomes of smallholder farmers in Chivi, Zimbabwe

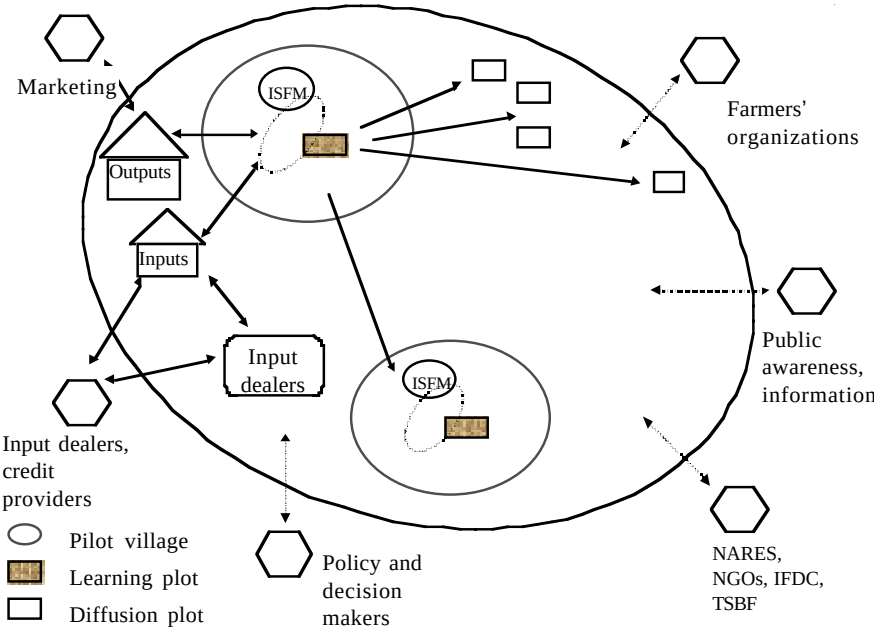


From Research Results to Creating Partnerships for Development

Successful interventions in any project area require the participation of key stakeholders (Figure 36.8). This derives from possible institutional synergies that can obtain, and from the need to analyze diffusion

pathways to increase impact beyond the plot level and pilot villages. In implementation of work in rural development, research and innovation, institutions are more and more confronted with issues that are too complex to be resolved by a single organization on its own. Nowadays, rural development has to meet many objectives such as improving the livelihoods of poor people, promoting sustainable use of natural resources and biodiversity, linking small-scale farmers to markets and enhancing food security and safety simultaneously. A single institution can no longer make isolated contributions to rural development in their specialized field, but need to ensure that their products and services, jointly with those of other organizations, contribute to these broader objectives. For this to happen, organizations need to combine different kinds of expertise and to work in partnership with other rural development and research organizations. Together, these partners need to work closely with the beneficiaries of rural development activities. They also need to involve and collaborate with other groups that have a role to play in tackling the issues and achieving the broader development objectives such as the private sector (agro-dealers), policy makers and other interest groups (Figure 36.8).

Figure 36.8: Creating partnerships for effective diffusion of integrated soil fertility management research (Murwira and Wopereis, 2003)



The major challenge observed to date in linking research results with rural development projects in southern Africa has been in bringing together the critical mass of expertise required to effect a coherent participatory research and development program. There has been huge staff turn-overs in most of the key national agricultural research systems (e.g. Zambia and Zimbabwe) or the personnel are simply not there (e.g. Malawi).

Conclusion

The main lessons from the work in southern Africa are that translating research results into farm practice is not just about technologies, its about people and reinforcing their decision making and their capacity to analyze trade-offs and options. All this calls for a new approach to doing business in rural development and research. This new way should put emphasis on interdisciplinary teamwork, inter-institutional partnerships, stakeholder involvement, participatory approaches and systems thinking. It sees rural development and innovation and the knowledge needed for it as the result of collective learning to which all these actors contribute, not as the result of the transfer of knowledge generated by a single organization. Most of the work reported is still on-going but it is hoped that the approaches expounded in this paper could lead to more tangible benefits at the farm level.

Acknowledgements

The support of the International Fund for Agricultural Development is gratefully acknowledged.

References

Murwira, H.K., Swift, M.J. and Frost, P.G.H. (1995) Manure as a key resource in sustainable agriculture: a case study of communal area farming systems in Zimbabwe.p131-148. A keynote address. In Livestock and Sustainable Nutrient Cycling in Farming Systems of Sub-Saharan Africa, Vol.II ILCA, Addis Ababa, Ethiopia, 22-26 Nov, 1993. Ed. J.M. Powell, S. Fernandez-Rivera, T.O. Williams and C. Renard.

Murwira, H.K. and Wopereis, M. (2003) Collaboration with rural development projects. Proceedings of the IFDC/TSBF-CIAT project results and planning workshop held in Nairobi, Kenya, 28-30 April, 2003. Unpublished.

Nzuma, J.K., Murwira, H.K. and Mpepereki, S. (1998) Cattle manure management options for reducing nutrient losses: farmer perceptions and solutions in Mangwende, Zimbabwe. P183-190. In: S.R.Waddington, H.K. Murwira, J. Kumwenda, D.Hikwa and F. Tagwira (eds). Soil fertility Research for Maize-based farming systems in Malawi and Zimbabwe. Proceedings of the Soil Fert Net Results and Planning Workshop held from 7-11 July at Africa University, Mutare, Zimbabwe. 312pp.