Title: Assessment of the Impacts of Farmer Participation in Farmer Research Groups in the Highlands of Kabale, Uganda

Institution: Africa Highlands Ecoregional Programme (AHI); International Centre for Research in Agroforestry (ICRAF)

Project Scientist: Pascal Sanginga (P.Sanginga@cgiar.org)

Project Coordinator: Ann Stroud (A.Stroud@cgiar.org)

Project Staff: Jackson Tumwine (AHI Kabale), Nelson Turyahabwe, Geoffrey Manzi (CIAT/AHI)

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Abstract

The African Highlands Initiative (AHI) is promoting community-based participatory research approaches using farmer research groups (FRG) to catalyse farmer participation in research, and to widen the impact of participatory research. However, there is dearth of systematic empirical studies that evaluates the quality of participation in FRGs, and their impacts. This report summarises the results of an empirical study that investigated the types of participatory research that occurred at the different stages of the research process, how farmer participation occurred, who participates in FRG, what are the factors that determined farmers' participation in FRG, and what criteria to use in monitoring and evaluating the performance of FRG. Results showed that the types of participation were more of functional consultative and collaborative types, but varied in the different stages of the research process as farmers were increasingly taking on more roles and responsibilities. Farmer participation in FRG tend to follow a "U" shaped curve, with high participation at the initial stages of the process, followed by dramatic decrease as many farmers drop out from the groups, and slow increases towards the end of the first seasons. Similarly, there was a significantly higher participation of male farmers at the beginning of the process, compared to women. However, as FRGs progressed, the proportion of men decreased while the relative proportion of women increased dramatically to reach about 67% of farmers in mixed groups, and 24% of the FRGs were women only. These results suggest that FRG proved to be a more effective mechanism to involve women and the resource-poor farmers in research who would otherwise be bypassed by conventional approaches. The results of the Logit regression model confirmed that the probability of participating in FRG was higher for women compared to men, and that there were no significant differences in wealth circumstances between FRG members and the rest of the community. We argue that FRG as an approach has a great potential for catalyzing the participation of farmers as partners in research and development activities. However, this requires significant support and personal commitment of researchers to broaden the scope of FRGs from a functional consultative type to a more collegial empowering type, and from variety evaluation to broader natural resources management research and other developmental issues.

Key words: *Quality of participation, Farmer Research Groups, Gender, Participatory research, Uganda.*

1. Introduction

The highlands of Eastern Africa are characterized by medium to high agricultural potential (producing about 50% of staple foods), but diminishing resource bases. They constitute about 23% of the total landmass in the region, yet house over 50% of the population given their suitability to human habitation. Population densities are already relatively very high (100-200 people per km$^{2)}$, have risen over the last fifty years within this ecoregion, resulting to critically small, often fragmented farms reaching 0.25 to 1.0 ha for an average family of six (AHI 1998). There is a diminishing natural research base due to declining ability to: maintain and improve soil fertility and erosion control; intensify livestock feed and nutrient management systems; decrease in social cohesion, local institutions and conducive policies.. The development of more sustainable agriculture requires attention both to resource conserving technologies, and to local groups and institutions with external organisations and professionals working in partnership with local people.

Over the last six years, the African Highlands Initiative (AHI) has made substantial efforts to promote community-based participatory approaches to address NRM issues related to maintaining soil productivity and land use efficiency, and to generate technologies that are more appropriate to farmers' circumstances. AHI's guiding philosophy is a client-driven approach using participatory methods and an effective research development continuum where research partners, using collaborative, synergetic partnership can bring together diverse contributions to foster farmers' innovations and collective action for design and dissemination of appropriate, integrated technologies and methods for improving NRM in the diverse and complex situation (AHI 1999). The current focus of AHI is to promote the institutionalisation of participatory research approaches to solve natural resources management issues in the East African Highlands.

Institutionalizing farmer participatory research requires developing and strengthening a community based adaptive research capacity which can be achieved through working with groups of farmers, rather than individuals (Ashby and Sperling 1994). However, until recently, most researchers have tended to work with individual farmers (Pretty 1994), and may not have the skills to work with groups. The importance of groups in FPR has been largely underestimated. Yet, it has been pointed out that " when individual farmers are the researchers' point of contact, there is nothing to ensure that other farmers will learn from their experiences: participation is often limited to a handful of farmers who have plots on their fields" (Bebbigton *et al.* 1994: 2-3). As observed by Jassey (2000), while working with individual farmers has been a centralized process controlled by researchers and focusing on technology, working with groups is a more decentralized process which can be owned by farmers, and can focus more on learning and empowerment of farmers

AHI's approaches emphasize the use and formation of FRG as a central strategy to participatory research. The approach is also rapidly gaining ground and attracting the attention of many other research and development institutions to address agricultural and natural resources management problems in the region. It is argued that group approach is more effective as it promotes collective learning and exchanges that occur in group settings (Hagmann *et al.* 1999, Heinrich 1993), and ensures that more people participate, thus making participatory research cost-effective, and relevant to the needs of different categories of farmers (Ashby *et al.* 2000, Bebbington *et al.*1994). Given the diversity and complexity of farmers' needs, the more people participate in the research process, the better the benefits should be. Particularly, if groups can act as intermediaries and take on some of the cost of communication with members and other farmers, then they can generate efficiency savings in the process of participation (Carney1997:118). An additional important advantage of farmer research

group approach is to ensure that the risk is shared and not borne by individuals. Furthermore FRG may also be the most culturally acceptable way of working with farmers in most African rural societies (Jassey 2000).

While there is widespread support to FRG in participatory research, the issue of assessing the quality of participation in FRG is of central concern. However, there is a dearth of systematic and empirical studies on evaluating participation in farmer research groups. We still lack authoritative insights into this complex issue (Ashby 1997, Okali *et al.* 1994). Yet, such analysis is critical to building more effective ways of organising and working with farmers' groups, building their capacity to innovate and experiment, and to facilitate the sharing of experiences, knowledge and skills among farmers.
This report presents the results of an empirical study to assess the impacts of farmer participation in farmer research groups in AHI benchmark sites of Kabale, Uganda. It analyses the "building blocks" or dimensions of participation in FRG, the performance of FRG, and the factors explaining their success or failure in participatory research.

The rest of the report is organized into four sections. The next section outlines the quality of participation framework. Section three describes the data collection procedures, while section four presents and discusses the results of the study, also in four points. First we examine the types of participatory research at the different stages of the research process from the perspectives of both farmers and researchers. Then we discuss how farmer participation occurred and how the process is managed. The next sections investigate who is participating in FRG, and the factors determining farmers' participation in FRG. In conclusion, the paper outlines some issues that need to be considered in improving the quality of participation in FRG.

2. Analytical framework: The Quality of Participation in Participatory Research

Uphoff (1978) observed that participation, and participatory research, is an overreaching concept best approached by looking at its more specific components or its dimensions. The dimensions of participation concern the kinds of participation taking place, who participates in them, and how does the process take place. In this paper we use the term "quality of participation" in a more general sense to mean special or distinguishing feature of the participation process, and not in its more normative sense of how good or bad something is (Oxford, 2000). Recently, the CGIAR system wide programme on Participatory Research and Gender Analysis (PRGA) developed a framework, which distinguishes two components of quality of participation: the building blocks or dimensions of participation, and the management principles of participation (PRGA 2000). The building blocks represent the analytical variables to describe participatory research, and ask questions such as:

- What type of participation is involved? When, at what stage of the research, should stakeholders be involved?
- What is the degree or strength of the participation? What is the objective of participation? How is the participation process managed?
- Who participates? Who should make key decisions? What roles should the different participants play?
- What are the criteria for successful participation? How do the participants evaluate the process of participation and the results?

The management principles ask the question "how do we do participatory research (Ashby 1997), and concern methods, skills and principles in facilitation, reflection and systematization of learning processes. They refer to some elements that need to be considered in managing participatory research processes, and some methods and criteria used to determine the appropriateness, effectiveness and validity of participatory research processes. As pointed out by Oakley (1994) and Uphoff (1978), identifying the critical traits or vital signs of participation should be the basis of evaluation of

participation. The study was also set to test the following hypotheses with respect to the process of participation:

- *Hypothesis 1:* Different types of participation occur at the different stages of the research (experimentation) process in FRG
- *Hypothesis 2:* Farmers' participation in groups tend to follow the normal adoption curve (Roger 1995), rising slowly at first, accelerating to a maximum, and then increasing at gradually slower rates.
- *Hypothesis 3:* Farmer Research Group may exclude certain categories of local people, particularly women and poor farmers, who may not be able to absorb the cost of participation and experimentation. More specifically we hypothesized that :
  - Men tend to dominate community organisations (and therefore FRGs) as they are more likely to have land and other resources for experimentation, and are more likely to be in contact with external (research) organisations.
  - Resources-rich farmers are likely to dominate FRG as they have resources to absorb the cost of participation and of experimentation.
  - There are significant positive relationships between farmers' education level, membership in local organizations and farmers' participation in FRG.

3. Data collection methods

The empirical study was conducted within two benchmark sites (Rubaya and Kashambya) of the African Highlands Initiative (AHI) in Kabale, south-western Uganda. The Kabale benchmark site is located in the highlands of south-western Uganda. The site is characterised by high population densities (456 inhabitant/km^2), adequate bimodal rainfall (1000-1500 mm), numerous catchments with steep cultivated slopes (1900-2400 masl), with severely declining soil fertility, fragmented and scattered small land holdings (AHI 1998).

The data come from an empirical study of 21 FRGs using a combination of participatory methods and sample survey questionnaire. Focus group discussions were conducted with FRG members. Informal and semi-structured interviews were conducted with group leaders, group members as well as non-participating farmers. The analysis was complemented by an econometric analysis of survey questionnaire of a sample of 129 FRG members, and 61 non-participating men and women farmers within the communities. The empirical model of the factors determining participation in FRG was estimated by the Logit model using the LIMDEP econometric software (LIMPDEP 1994). The Logit model is a regression technique that has been shown to be appropriate for examining qualitative dependent variables (such as participation), and permits their interpretation as probability (Lia 1994). It has been extensively used in empirical adoption studies (CIMMYT 1993, Feder et al., 1993).

4. Results and Discussions

4. 1.Types of Participation in FRG

There exists a large body of literature suggesting various typologies of FPR (Martin and Sherrington 1997, Pretty 1994, Okali *et al.* 1994, Biggs 1989, Ashby 1987). However, Biggs' classification, based on the different relationships between researcher and farmers, and their decision-making roles at various stages of the research process, is probably the most used. Drawing upon Biggs' classification, Lilja and Ashby (1999) developed a checklist to assess the types of participatory research at different stages of the research process, based on the locus of decision making. The checklist distinguishes three research stages with about sixteen activities, and five types of participatory research depending on who makes the decision at various stages in the innovation process. The five types of FPR are:

- Type A *(contractual):* Scientists make the decision alone without organized communication with farmers, usually contracting farmers to provide land, labour and other services needed for on-farm research, without being involved in decision making.
- Type B *(consultative):* Scientists make the decision alone but with organized communication with farmers. Scientists consult farmers about their problems, opinions, preferences and priorities through organized one-way communication, but the decisions are not made with farmers nor are there delegated to farmers.
- Type C *(collaborative):* The decisions are jointly made by farmers and scientists through a two-way organized communication, and continuous interaction between farmers and researchers who are seen as partners in the research process.
- Type D *(collegial):* The decisions are made by farmers collectively in a group process or by individual farmers who are involved in organized communication with scientists. Farmers have the major say in running the experiment, but may seek advice from scientists who may be facilitating the collective or individual decision-making of farmers or may have already built the ability of farmers to make the decision with little outsider involvement. The major emphasis here is on activities designed to increase the ability of farmers to do research and request information and services from formal research and extension organizations.
- Type E *(farmer experimentation):* Farmers make the decision individually or in a group without organized communication with scientists. This concerns research-minded farmers who experiment on their own.

A generalized research process in AHI sites or cycle would consist of: initial community contact and clarification of expectations, followed by a joint diagnosis, discussion and design of solutions; farmer testing and modification of solutions; joint analysis, monitoring, evaluation, adaptation and dissemination; and continual sharing and reflection by the various stakeholders and key actors on the process and the results. The aim is to conduct research work in a more participatory and consistent way with the residents or stakeholders, moving the process from where it is towards a more collegial type of relationship. Greater participation of the resident stakeholders in all these processes moving in general terms from the consultative to collegial mode is the major thrust of this project.

Table 1: Types of participation – current status and future targets

Process	Passive Contractual Consultative Collaborative Collegial farmer experimentation
Organization of process	X----------→
Problem/issue identification	X----------→
Planning & designing	X----------→
Implementation (research & dissemination)	X----------→[2]
Assessment & analysis	X X----------→
Monitoring	X----------→
Evaluating	X----------→
Capacity building	X----------→
Knowledge	X- - - - - - - - - - - - -- - - - - - -X----------→

source	

[1] Current condition ; [2] Refers to on-farm trials & technology dissemination
X Current condition; --→ where we want to be in 2-3 years

An analysis of the types of participatory research in AHI-Kabale revealed that typically, farmers' participation occurred in the stage of technology evaluation and dissemination. We distinguished eight different stages within AHI's participatory agroecosystem management (PAM) approach. These included: diagnostic, solutions identification, trial planning, trial implementation, trial management, monitoring (data collection), data analysis (evaluation), and dissemination. In general, PRA exercises provided starting points to identify problems by developing problem trees with farmers, which were then used as a basis for identifying and selecting solutions and best-bet technologies that were the most likely entry points. Once the entry-points were established, PAM planning workshops were organized to develop participatory research action plans (PRAP). Then scientists designed adaptive research experiments, which were established on farmers' fields, managed by farmers and evaluated to select best-bet options to disseminate to farmers. The major thrust of AHI is to promote greater participation of farmers in all the research process, moving from the consultative to more collegial type of participation. However, this is far from being reflected in actual practice.

We hypothesized that different types of participation occured at the different stages of the experimentation process in FRG, and that farmers and scientists may have different perceptions of the participatory process. Figure 1 shows the analysis of the types of participation in different stages of the participatory research process from the perspectives of researchers and farmers. Results show some interesting differences between farmers and researchers in their perception of type and degree of participation at the different stages of the experimentation process. For instance, in diagnostic stage, researchers relied on PRA to identify major problems, and develop problem trees, mapping resources bases, and current farming strategies. However, while researchers indicated that farmers were consulted in identifying and designing solutions, farmers did not recognize their active participation, and instead believed that researchers "brought" solutions ("medicine") to their problems. It appeared that after diagnozing problems with farmers, researchers then identified on-shelf solutions or best-bet solutions to be evaluated by farmers in farmers' fields. Then simple trails were designed by researchers and established with farmers in group experiments to evaluate different varieties of crops and management practices.

Similarly, farmers' involvement in data collection and analysis of trial results was rather limited, except in some cases where field visits were organized and informal evaluations carried out without organized communication between farmers and researchers. This points to a lack of systematic feedback process to scientists and to the research system. However, we observed that in many cases, farmers recognized to take some independent initiatives in the management of trials on a more collegial mode. In many FRGs, farmers seemed to be keen on taking over control of some stages in the research, often without researchers' knowledge. Dissemination of proven technologies was a spontaneous farmer-to-farmer dissemination, without knowledge of or recommendations from the researcher.

Although there are opportunities to give more roles to farmers (such as monitoring, evaluation, trial management), researchers were still applying more of consultative types of participation. These differences in the different roles and responsibilities of researchers and farmers seem to point to a more functional type of participation and a lack of ownership and responsibility of the process by the farmers. There is need to support research teams and farmers to improve the quality of participation, moving from where it is now towards a more collegial type of participation to build farmers and communities capacity to innovate and conduct experiment on their own. It is interesting to note that this figure and

the checklist can be used as a monitoring tool to assess the progress and changes made in the degree and intensity of participation of farmers at different points in time.

4.2. HOW does participation occur in FRG?

Table 2 gives a brief profile of the FRG in Kabale. The majority of the 21 FRGs in AHI sites were newly formed groups (71%) and only 29% were existing groups. Most FRGs were formed between 1998 and 1999, and have conducted three to six seasons of experiments. The average number of farmers in each group was 28 ranging from 10 to 45 farmers. FRGs were either mixed (76%) or exclusively women's groups (24%) (See picture 1and 2). Most experiments are still on the basics of improved farming methods, testing and evaluation of new varieties, fertilizer application, and other agronomic practices that most farmers did not have prior experiences on. Generally, the experiments compare different improved crop varieties and improved agronomic practices to local varieties and local farming methods. Virtually all FRGs have experiments on new varieties of beans and potatoes, the two most important food and cash crops in the area, with some FRGs reaching the stage of seed multiplication for the two crops. Other experiments include testing and evaluation of different varieties of maize, wheat, sorghum and sweet potatoes. NRM research focuses on soil fertility management and includes experiments on different regimes of inorganic fertilizer application, farm yard manure management, leguminous cover crop, integrated disease management of potatoes bacterial wilt and beans root rot. These are often conducted on individual plots of group members. However, it is interesting to note that a growing number of FRGs have expressed high interests in agroforestry technologies, after some exposure exchange visits both to research station and farmers' fields. In 2000 season, some four FRGs (19%) initiated agroforestry experiments, starting with tree nurseries, while another one FRG had prior nurseries of forest trees (eucalyptus and pines).

Table 2: Profile of Farmers Research Groups in Kabale

FRG Characteristics	N= 21
Number of mixed groups	16 (76%)
Number of all-women groups	5 (24%)
Number of all-men Groups	0
Proportion of women in mixed groups	67%
Average number of members	28 (range 10-65)
Number of Existing groups	6 (29%)
Number of New groups	15 (71%)
Average number of technologies	2.1 (range 1-7)
Average number of experiment seasons (2 seasons/year)	3.5 (range 1-8)

As noted above, the majority of FRGs were initiated specifically for the purpose of research. Analysis of FRGs formation and development process showed that virtually all have passed the “storming” stage and reached the "norming" stage (Pretty *et al* 1995) with clear efforts to establish group structures, norms and regulations. Only a few have reached the performing stage where group members are raping some of the benefits of participation in FRG. In the newly formed FRGs, initial participation of members was mainly through voluntary self-selection of farmers based on their interest and willingness to participate in research. Usually, after initial PAM diagnostic and planning stages, farmers were

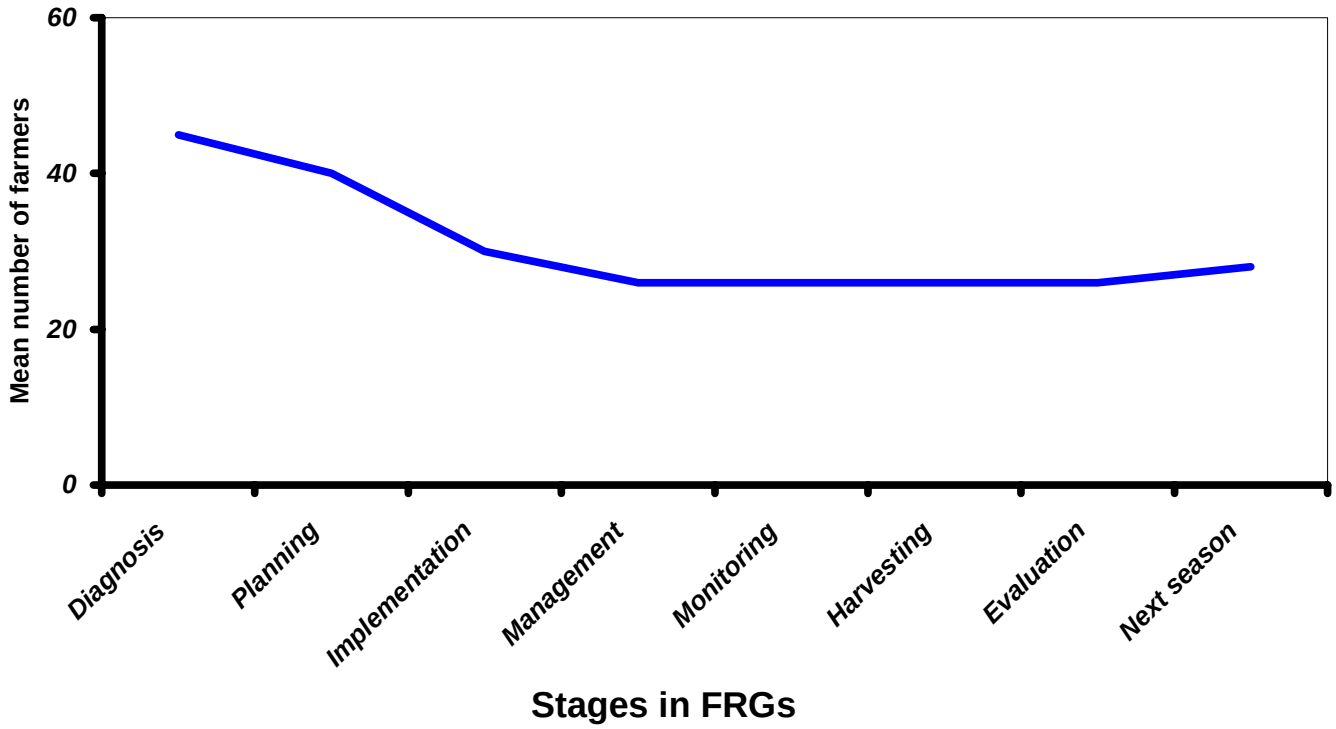
advised to form groups to be able to participate in the research programme. No explicit criteria for membership were laid down, and there was no proactive role of scientists to facilitate or guide the selection of members. In contrast to the CIALs, FRG members are not elected by the communities, nor are they conducting research on behalf of the communities.

In line with the different roles of scientists and farmers implied in the different types of participatory research, scientists generally provide technical leadership, supply small quantities of experimental materials (mainly seeds and inorganic fertilizers), and in most cases field assistants provide technical training to farmers in experimentation practices and monitor the experiments (data collection). The research team has also a sociologist who, among other things, facilitates group dynamics and supports FRG to strengthen their organizational capacity. Experiments are usually planned and conducted by the group on a collective group plot often donated by one FRG member, or rented out by the group, or in some cases on individual plots managed by the group. All routine experiment management activities (land preparation, planting, weeding, harvesting) are carried out collectively on the group plot for two or three seasons, before seeds are shared among individual farmers for further experimentation and for seed multiplication. FRGs are then expected to conduct other rounds of experiments on other technologies, while continuing with informal seed multiplication to sustain both the group and the interest of members in group activities. It is interesting to note that these roles are evolving and in some successful FRGs, farmers are increasingly taking on some of the researchers' roles, and are willing to take on more responsibilities.

We analysed the trend of participation in the 21 FRGs, at the different stages of the experimentation process. Our initial hypothesis was that farmers' participation in groups tend to follow the normal adoption curve (Roger 1995), rising slowly at first, accelerating to a maximum, and then increasing at gradually slower rates. Results show that farmer participation in FRG tend instead to follow a *"U*" shaped curve (Figure 2), with high participation at the initial stages of the process, followed by dramatic decrease as many farmers drop out from the groups, and slow increases towards the end of the first seasons. Many farmers participated in the diagnosis and group formation stages expecting free handouts (fertilizers, seeds, pesticides and credit…). They later dropped out when they discovered that there were no immediate personal benefits and free handouts. Ashby *et al.* (2000) also observed that CIALs often go through a difficult period during their early development when the initial enthusiasm experienced at the motivational stage and diagnostic meetings has worn off. Some members lose interests, other drop out. However, after going through this "storming" period (Pretty *et al.* 1994) when many members drop out, the FRGs established their group structure by electing a five to seven member executive committees, and by agreeing on some common rules, norms and regulations. Towards the end of the first season when groups harvest their successful experiments, more farmers want to join FRGs. While some groups were inclusive and open to new members, the majority of FRGs established strict norms to restrict new members.

4.3. WHO Participates?

Figure 2: Pattern of Participation in Farmer Research Groups

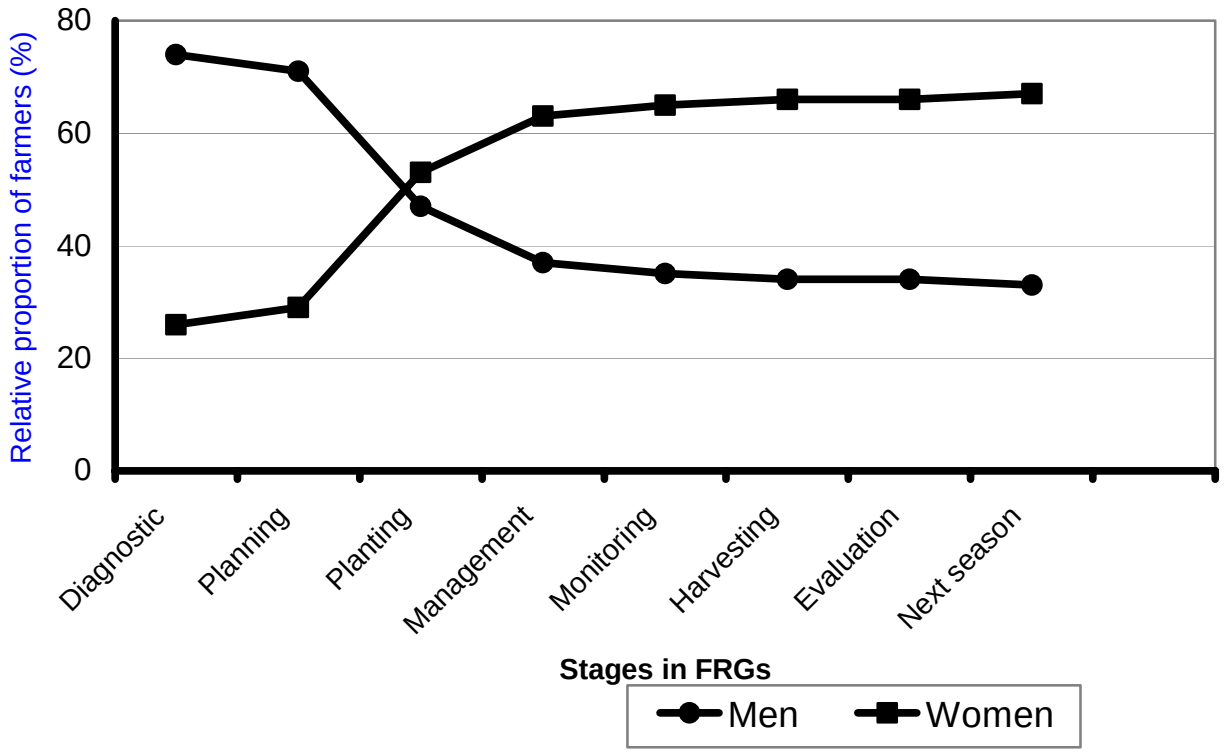


It cannot be assumed that farmers' oganizations will represent all groups in the local community (Bebbigton *et al.* 1994). The identification of the specific characteristics of the participants thus is important in assessing the quality of participation, as it determines who participates and how the process would be managed. Two aspects of who participates need to be clarified in order to interpret the nature (quality) of participation: representation and expertise i.e. whether the participants are representative of a population of end users, and whether the participants bring relevant expertise to the process (Ashby 1997). Gender and wealth are basic determinants of representation and expertise and need to be used as criteria for distinguishing who participates. We therefore hypothesized that: *Farmer Research Group may exclude certain categories of local people, particularly women and poor farmers, who may not be able to absorb the cost of participation and experimentation.*

Gender

Previous studies on farmers research organizations have reported significant gender differences in farmers' participation in groups. In his study on participatory evaluation of farmers' organizations in Asia, Uphoff (1988) found that membership in farmers' organizatios was only about 5% female, and less than 1% of farmer representatives were women. Similarly, Ashby et al (2000) reported that the majority of CIALs in Colombia were men only (56%) while only 7% include women only, and women were in the minority (31%) in mixed CIALs and tended to drop out. In Honduras, specific efforts were necessary to include women given their rather low representation in CIALs (Humphries *et al.* 2000). This suggests that women may have less organizational responsibility. We therefore hypothesized that: *Men tend to dominate community organisations (and therefore FRGs) as they are more likely to have land and other resources for experimentation, and are more likely to be in contact with external (research) organisations.*

Figure 3: Men and women farmers' participation in FRGs



Results in figure 3 show that there was a significantly higher participation of male farmers at the beginning of the process, compared to women. However, as FRGs progressed, the proportion of men decreased while the relative proportion of women increased dramatically. Women represented about 67% of farmers in mixed groups, and 24% of the FRGs were women only. By contrast, there was no exclusive men's group, and men were reported to have lower participation rates in mixed groups. However, men monopolized leadership positions in mixed groups. Analysis of leadership position in mixed FRGs showed that virtually all chairpersons were men (92%), while the majority of vice chairpersons were women (55%). Further FRG secretaries tended to be men (83 %) in mixed groups, while women are often assigned the role of treasurer (72%) because of their perceived integrity and reliability in keeping group funds and other assets. In general we found that men occupied about 62% of positions in mixed FRGs executive committees, despite the fact that women constitute the large majority of members.

These gender biases in leadership position can be explained by persistent gender relations within the household and the community that men are more able in making decisions, organize group activities and maintain discipline within the group. Also, men are better placed to establish contacts with external institutions, and to voice their needs and demands. Also, the majority of women interviewed argued that having some men in the group offers some protection to the women and serves some public relations within and outside the community. Even in women only FRG, it is common to find some men appointed as advisor or patron to women's group. In Zimbabwe, women indicated that it was not necessary to have separate women's groups since their needs were the same as the men (Jiggins 2001) However, it is interesting to note that there are important dynamics occurring in mixed groups, with women

increasingly taking on leadership positions, often by duplicating men's positions or by creating separate women's activities. Furthermore, some 22% of women argued that men are not reliable, and are difficult to work with in a group for collective interest, rather than individual benefits. Early diagnostic survey conducted by AHI in Kabale (AHI 1998) also showed that alcoholism and idleness among men was indeed one of the most important problems constraining agricultural productivity.

The higher participation of women can be explained by their dominant roles and responsibilities in crop production. Like in many other parts of sub-Saharan Africa the feminization of agriculture (Kaaria and Ashby 2000) has meant that women are now performing most of the agricultural activities, even those traditionally done by men. A baseline survey conducted to analyse gender division of roles and responsibilities in agriculttural activities showed that women were responsible for much of the farm work, accounting up to 97.5% of farm activities. There were also a number of informal women's groups and networks which existed with the purpose of working on farms for income. We found that women had a significant amount of control and decision-making within the household and in controling their income. For example, about 70% of the married women kept separate their income and did not pool it together with their husbands. Only 10% of the women said their husband controlled the household money. These were relatively younger couples.

Further, groups are known to provide women with a legitimate social space to foster a sense of solidarity and collective action. Several studies conducted by the World Bank in Africa, show that women's groups have proved to be one of the most effective entry points for activities reaching poor households, and among the most effective local-level institutions (World Bank 1998). Thus making significant efforts to involve women in research can bring significant returns to research. We argue that FRG is an effective mechanism to provide women with opportunities to participate in agricultural research and development.

Wealth categories

Similarly to gender, some authors have pointed out to the limited capacity of research and development organizations to work with the poorest groups who tend to select themselves out of activities which demand time, risk, or other commitments (Ashby and Sperling 1994). Rich farmers are likely to be in contact with researchers and development agents, by contrast to the poor who do not have resources and time to be involved in research activities, nor are they likely to have the political standing to get themselves elected into groups or committees (Humphries *et al.* 2000). Thus we hypothesized that: *Resources-rich farmers are likely to dominate FRG as they have resources to absorb the cost of participation and of experimentation.*

The distinguishing characteristics of wealth categories are summarised in the table 3 below.

Table 3: Characteristics of different Wealth Categories in Rubaya, Kabale, Uganda

Class 1: Resources-rich farmers (Not so poor farmers)	Class 2: Average farmers	Class 3: Resources-poor farmers
Large farms, more than 10-15 pieces of land, sometimes in valley bottoms Own 4-5 heads of cattle and many goats Buy land in addition to inherited	Have 6-10 pieces of land Have surplus for sale Have 1-3 heads of cow and some goats Rarely buy land in addition to inherited land	Have only inherited land (2-5 pieces) Have grass thatched houses Sell land in case of problems Exchange labour for land, money or food

land Have higher income from crop surplus sales, and off-farm income Hire casual labour Have permanent iron roofed houses	Have semi-permanent iron roofed house	No cattle, only few chickens and sometimes some goats

Table 4 shows the distribution of FRGs members by wealth categories. Wealth ranking exercises based on local socially defined well-being categories and interviews with FRG members showed that the majority of FRG members were in the average group (68% compared to 53% in larger community). Resources-rich farmers (not so poor) represented 18% of FRG members and 21% in the larger communities. The poor represented 14% in FRGs compared to 26% in larger communities. However, resources rich farmers and educated farmers dominated leadership positions in FRGs committees. It may be argued that there is a risk that participation in FRG may result in the capture of the benefits by the rich, to the detriment of the poor (Hoddinot *et al.* 2000). Rich farmers are more likely to retain knowledge and technologies for their own use instead of sharing them with the community (Ashby and Sperling 1994). There is thus therefore a real risk for FPR of creating a privileged group of farmers with access to technology.

It has been argued that working with rich farmers may lead to technologies which are not appropriate to poor farmers, and which may not benefit them (Selener 1997, Sims and Leonard 1989). In Kabale, to the exception of the small minority of valley bottom commercial dairy farmers, often residing in cities, it can be argued that virtually all farmers are small-scale resource -poor farmers using traditional methods of farming. Although there exists some differentiation among this category based on socially and locally defined wealth categories and assets, their production conditions are generally similar, and technologies developed with one category can also benefit the other. We found no evidence to support the hypothesis that rich farmers monopolised the benefits and technologies developed within FRG, as poor people also participate in FRG. Experience with the CIALs has also shown that poor people have successfully participated in research and conducting experiences (Ashby *et al.* 2000, Humphries *et al.* 2000), and that CIALs could also benefit poor farmers.

Table 4: Comparison of wealth categories between FRG members and other farmers in the communities (%)

Wealth Categories	FRG Members	Other farmers
Class 1: Resources-rich farmers (Not so poor farmers)	18	21
Class 2: Average farmers	68	53
Class 3: Resources-poor farmers	14	26
Total	100	100

4.4. Determinants of farmer participation in FRG

It cannot be expected that a single FRG would represent all categories of farmers in a community. In order to determine what categories of farmers were likely to participate in FRGs, and to investigate their

characteristics, we conducted a survey of FRG members and other farmers in the community. The results of the Logit model (Table 5) showed that five out of the eleven variables included in the model were significant in explaining farmers' participation in FRG. These were gender, contact with extension services, availability of family labour, village distance, and household decision-making pattern.

Table 5: Determinants of farmers' participation in Farmer Research Group: A Logit model

Variables	Coefficients	Std Error	T ratio	Mean of X	Std Dev. of X
Gender (Men = 1, women =0)	-2.5027	1.251	-2.00**	0.4833	0.5016
Age of the farmer (years)	0.96791E-01	0.8403E-01	1.152	37.62	11.748
Education level (years of schooling)	0.39550E-01	0.2018	0.196	6.6207	3.6942
Family labour (household size)	0.60842	0.3162	1.924**	5.95	2.435
Extension contacts	2.4865	0.7762	3.203***	1.7583	2.2153
Village distance	1.3186	0.7599	1.735*	5.9500	2.4352
Decision making pattern	3.6912	1.486	2.484**	1.266	0.6576
Household headship status	-0.43874	1.256	-0.349	1.0667	0.49761
Membership in associations	0.29588	1.247	0.237	1.558	0.74242
Wealth category	0.35246	1.059	0.333	2.2272	0.52561
Constant	-22.941	9.761	-2.350**		
Log-Likelihood----	-117.33				
Percent of correct predictions:	94.17%				
Sample size	170				

*** Singificant at 1%, ** singificant at 5%, * significant 10%

The negative sign on gender confirmed our earlier observations that men farmers have a lower probability of participation than women farmers. Family labour as measured by household size was also significant in determining participation in FRG as the availability of family labour allows farmers to participate in group activities without negatively affecting their individual activities. Also, men farmers with available family labour were more likely to get their wives or children represent them when carrying out some group activities such as weeding, land preparation and other collective activities. The results also revealed that farmers from households where a cooperative and bargaining decision-making pattern prevailed, had high probability of participation than in households where there was a unitary, single decision-making pattern. The results concerning contact with extension services were expected as many empirical findings have indicated that contact with extension services increases the probability of participation as farmers become more aware of innovations, and tend to select themselves for experimenting with innovations. These results could be explained by a self-selection process by which the more risk-averse farmers seek more information. Similarly, village access was an important variable, as farmers living in remote villages were less likely to have contacts with external organizations such as researchers who limit themselves to more accessible villages.

In line with our earlier observations, the results showed no significant differences in the economic and wealth circumstances between FRG members and the rest of the community, suggesting that resources-poor farmers were also involved in FRG, along with resource-rich farmers. Although positive, the effects of education, age of the farmers, and household head status were not significant in explaining farmers' participation in FRGs. The results concerning membership of local organizations were unexpected, as it is known that farmers belonging to local organizations are more likely to participate and select themselves for new organizations. For example, Humphries *et al.* (2000) found that the majority of CIALs members have been involved in past projects, and served as community leaders or members of local organizations. In Kabale, we observed that local organizations that could facilitate participation in FRGs were generally non-existent or weak, and it was necessary to form new FRGs.

4.5. Performance Evaluation of Farmer Research Groups

It was initially hypothesised that the use of the participatory research process will increase the number and range of technologies for farmers, will enhance adaptation of technologies to heterogeneous environments and resource endowment circumstances; thus making the research process more efficient and ultimately faster. There will be greater technology uptake (testing and adaptation) by a big number of farmers. The following impact categories and indicators to be monitored were thus developed at the inception of the project.

Table 8 : Proposed impact categories and indicators to be monitored

Impact Categories	Indicators
1. Improved decision making	1.1 Range of stakeholders in making decisions with high impact 1.2 Fora for decision making 1.3 Decision making processes and skills
2. Increased knowledge base	1.1 Knowledge of technical options 1.2 Documentation of local knowledge 1.3 Status of information network
3. Increased equity	3.1 Knowledge of stakeholders, needs and interests 3.2 Participation of range of stakeholders 3.3 Nature of bargaining power
4. Skills enhancement	4.1 Skills for negotiation & facilitation enhanced 4.2 Ability to express perception of issues & change in larger scale 4.3 Use of stakeholder analysis
5. Increased generation and use of participatory methods and tools	5.1 Number & diversity of uses of tools & methods 5.2 Tool/method designers diversification

We initiated a participatory monitoring and evaluation system to more actively involve farmers in tracking changes and sharing results both for feed back to research, self-reflection and critical learning. Participatory evaluation processes evolved around a list of expectations, fears, and activities and objectives which partain to important aspects that FRG members were concerned with. Seven major

performance criteria and their indicators were identified through a facilitated process of farmers' self assessment by farmers.

Table 6: Performance criteria and indicators of Farmer Research Groups

Performance Criteria	Performance Indicators
Group organizational capacity	Group formation, group objectives, leadership, group structure, norms, rules and regulations, decision-making, meetings and group activities, communication, record keeping, group dynamics
Experimentation/research activities	Number of experiments, number of options/technologies, number of people with experiments, extent of experimentation, expansion to other crops and plots, extent of own experiment, feedback to research, spill over effects, technology outputs,)
Participation process	number of people attending meetings, group activities, extent of participation, decision making, communication, group dynamics; participation of women in decision-making
Human capital	Knowledge of technical options, new farming methods, self esteem, self confidence acquired in FRG, skills in implementing options, attitudes; innovativeness
Social capital (Bonding)	Cooperation, trust, collective action, group cohesion, compliance to norms and rules, diversity of membership, heterogeneity/homogeneity of members
Social capital (Bridging)	Contacts with external institutions; Contacts and relations with other groups, associations and local institutions; Initiatives to contact external organizations; Collaboration/relation with local councils; Exchange visits, field days; visits by external organisations
Reach or dissemination	relations with rest of community, sharing of information and technology, farmer-to farmer dissemination; sharing of experience
Sustainability	financial contribution, diversification of activities, vertical linkages, own initiatives, plan for future, dependence to external organizations

These performance criteria were assessed using a five point scale (5-4= High 3= Average and 2-1=Low). The results of performance evaluation (Table 4) were mixed. About half of the groups had a low performance level. These groups were found to be in a "storming stage" where members are just beginning to have a loose sense of group. FRGs in the high performance category, have established norms and rules, elected their leaders, developed a group organizational structure and diversified their activities. These groups have reached a performing stage where members have started to gain individual benefits from the group. These groups also scored high on indices of group sustainability and social capital.

Table 7: Performance Evaluation of Farmer Research Groups in Kabale (N=21)

Performance Criteria	Performance Level % (N=21)*		
	High	Medium	Low
Group organization	29	38	33
Activities	48	33	19
Participation	33	52	14
Human Capital	24	38	38
Social Capital-bonding	33	28	38
Social Capital- bridging	14	19	67
Reach -Dissemination	19	38	43
Sustainability	14	19	14
Overall Assessment	24%	33%	43%

* Three newly formed groups were not included in the analysis

Firstly, perhaps the most significant impact of FRG is its capacity to reach women and the poor: FRG proved to be an effective mean of reaching rural women and rural poor as they are often neglected by formal research and extension services. Women constituted about 67% of FRG members in mixed groups and have formed their separate FRGs without a proactive intervention from researchers. Similarly, resources poor farmers, who would otherwise be bypassed by conventional approaches, also participated in FRG. Results of focus groups discussions with men and women revealed that FRGs are increasingly contributing to modifying gender relations, roles and responsibilities with men members of FRG becoming increasingly involved in agricultural activities, along side women, and better appreciating women's roles. As noted earlier, PRA exercises in Kabale revealed that one of the most important social problems affecting agricultural productivity in Kabale is "idleness" of men to the extent that district ordinances and local by-laws have been put forward to force men to participate in agricultural activities. Local drama are usually performed in the communities and consistently address the problems of alcoholism among men.

Secondly, the majority of farmers reported significant improvements in human capital, that is in their capacities, knowledge, attitudes and skills. Farmers are collectively acquiring new skills and new knowledge, gaining confidence and self-esteem to articulate their opinions and problems in groups, and in meetings with external organizations. A considerable number of individual farmers have initiated their own experiments on their individual fields, and helped other to establish demonstration plots. Some farmers are now being considered as "experts" in their communities and are usually consulted by other farmers for advice on seed production, fertilizer application and herbicide use. It is important to note that the two last seasons of experiments were badly affected by prolonged drought. While scientists were easily discouraged by the failures of experiments, farmers were willing to try other rounds of experiments. However, so far very little modifications or adaptations have been made by farmers. Instead, some groups have established their own experimental plots where they made modifications, often without the knowledge of scientists. Farmers have also understood the practice of experimentation as a learning process through small plots, and good management practices, contrary to the prevailing system of free hand outs often promoted by a number of NGOs in the area. However, by contrast, in some other FRGs farmers were more motivated by free improved seeds every new

season. They were more dependent on researchers and have not been able to produce their own seeds after about 4 seasons of experiments.

The results showed that the organizational capacity of the majority of groups needs to be strengthened. This would have beneficial implications on both social capital and sustainability. One of the indicators group sustainability was financial contribution, i.e. the extent to which groups generated money for its activities and functioning. Groups with high levels of performance had developed some rules for financial contributions. These included regular contributions by members or levy of contribution for special events, imposition of fines for failure to participate in group activities, subscription by new members, selling of seeds after harvest of experiments and seed multiplication plots, hiring out group labour to the community. In general contributions to groups did not exceed Shs. 1000 (US$ 0.6) per member and many members expressed difficulties in raising the money. Some group members pay for their fellow members against labour on their individual plots, or other dedicated members have to sell their labour to raise the money. Fines imposed to members for not participating in group activities were equivalent to local labour wages and varied between Shs 500 and Shs 1000 (US$ 0.3 and 0.6). In high performing groups, there was compliance to these rules, while no clear rules existed in other groups.
Although these contributions and fines represent important efforts by FRGs towards financial sustainability, the amount of money generated is still very limited for meaningful activities, i.e. purchase of inputs for experiment or other group activities (fertilizers, farm implements, improved seeds. There is need to develop more sustainable financial mechanisms to reinforce the organizational capacity of these groups in order to take advantage of current policies and opportunities and reforms in the agricultural sector in Uganda(decentralization and privatization of agricultural extension services, decentarlization of agricultural research centres, plan for modernization of agriculture (PAM), etc.

Finally, FRGs are also supporting mutual beneficial collective action (Uphoff 2000) and other important dimensions of social capital such as exchange of information and knowledge, sharing of resources, collective management of resources, community engagement, spirit of voluntarism, charitable involvement, and local community participation in research and development activities. Recent studies have shown that certain dimensions of social capital such as group functioning, participation in decision-making, financial and in kind contribution to groups, can generate returns that exceed those of human capital (Burt 1998), and can contribute significantly to household welfare (Narayan and Pritchett 1999). Social capital is in fact the capital of the poor (Woolcock and Narayan 200). In this context, FRG is a resource that women and the poor are using for reducing risks, accessing agricultural technologies, information and other benefits of collective action. The majority of these FRGs have strengthened their organizational capacity, their group structure and leadership structure to act collectively, not only on their experiments activities, but increasingly towards other common good. Farmers are increasingly arranging rotating group exchange labour trough FRGs and other activities demanding collective action. They are increasingly becoming resources that individual farmers are using to access agricultural technologies, services and information; reduce risks and coordinate collective action.

We found that FRGs are increasingly becoming vehicle through which farmers are pursuing wider concerns, initiating new activities, organizing collective action among members and extending relations and linkages with external organisations. New groups have emerged and demanded to be included in AHI. FRG also provided farmers, particularly women with legitimate social space to widen their social interactions, and organize collective actions, through regular fora and meetings. These FRGs are increasingly taking the lead in catalysing the development process within their communities, and are increasingly making demands to AHI's and other research and development organizations. For instance, most FRG are now demanding for agroforestry technologies, and more varieties of different

crops. Some have initiated crafting activities to generate income, while others have expanded their activities to include a local rotating saving and credit schemes. Farmers in Rubaya have also initiated a local bank for the purchase of fertilizer and have mobilized up to Ushs 617,000 ($363), and local stockists of fertilizers and pesticides are now organizing themselves. With the initiation of exposure exchange visits, FRGs are also helping to build "bridging" social capital by linking FRGs amongst themselves, and to other formal and informal research and development organizations.

Recent studies have also shown that social capital is associated with early adoption of innovations by facilitating greater linkages among individuals, social participation, interpersonnal connectdness , norms and networks that enable people to act collectively. We found some evidence of "learning with spill over effects " in the sense that technologies (seeds) and skills are gradually shared with other community members, through farmer-to-farmer exchanges and sale of seeds. Yet, in some FRGs, there is tendency to exclude non-group members in an attempt to monopolize the benefits (improved varieties), in reaction to the ridicule from other community members at the initial stages. This later behaviour is consistent with Humphries *et al.* (2000) observations that when research yields private benefits (like improved varieties) it may be of interest of farmers to continue excluding others in the community so that they may capture a larger proportion of the benefits. However, it is too early to make definite conclusion as most FRGs are relatively recent and we cannot expect benefits to spread into community to non-FRG members in a short time. Most FRG are likely to privilege their members, before other members.

We argue that FRG makes the adoption of agricultural technologies more likely as many people evaluate different technologies together, and in different conditions. There is now a widespread awareness of the technological options in the communities with active FRGs, and the demand for improved varieties and planting materials has increased. All together, the 21 FRGs analysed in this study represented more than 675 farmers who are directly exposed to new technologies, improved varieties and new farming methods, and acquiring new skills and knowledge. Given the prevailing farmer-to-farmer transfer of technologies, there is a high probability that technologies introduced and developed in FRG are likely to be adopted rapidly by a large number of farmers in the community. There is evidence of some "learning with spill over effects" taking place within and outside the communities. Technologies (seeds) and skills are gradually shared with other community members, through farmer-to-farmer exchanges and sale of seeds. Yet, in some FRGs, there is tendency to exclude non-group members in an attempt to monopolize the benefits (improved varieties), in reaction to the ridicule from other community members at the initial stages.

Although no empirical study has been done on adoption of climbing beans and potatoes, there is mounting evidence that climbing beans and improved potato varieties, initially introduced through FRGs, are now widely available in the communities through dynamic farmer-to farmer dissemination channels. The most striking example is on production of potato seeds by farmers. These varieties were initially introduced for evaluation and testing to a limited number of FRGs in 1995, and are now being multiplied, shared, distributed and sold to other farmers. One farmer FRG member has joined the Uganda national potato seed producer association (UNSPA) and is now recognized as producer of certified seeds. In season B of 2000, this farmer produced 70 bags (7000 KGs) of clean potato seeds which were sold to other farmers and to NGOs which in turn distributed to other farmers in the communities. His group also produced 850kgs of potato seeds. There were also 12 farmers who are experimenting with the seed plot production technologies, and together produced more than 6000 Kgs of clean seeds of improved variety which was eventually sold or exchanged with other farmers through local social networks. Similarly, some genotypes of climbing beans were introduced for evaluation with FRGs, and are now available in the communities.

Performance Factors in Farmers Research Groups

A number of factors were found to affect FRG performance. These include:

- Larger FRGs showed lower participation rates, higher rates of drop out, and higher number of inactive members which adversely affected group performance and cohesion. Leadership conflicts were common in larger groups.
- Social capital (relations of trust, cooperation, norms and regulations social interactions, group dynamics and collective action) was higher in smaller groups with a stable membership and leadership. However, there was a low level of bridging social capital, and only few groups were found to build some considerable amounts of this type of social capital. The leaders of such groups were also local council chairpersons, and thus had wider social networks and were often the point of contacts for external orgnisations and visitors. This suggests that effective embededdness of local leaders was key to social capital formation. In these communities where FRG leaders were also members of local councils or village communities, FRGs were likely to be more successful in communities where there was a local commitment to collective action and strong social capital. Similarly, FRG was found to be a very effective mechanism for building human and social capital in the communities.
- The successful FRGs were those that broadened the scope of their activities well beyond experiments. They were gradually becoming self-sustaining by diversifying their group activities beyond initial research activities and experiments.
- (Lack of) Personal commitment of researchers and regular monitoring were key in explaining FRG success ("failure"). FRG as an approach has a great potential for catalyzing the participation of farmers as partners in research and development activities.
- Simple and short-term experimentation on crop variety evaluation, seed multiplication and fertilizer application were good entry points to sustain farmer participation. However, FRGs may not be effective for research involving soil ferility and natural resource management, without short-term benefits to members.

The findings of self-assessment of FRGs suggest that more than increasing the number of farmers and farmers' research groups, we need to invest in improving the quality of participation to achieve good quality research. This requires significant support and personal commitment of RESEARCHERS. It also requires broadening the scope of PR from a functional consultative type, to a more collegial empowering type, from variety selection to broader natural resources management research.

5. CONCLUSION

This study was conducted against the background of increasing interest in community-based farmer participatory research as an approach to institutionalize and to broaden the impact of participatory research. One of the major strategies of the African Highlands initiative is to promote community-based participatory research methodologies for research and development by forming and using farmer research groups rather than individual farmers. This paper assessed the quality of participation in FRG, in Kabale, southwestern Uganda. The quality of participation provides a useful analytical framework for investigating the specific characteristics or dimensions of participatory research by looking at what types of participatory research are conducted, who participate in them, how participation is managed, what criteria should be used to monitor and evaluate the performance of FRG, and what are the impacts? A subsequent paper analyses the performance and impacts of FRGs.

The findings of this study showed that FPR is a dynamic process and that different types of participation can occur at the different stages of the research process. One of the major thrusts of Ahi is to move the

process from it is now towards more collaborative and collegial participation of farmers to foster farmers' capacity to innovate and experiment with natural resource management technology options. The results of the study did not support the hypothesis that FPR may exclude certain categories of farmers, especially women and poor farmers who may not have the resources to absorb the cost of participation. On the contrary we argue that FRGs are in fact effective mechanisms to reach women and poor farmers who are by-passed by conventional research and development services. Although different types of participation occurred at different stages of the research process, the results showed that the participation of farmers was evolving toward a more collaborative mode, with farmers increasingly taking more roles and responsibilities, gaining confidence, enhancing their human and social capital, and sharing knowledge, skills and technologies. However, there are great prospects and good opportunities to invest efforts to enhance the quality of participation in FRG. This requires important skills , principles and methods and tools that researchers and farmers need to build together.

As observed by Braun *et al.* 2000, FRG approaches require and promote a much closer engagement of agricultural research and development institutions with rural communities, and building institutional structures and processes for agricultural development. Given the current problems faced by agricultural research in developing countries, we argue that FRG can help increase the relevance of research to the needs of small scale farmers, increase the efficiency of technology development and dissemination, and widen adoption and impact of agricultural technologies on the lives of resources poor farmers. FRG as an approach has a great potential for catalyzing the participation of farmers as partners in research and development activities. This requires significant support and personal commitment of researchers. It also requires broadening the scope of PR from a functional consultative type, to a more collegial empowering type, from variety selection to broader natural resources management research. However, achieving such potentials require skills, capacities and personal commitment that researchers in Kabale need to internalize. As Booth observed *" the main obstacle in providing farmer participatory research is the research workers themselves* (quoted in Selener 1999). We concur with Bebbigton *et al.* (1994:28) that " if we are serious about fostering the external forces to make research organizations client-driven rather than research driven, investments will have to be made in developing local farmers' associations".

The findings of this study suggest that one of the most important outcomes of FRGs is its ability to strengthen certain dimensions of human and social capital that generate returns in human capabilities, reducing research risks, accessing knowledge, skills and technologies, and facilitating mutual beneficial collective action (Uphoff and Mijayaratna 2000). It is therefore critical to invest in strengthening the organizational capacity of FRGs and to facilitate FRG to build both "bonding" and "bridging" social capital (World Bank 2000, Woolock and Narayan 2000) within and between communities and other groups and organizations. One of the great values of such investment is that it builds farmers' confidence and networks to communicate more easily with each other and with research and development organizations. Farmer participatory research should be viewed through human and social capital lens, and the assessment of its impacts should include the potential effects on human and social capital, its impacts on empowering farmers and improving the organizational capacity to conduct research. We concur with Bebbigton *et al.* (1994:28) that " if we are serious about fostering the external forces to make research organizations client-driven rather than research driven, investments will have to be made in developing local farmers' associations".

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