RESEARCH GUIDELINES: GENDER, LOCAL KNOWLEDGE AND PLANT GENETIC RESOURCE MANAGEMENT

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INTRODUCTION

This strategy provides a methodological framework for how to explore the gender dynamics of plant genetic resource use and management by farmers. While mainly developed to address gaps in the research in Zimbabwe, it provides researchers who would like to explore this issue with guidelines and suggestions on ethics, key questions to ask, methodologies and approaches to use to undertake research on these issues.

ASSUMPTIONS

Researchers should recognize the dynamic nature of local knowledge: It is constantly evolving as it is used. Like other systems of knowledge, local knowledge changes over time and is in most cases cumulative. Local knowledge is contextual (environmental, cultural, economic & political) and is therefore subject to change over time and space. Rather than something static that can be captured, collected and recorded, researchers should consider local knowledge as a dimension of culture that should be harmonized with development strategies.

Nor is local knowledge evenly distributed in a community. Researchers should thus assume that there will be differences by gender, age and other social variables, and also personal differences.

The research on local knowledge concerning agro-biodiversity should aim at understanding and recognizing the local systems as a platform of development, and particularly study local systems with respect to their capacity to:

- experiment, including modes of local experimentation;
- learn and adapt;
- absorb biodiversity; and
- strengthen local knowledge by internalizing new ideas.

While the assumption that transfer of modern technology can solve the problems of poverty in smallholder agriculture has, in most cases, been proven wrong, the simple “participation-fix” may prove to be equally wrong. Studies of a local system do not mean “going backward”. The purpose of studying local knowledge should be to find another path to development, a path that is accessible for poor smallholders because it follows the tracks of their local value systems and worldviews, moves in a landscape of local resources, and empowers those who walk it.

There may be policy constraints, but we assume that there is always room for progressive initiatives, and that it is possible to open a policy dialogue to remove constraints to community based development. Contribution to a constructive policy dialogue is one important aspect of the research.

RESEARCH ETHICS

Researchers and field staff should be respectful of local culture and the customary rights of local communities, and they should observe relevant laws and regulations within the host countries. Researchers should know and honour national and international obligations such as those outlined in the Convention on Biological Diversity, and the FAO Code of Conduct on Genetic Resources Collection and Transfer. Individuals or partner institutions in the LinKS project should not use genetic materials or information acquired through project participation for application for any form of intellectual property rights.

All researchers within the LinKS context should support the individual's and community's sense of pride in their knowledge and diversity. The finding of any research should be given back to the community involved, preferably in their own language and their own media.

METHODS AND APPROACHES

Quick methods, such as PRA (participatory rural appraisal) and surveys, are useful for gathering general information and can help to provide the base for an understanding of what the issues are in a given context. Methods that give researchers an opportunity to stay and work with local people for a certain period of time (such as case studies and participant observation) are therefore more appropriate tools to use to obtain an in-depth understanding of the dynamics of knowledge and poverty. .

Social science research (especially regarding knowledge and gender) should be integrated with research on technical issues (management of agro-biodiversity, seed selection). Hence, the LinKS project research should use an interdisciplinary approach to addressing the research questions and use teams with specialists from diverse disciplines such as agricultural sciences, ecology, anthropology, social and gender relations, geography and political sciences.

Interdisciplinary research is a dynamic process that may be assisted by structural design. The structural design must be developed when the research questions have been defined. The methodological approaches will have to depend upon each research question and how this question can be addressed in the best way. The dynamic processes will guide how the methodological approaches develop. However, it is generally advisable to use a range of research methods such as:

- literature reviews
- ethnographic methods
- PRA
- interviews of key informants and focus groups
- networking
- gender analysis
- sustainable livelihoods analysis
- narratives and life histories; as well as
- a range of techniques for analysing policy.

The main focus will be on gathering qualitative information to better understand the given situation rather than to come up with quantifiable results.

RESEARCH ISSUES

In the following outline, the research issues related to gender, biodiversity and local knowledge are divided into sections. Each section ends with a list of research questions and suggested

research methods. There should, however, be openness for new ideas and experimentation with different methods. Arranging seed fairs is an example of a special method to bring out hidden diversity and knowledge. There are many other such examples not mentioned in this document.

1. The knowledge and gender link

Patterns of labour division are part of a society's cultural system. Many societies favour a gendered division of labour where men and women do different work and possess knowledge and experiences of different kinds. Understanding the division of labour and gender roles in all aspects of agro-biodiversity management is a good starting point, but analysis of who does what needs to be followed up with more in-depth studies focusing on (1) social interactions; (2) underlying knowledge and understanding; and (3) to identify local experts and innovators.

Social interactions

Specific tasks may be done by certain family members according to sex, or sex and age, but other family members may be involved indirectly or through discussions. It can be wrong to conclude that a certain task is the exclusive responsibility of one sex. A smallholder farm is a family enterprise where roles and functions of individuals should not be isolated from the family context. There may also be important social interactions in the community, for instance in the form of collaboration, exchange and discussion with neighbours.

In cases where the man is absent, for instance because of labour migration, the issue of gender roles will obviously appear differently. How women farmers cope with and adapt to such situations is another important subject of study.

RESEARCH QUESTIONS

- Who does what and who has access to resources in the household and the community?
- Who manages and has knowledge about genetic resources, by gender, and how is this related to family and community interactions?
- How is women's management of plant genetic resources affected when husbands are absent due to labour migration or other reasons?

METHODS

- Gender analysis and PRA tools to understand the division of labour and who has experience.
- Surveys and informal interviews to gain more in-depth information.

Underlying knowledge and understanding

Decisions on choice of varieties, on seed selection, on cropping pattern and other aspects of the farming system all reflect a body of knowledge and understanding. Likewise, practices and methods of storing of seeds, processing and preparation of food, and on adaptation in crises, are manifestations of an old but evolving process of knowledge generation. The nature and extent of the underlying knowledge may be hard to deduce from seeing what people do. It may also be difficult to find out through interviews since researchers and local people may not have enough common concepts. Understanding the depths of and limits to the underlying knowledge may require the use of researchers who know local language and culture, and have time to stay and work with key informants over a sufficient period of time. This may also require the involvement of female researchers, for instance post-graduate students from relevant MSc programmes, where it is more culturally appropriate for women to work with local women.

Certain aspects of farming are subject to day-to-day decisions and therefore there are variations from season to season and from farm to farm. This is especially the case when looking at crop

varieties and cropping patterns. It is important to find out the knowledge and philosophy that guide such decisions. Hence it is important to consider that local knowledge is derived (mainly) from experiences, sometimes through deliberate experimentation. It is thus important to study how knowledge is gained through local experimentation, and the extent of that knowledge.

RESEARCH QUESTIONS

- What kinds of knowledge and understandings determine and guide local people's practices and decisions related to management of plant genetic resources?
- What are the dynamics of local knowledge; is it actually vanishing, or is it changing in response to changing circumstances? (again, who are you asking?)
- Does local experimentation occur? If so, elaborate the methods of local experimentation.

METHODS

Qualitative methods - case studies, participant observation and informal interviews.

Local experts and innovators

Even in communities where the farming system is uniform, there may be individual differences in regard to knowledge and practices with respect to experimentation and innovation. Thus there may be local experts whose innovations and ideas diffuse into the wider community. In-depth studies with key individuals may require a preliminary survey to identify relevant persons for such a study. It may be necessary to find the **local experts** and study the role and potentials of such local experts. The perspective of such research also includes the recognition of local knowledge in general and local experts in particular, and creating a situation where external and local sources of innovation and technology development could interact.

RESEARCH QUESTIONS

- Who are the local experts by gender and age?
- What are the roles and potential of local experts to:
  - ➡ serve as the local source of quality seeds?
  - ➡ experiment with new seeds and methods?
  - ➡ serve as contact person for external development agents?
  - ➡ spearhead new developmental initiatives?

METHODS

- Surveys to identify local experts who are relevant for this research;
- Participant observation, discussion and other qualitative methods with those identified as farmer breeders and innovators.

2. The biodiversity link

Seed security

Farmers are seed insecure when they do not have, or cannot afford to buy sufficient quantities of desired types of seeds with good enough quality to exploit the potentials of the farm.

In smallholder agriculture, the main source of planting materials is farmer-saved seeds, either their own or from neighbours, relatives or local markets. Commercial seeds mainly supply the commercial agricultural sector and play a supplementary role only in the small-scale sector of agriculture. Farmers who are seed insecure are unlikely to be able to access commercial seeds unless these are given as gifts. The source of the seed insecurity problem as well as the solutions

must therefore be sought in the community seed supply system. The research must clarify the extent of such problems and find out the reasons why some farmers are unable to save or otherwise access the seeds that they need.

RESEARCH QUESTIONS

- What is the extent and severity of seed insecurity?
- In case of seed insecurity, why is there seed insecurity and how can the situation be improved?

METHODS

Surveys

Understanding the farmer breeders

1. Identifying farmer breeders

Traditional management of seeds depends on seed selection practices that qualify as plant breeding. This may not be practiced by everybody, and not be practiced equally by different practitioners. There may be differences by gender and there may be individual differences. The research should clarify what are the gender roles and responsibility for seed selection. It should also identify local seed selection experts and their roles as sources of good seeds in the community.

2. Breeding methods

Studies of local seed selection usually focus on selection criteria and on times of selection. Selection criteria are related to local needs and preferences that may not be the same as in commercial plant breeding that emphasizes economic yield and market standards. Times of selection refer to selection based on observation in the field, during harvest or after harvest. Generally, plant breeding is done through some form of mass selection. Mass selection means choosing materials according to appearance (phenotype), bulking and replanting of selected seeds and then repetition of the selection next season. This is efficient in case of characters with a high heritability (such as colour or growth form) and less efficient or ineffective on characters with a low heritability (such as yield). However, mass selection can be practiced in many ways. There are examples of farmer breeders who consciously look for plants that do well relative to surrounding plants. That increases efficiency of selection for characters with a low heritability.

The research should thus clarify the mode and underlying knowledge related to the way mass selection is practiced by the local experts. The research should also be aware of the possible use of other forms of selection, such as pure line or clone selection (depending on crop type). Selection may be practiced in order to maintain or to change a variety. Maintenance selection may be necessary to avoid the deterioration of seeds that is likely to occur over time if no selection is practiced. Directional selection means selection to change/improve the variety. It is important to know the intention of farmer selectors in this respect.

3. Constraints

Technically, progress may be constrained by lack of potential for change in available genetic stock, or by inefficiency of breeding method. There may also be socio-economic constraints. Seed selection may require some “surplus” in the form of resources and time. The seed selectors are often found to be among the relatively better off in the communities. There could also be other socio-economic constraints.

4. Status and relations in society

The key question is: Do the local experts operate in isolation only benefiting themselves, or are they sources of good seeds allowing their selections to spread by diffusion in the community?

5. Seed exchange and diffusion

It is important to understand how seeds are diffused in the communities and how fast.

6. Value system (ownership/sharing of genetic resources)
Handling of seeds may reflect values or standards, consciously or unconsciously. Are seeds treated as a common good that can be freely shared and exchanged, or are the benefits of good seed selection the exclusive property or right of the seed selectors themselves? Is there an inherent value conflict when commercial seeds with attached intellectual property rights are introduced in communities where traditional seed management is still prevailing?

RESEARCH QUESTIONS

- How widespread (or rare) are practices of intensive and less intensive local plant breeding, and who are the local breeding experts by gender, age or other social variables (i.e./e.g.?)?
- In the case of intensive farmer breeding, what are the common selection criteria and times of selection?
- In the case of intensive farmer breeding, what are the breeding method in terms of how mass selection (or other types of selection) is applied?
- Do local breeders select for maintenance of varieties, or for improvement?
- In the case of breeding for improvement of varieties, what is the likely constraint to breeding progress, genetic variability, inefficiency of breeding method, or both?
- Do seeds that are generated by one farmer breeder diffuse into the society, if so how?
- Are genetic resources perceived as a common property that can be freely exchanged, or are there restrictions on the access to genetic resources?

METHODS

These questions require surveys to get the overall picture, and qualitative methods to elaborate methods, knowledge and perceptions at the level of individual farmer breeders. Some questions, or related issues, such as genetic potential of available germplasm, may require technical research on a plant breeding research station.

Farmer breeders as agents of conservation and development

When farmer breeders select seeds, selection changes with changing circumstances. If there is climate change, for instance in the form of more frequent occurrence of drought, farmers may switch to more emphasis on drought tolerant crops and short season varieties. When farming systems change, for instance by adoption of fertilizers, selection will favour fertilizer responsive plants. Thus farmer selectors are by nature responsive to change of circumstances and change of opportunities. They may therefore be particularly open for external development opportunities if those are provided by agencies that want to work with instead of replacing them. The prospects and potentials of using local seed selectors as partners in development should be explored.

Farmer breeders normally do not conserve particular landraces. But as long as active farmer breeding goes on, genetic diversity will remain in circulation and maintain an evolutionary potential. This is a different form of conservation compared with gene-bank storing of collected materials, and is important as a complementary conservation measure. The degree to which this traditional form of conservation is still intact and capable of keeping diversity alive should be elaborated.

RESEARCH QUESTIONS

- Are farmer breeders particularly open for external contributions and innovative initiatives?
- Are farmer breeders strategic individuals that can link community innovation systems to the external agents of development?
- Are on-going local breeding capable of maintaining the genetic resource base, or are the genetic resource base exposed to erosion?

METHODS

Most of this must be elaborated through case studies (qualitative methods) with farmer breeders. Findings must be analysed in conjunction with information gathered under other research questions, such as how common farmer breeders are.

Working with farmer breeders

1. Using gene banks for genetic restoration

Plant genetic resources in the form of landraces have been collected for conservation in gene banks for many years. Currently local materials from the countries that participate in the LinKS project are available in national gene banks, in the Regional SADC Gene Bank in Lusaka, in international gene banks belonging to the CGIAR, and to some of the bigger national gene banks, such as the one belonging to the United States Department of Agriculture. The purpose of the gene banks is to supply germplasm to "bona fide" users. In reality seeds are distributed to research institutes and breeding companies only. The idea of restoring seeds to communities is of more recent date. But it has become apparent that germplasm may disappear from a community because of natural or man-made disasters (such as drought and war) and be wanted back as part of a post-disaster recovery programme. This is mentioned as a special recommendation in the 1996 FAO Global Plan of Action on the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. The LinKS project could explore if communities know of lost germplasm that they wish to have back. In that case, the project could search for the materials in gene banks and facilitate restoration if the missing germplasm can be found.

2. Accessing materials from Research Stations

Research stations develop enhanced germplasm from which commercial varieties are derived. Such materials could also be distributed to farmer breeders for local selection or reselection. This could be done experimentally to monitor how farmer breeders would respond to and exploit such opportunities. Particularly populations of maize would be convenient for such research.

3. Progressive seed selection

If farmer breeders are found to be selecting for change, and if their method of mass selection is found to be inefficient, experimental instruction on more efficient forms of mass selection could be tried, with monitoring of farmers' response.

4. Disease resistance

In commercial plant breeding resistance to diseases, and sometimes to pests, belongs to the most important breeding targets. Usually single gene sources of resistance are employed, resulting in a form of resistance that tends to break down after some years of exposure in the field. When farmers use commercial varieties and the resistance breaks down, breeders must provide a new variety with resistance to the new strain of the disease. This may take time and is sometimes a source of farmer frustration with the modern varieties.

Landraces that are continuously exposed to local diseases will, if they are diverse enough, develop a degree of field resistance that gives an adequate protection. When new diseases appear, landraces may be devastated, but resistance to the new disease will start building up. In Zimbabwe the *gray leaf spot disease* is severely affecting maize. Releasing segregating breeding materials or open pollinated varieties to farmer breeders would enable the build up of resistance locally. That could be done in an experimental scale and be monitored by crop science experts and compared with the centralized breeding response to the same challenge.

RESEARCH QUESTIONS

- Is there demand or need for restoration of lost seeds in the communities?
- Are the lost seeds available in gene banks?

- Can efficiency of and interest in local seed selection be improved and stimulated by supply of enhanced germplasm with potentials for local reselection?
- Can efficiency of and interest in local seed selection be improved and stimulated by introduction of more efficient selection methods?
- Can plant diseases be managed by locally developed field resistance?

METHODS

These questions require the combined use of interviews and qualitative methods together with technical research. The technical side can search for relevant germplasm in gene banks and at research stations, and also participate in observation of how germplasm and methodology introductions are followed up and utilized by farmer breeders.

Seed storage

Farmers who save their own seeds must be capable of keeping their seeds without loss of germination capacity until the next planting season. Perfect seed security may depend on the ability to keep surplus seeds for one more year. This requires methods of processing of seeds (proper drying) and protecting them against moulds, weevils and rodents. The project could survey seed storage methods and differences in women's and men's experiences with maintenance of the quality of their seeds, and, if needed, explore appropriate ways of improvement of seed storage.

RESEARCH QUESTIONS

- What methods are used to process and store seeds?
- Are the locally stored seeds maintained adequately with respect to germination capacity at planting time?

METHODS

The questions may require surveys and must be specified according to crop type (i.e. seeds of some crops are easier to store than others).