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Participatory Selection Of Beans In Rwanda:

Results, Methods, And Institutional Issues

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NEW HORIZONS: THE ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF PARTICIPATORY WATERSHED DEVELOPMENT

Louise Sperling & Urs Scheidegger

Introduction : Beans and bean expertise in Rwanda

Beans (*Phaseolus vulgaris* L.) are pivotal to the Rwandan household. Eaten twice daily, with pods, green seeds, leaves and grains all variously thrown into the cooking pot, beans provide 65% of the protein and 32% of the caloric intake (MINIPLAN, 1988). Beans are the "meat" and to some extent the "bread" of the Rwandan countryside.

The centrality of beans for nutrition is matched by their key role in agriculture. Grown by 95% of farmers, in all major regions of the country (from 1000-2200 metres), beans are sown two, sometimes three seasons a year. A third remarkable aspect lies in their genetic diversity, with Rwanda providing one of the most varied and vibrant bean varietal pools in the world. At least 550 local varieties are found countrywide, with important and unique types having evolved from both the MesoAmerican and Andean genepools (Scheidegger in CIAT 1993, and S. Beebe, pers. comm.). Farmers constantly experiment with varieties and have developed productive mixtures of up to 30 components (Lamb and Hardman, 1985; Voss, 1992). Such varietal blends are altered according to different soil conditions, crop associations and seasons. Farmers' efficiency at targeting mixes to their own specific agro-ecological conditions is such that formal breeders often have a hard time outyielding the local bests (CIAT, 1985). More generally, mixture use encourages production stability as well as utilisation of the country's highly diverse production niches.

Yet, while most Rwandan farmers need and grow beans, have been exposed to very diverse materials, and manage complex mixes, they were for many years at the fringes of the research system. This paper presents results of a five-year programme (1988-93) on participatory selection of beans in Rwanda. It looks at the technical and social challenges of integrating farmers into on-station selection as well as issues in setting up a countrywide programme on decentralised selection in community plots. Choice of farmers, trial design, and evaluation procedure can affect the technical findings but also influence the potential to institutionalise participatory selection procedures on a broad scale. Some of the trade-offs between a research-focused v. a development-focused participatory selection programme are highlighted. Finally, the paper discusses participatory selection in the light of the recent and wide-scale civil disruptions in Rwanda. Farmer-centred methods are being used to evaluate possible varietal and genetic erosion, and participatory selection has been proposed as a major means for reintroducing landrace material to Rwandan communities.

The Participatory Selection Programme: An overview

Until recently, the selection sequence of the Institut des Sciences Agronomiques du Rwanda (ISAR) paralleled Western models, seeking farmer feedback at the very last stages, in on-farm trials, if at all. Further, farmers were offered only two to five options - the tip of a selection funnel originally numbering some 200 entries. Follow-up surveys in 1988 showed that ISAR had achieved some laudable bean successes, but still short of what could be expected in a country where a Rwandan farmer on her own may test 75-100 varieties in a lifetime (Sperling, 1992).

Thus in 1988 ISAR and International Centre for Tropical Agriculture (CIAT) researchers took the first steps towards a participatory selection programme, with the aim of improving performance for highly heterogeneous production environments. Two key questions shaped inquiry.

1) Was there 'untapped potential', that is, could farmers absorb and productively use a much greater range of cultivars than that currently delivered by the formal research system?

2) Could breeders and farmers, working together, target more environments faster and more productively?

Phase I: Participatory On-station Screening

Although the results of the first phase of research have been reported elsewhere (Sperling 1992; Sperling et al. 1993), in brief, from 1988-1990 the experiment centred on participatory, on-station screening. Local experts in Rwanda, drawn from a pool of older women, evaluated 15 cultivars in on-station trials two to four seasons before normal on-farm testing. On-station evaluations revealed that experts select bush beans along two general axes, according to preference and performance. Many of the attributes prized highly by the women, such as compatibility in a banana intercrop or resistance to heavy rainfall, would not have been easily anticipated in a formal breeding framework.

On-farm results demonstrated farmers' ability to target cultivars from station fields to their home plots. Farmer bush bean selections out-performed their own mixtures with average production increases of up to 38%. Breeder selections in the same region on average showed negative or insignificant production increases. In addition, the diversity of cultivars desired by farmers was considerably greater than that normally on offer: the number adopted over the two-year experimental period, 21, matched the total number of varieties released by the national programme in the previous 25 years (Sperling 1992; Sperling et al. 1993).

However, the first phase of the participatory selection, although collaborative, remained very much research-oriented. The major conclusions are summarised in Box 1.

Box 1. Participatory Selection with Rwanda Bean Farmers: Phase I, 1988-1990

1. Communities recognise differing expertise in varietal selection. These go beyond the frequently-cited divisions of gender and age. Some women are known for astutely distinguishing among varieties for particular farming contexts.

2. Farmers' varietal criteria overlap with breeder concerns but also contain 'composite' traits. These composites, which represent combinations of features, help determine actual performance on-farm and are hard for formal breeders to anticipate. A good example of a composite trait is the ability of a bean variety to perform well under a banana stand. Here such features would include uprightness of stem, sturdiness of stem and height of lowest pods from the ground.

3. Farmers can target from station to on-farm plots, thus meeting their own agronomic and socio-economic criteria as well as achieving production gains.

4. Farmers are ready to use a wide diversity/number of cultivars.

Phase II: Expansion and Devolution to Community-based Screening

From 1990 to 1993, CIAT and ISAR expanded the farmer participation experiment, exploring specific themes in several directions.

On-station, researchers wondered whether farmers could be brought in a stage earlier, 5-7 seasons before normal on-farm testing. Potentially, such a move could further reduce on-station testing costs (cutting field trial time) as well as deliver well-adapted varieties to farmers' fields with greater speed. This also implied that farmers would be screening many more lines. Was there a limit to what farmers could handle?

For the three years, farmers viewed a trial normally containing about 80 lines. To minimise risk due to insufficient field testing the CIAT pathologist screened this trial earlier than usual and eliminated the most disease susceptible entries (to anthracnose, aschochyta, bean common mosaic virus and rust). So, in fact, farmers screened what researchers felt was the *"largest reduced-risk pool"*, some 79, 41 and 43 lines in 1990, 1991 and 1992 respectively. Bringing farmers in this early amounts to what might be termed 'prototype screening' and in any such premature collaboration, researchers should make special efforts to anticipate risks which farmers cannot.

To broaden the programme on-farm, Phase II focused on how to encourage communities to select their own expert representatives and how to evolve much of the on-farm testing to where it belongs, in the communities themselves. The move towards 'devolution' was a healthy mixture of empowerment and economics. Communities should have the right to select their own delegates to screen on-station. Communities should also control how those 20 or 25 chosen varieties are subsequently tested in rural areas. In practical terms, such a selection programme can only be widely decentralised, targeting germplasm for many

different areas, if communities bear the brunt of the local-level costs (Sperling and Berkowitz, 1994).

From March 1990 onwards, women experts coming to station represented the interests of three types of *ad hoc* local groups:

1. Farmers' research groups backed by non-governmental organisations (NGOs) for specific development projects;
2. Self-organised and independent groups of 'research-oriented farmers'; and
3. Several groups of farmers united by geographic proximity in an administrative unit known as a 'commune'.[1]

The cultivars women selected were then managed in various types of community plots, the NGO probably serving several hundred farmers, and the commune units potentially reaching up to 6,000 households. Hence the total potential population reached was 27,000 households or about 135,000 persons. Thirty to fifty farmers were normally invited to review each community plot. One or two of the selected varieties were given to each evaluator at harvest, for testing in their home plots the following seasons.

It is important to note the scientists' concerns about the concept of Phase II, which some saw as at the border of biological research and moving towards extension. The participatory programme came under yearly review from the Great Lakes Regional Bean Network Oversight Committee, an interdisciplinary group representing national institutes of Burundi and Zaire and Rwanda. Here, the feeling was that research itself would be needed to determine the 'hows' of the programme's institutionalisation, not only for Rwanda, but for a range of African national partners. Partially to address the concerns of rigour, the programme was eventually set up as an experiment in which the normal breeding sequence served as the 'control' and the participatory programme as the 'treatment'. The two schema were eventually to be compared along such parameters as number of acceptable varieties identified and adoption rates.

Select Results: Phase II

From the initial screenings, it was clear not only that different farming communities wanted to test a number of varieties, but that they had diverse needs and preferences. For instance, some farming areas were moving principally toward climbing bean varieties (partially due to their better tolerance to root rots, as well as high yield performance), others focusing on what they felt would be *"poor soil performers."* Table I shows the span for trial evaluations near the end of 1992: only 5 of 19 bush bean entries were chosen across all farmer groups. Communities represented in the on-station screening were located within about a 50km radius, and gradients in soil fertility were perhaps their most important differentiating variable.

1. In other contexts, such as Zaire, the participatory experiment was carried out with well-organised farmers' cooperatives. Unfortunately, Rwanda has a limited tradition of farmers' cooperatives or any grass-roots organisations which might lobby for farmers' interests or organise collective ventures on a large-scale, for example, credit or marketing.

Table 1. Farmer selection of bush beans from community plots, Rwanda, 12/92-1/93*

Variety	SITES				
	Sahera	*Rutsatira*	*Gikongoro*	*Save*	*Muganza*
RWR 756	X	X	X	X	X
RWR 1058	X	X		X	X
RWR 1115	X	X	X	X	X
RWR 785	X		X	X	X
RWR 779	X	X	X	X	
RWR 911	X	X	X	X	X
RWR 1134	X				
XAN 162	X	X	X	X	X
G484	X	X	X	X	X
RWR 719	X	X	X		X
MLB 49-89A	X			X	
URUGEZI		X	X	X	X
SCAM 80 CM/5		X		X	
RWR 14			X		
RWR 802			X	X	X
RWR 853			X		
RWR 1056			X		
MLB 40 89A			X		X
RWR 1059				X	

** Shading Highlights varieties Chosen by all farmer Groups.*

The participatory experiment had proposed that varieties selected by communities and which later showed wider adoption, should be brought back into the formal system and baptised as farmer-breeder varieties. Subsequent seed multiplication and distribution would have to be decentralised to meet diverse regional needs.

Perhaps the most important insights during Phase II lay with institutional concerns. Turning over both the choice of on-station representatives to communities as well as subsequent community plot testing does not always mean that community needs are served. This certainly rang true in Rwanda where relationships even at the neighbourhood or 'hill' level are marked by hierarchy and where women fall near the bottom of the heap no matter what their class or ethnic group. *"Women have no race"* goes one proverb, indicating that their power derives from their relationships to significant male others, brother, father, whatever the case may be. In practical terms, the power structures and particularly the male hierarchies, distorted the expansion of the experiment at several key points. In the selection

of farmer representatives to screen on-station trials for example, researchers had the sense that some of the so-called community-selected experts, were neither very informed, nor very representative of community interests. For instance, one community was represented by the government agronomist's sister, and the sector head's wife. The male authorities in charge linked power with knowledge, and imputed male knowledge to their female sidekicks. If he was an important official, *she* must be a farmer expert.

There was also concern that key figures in charge sometimes fell short on their obligations to community participants at the very last stage. The community plot was laid and evaluations completed, but seed of selected varieties was never distributed. So, in theory, the data was in but the seeds never got out to home plots. The advantages of working through administrative structures are many: these units exist countrywide, in all agro-ecological zones and potentially canvassing all farmers. They have the land and could incorporate a mandate of decentralised selection. The philosophy of such units, however, is sometimes governed by 'control' rather than 'service'. Given their substantial strengths, researchers hoped they could be reshaped to collaborate more fully.

The experiment did thrive when women themselves had some control and when the community saw itself as a true community. One women's cooperative, supported by a Belgian NGO, was well organised and very serious about the research. Five experts were sent to station, varieties chosen were subsequently tested on designated group members' plots, and the cooperative as a whole agreed what to multiply, what to discard and what to test further. Over a ton of seed was multiplied before other communities had started to budge.

Technical and Institutional Challenges

Participatory breeding programmes are often viewed by scientists as technical experiments (eg. do farmers have expertise?), yet some of the greatest challenges may lie in identifying appropriate institutional forms. Within the Consultative Group for International Agricultural Research (CGIAR), institution building has principally been focused on national institutions, such as helping National Agricultural Research Systems (NARS) become more client-oriented (Merrill-Sands et al., 1991). However, equal if not greater challenges may rest at the community level: how to identify or help create organisations which represent the full range of farmer interests and which can serve as on-going research partners to a welcoming formal sector. Incipient work on the effectiveness of working with local farmer groups (Ashby et al., 1995) and larger farmer organisations (Merrill-Sands et al., forthcoming) is pathbreaking. However, it remains marginalised and detached from the hardcore science concerns within the CGIAR.

While it may be a conceptual leap, cost-effective breeding hinges on identifying legitimate and representative local partners, and in some cases, expanding the local power base. In the longer-term, local partners, and particularly solidly-organised local groups, should create a demand-pull on research, reshaping the larger pool of varieties on offer and selecting from this the most promising options for localised experiments (see Ashby and Sperling, 1995). Expressed in popular form, one might think of the research station as an inventory

warehouse: the goods are on offer to whet clients' interests/needs, with customers selecting out only what is relevant. Future stocks, even prototype models, might be developed together with clients, and certainly, with clients' needs in mind.

The shift of focus from exploring technical expertise to experimenting with institutional options was accompanied by a changing methodological emphasis.

On-Station Procedures

In terms of technical concerns, great care was taken on-station to find out how to make the on-station trials 'transparent' to farmers, to ensure there were no hidden biases. Though seed colour and shape of trial entries might be similar to local varieties, it was explained that farmers were evaluating varieties new to the region. Any use of manure was signalled, as was any other management practice which might enhance yields. For one season, researchers planted varieties in a box format, 3m by 3m, rather than sowing in two lines, so that farmers could better see a clump of the variety, walk around it, and more easily exchange comments among themselves. Farmers said they appreciated the effort, but it made no difference; they were used to testing varieties in small, odd patches.

During the initial phase of the programme, there was also a strong focus on direct feedback. Scientists wanted to learn first-hand how farmers evaluate: by which criteria, the ranges of acceptability within criteria, the trade-offs among varietal features, and even the possible limits of screening but one set of varieties (see Box 2). The evaluation format was comprehensive: farmers scored each variety and assessed its positive and negative traits. Interviewing was often one on one, scientist (or technician) to farmer.

Box 2. Farmers' evaluations: is a single replicate enough?

One experiment tried to examine the validity of farmer evaluations in the face of a single replicate assessment. Station trials usually have at least four to anticipate effects of select plot variation on varietal performance, eg. lower yield due to a patch of lower soil fertility. In the experiment, eight varieties of bush and climbing beans (total 16), which had been chosen by women farmers the preceding year from ISAR's trial, were grown with and without 30 t/ha of farmyard manure. While farmers normally evaluate a single replicate, during 1991, a select group scanned some six. Repeatability of farmer scores was high for clearly good or bad yielders, while scores were not fully consistent over replicates for intermediate varieties. It was observed that farmers differentiate parts of higher and lower soil fertility within an experimental plot and then estimate yield for both parts separately. This way of looking at experimental plots, if less objective, may be more refined than the experimental procedure of determining total plot yield and, under highly diverse soil conditions, could result in a fairer judgement of varieties. Farmers also stated that there were no visible differences among replications, that is, there was no relation between fertilisation and crop development. This qualitative assessment was in full agreement with statistical analysis of yield data (Scheidegger in CIAT, 1991).

As the experiment evolved, exposing farmers to a greater range of germplasm and moving towards a community (v. individual) focus, so too methods had to be retooled. From the scientist point of view, in-depth evaluation of 80 entries was no longer logistically possible, nor perhaps necessary. The evaluation format aimed for efficient procedures which encouraged sharing among farmers and gave feedback (or 'feedforward') out to communities rather than channel back primarily to research offices. Farmer groups were given two sets of coloured ribbons to indicate varieties they wanted to test in future community plots and those they felt should be eliminated. After the tagging, plenary field discussions focused on the varieties most often signalled, the outliers (those with one ribbon), and any variety which particularly captured farmer interest. While one might argue that ribbons confounded results, that is, farmers visualising others' choices might be unduly influenced, farmer representatives, eager to ferret out the most suitable varieties for their own home areas, perceived no problem. On the contrary, they enjoyed exchanging ideas and reflecting on inter-group differences. They found the final tallies particularly exciting. Ribbons allowed them not only to reflect on their own choices, but to immediately synthesise the results of five group selections. Such synthesis, usually confined to office corridors, was visually striking and illuminating. During the second phase of on-station evaluation, feedforward came at the expense of detailed feedback, with more cursory identification also the consequence of greatly enlarging the options on offer.

On-Farm Procedures

On-farm procedures also followed a course from intensive to more extensive monitoring. During Phase I, farmers designed and managed their individual home trials, but researchers asked for a local check and were on hand to weigh and sometimes help harvest experimental plots. For the research community, qualitative and quantitative information was critical for assessing whether farmer selections from on-station trials had actually performed. Farmers, of course, often carry checks in their heads and don't need a scale to show if the variety is a winner.

During the second phase, the way trials were conducted within communities was determined by participants themselves and in part reflected the group's orientation towards its members. The farmers' research group, technically assisted by an NGO, decentralised testing and evaluated together. A core group, designated as the research contingent, divided up the station-selected varieties and tested them on individual plots: group evaluation was then completed by means of a walking tour (PAMU, 1993). The group subsequently multiplied and diffused the most promising entries. The Rwandan Program received a written report on the farmer evaluation, by which time the varieties had already been launched on their way among other community members.

The experiment within the administrative units ('communes') was conducted in a very different and more standard manner. The agronomist took control, station researchers drew up a standardised protocol (varieties sown in lines, at given densities) and some local farmers were invited to evaluate the plot and select varieties for home use. One advantage

was that more farmers were exposed to a greater range of cultivars than in the previous model. Such a top-down research posture at the community level is not atypical of many local grassroots groups, who may have some technicians trained under standard models. Due to their greater involvement in commune evaluations, researchers received feedback more quickly, but the progress towards adaptive testing on individual plots and further diffusion was significantly slower.

The different methods and designs used through the experiment represented trade-offs for the various actors involved. Researchers were initially disappointed by the poor level of farmer expertise proffered when communities themselves controlled participant selection. Perhaps with greater experience, the power structures would have better signalled exceptional skills within the global group 'women'. Some scientists also lamented the decline in detailed feedback as farmers screened a larger pool of germplasm and as some subsequent community designs and evaluations ignored 'researcher language' altogether, for example, presenting no yield data. The move towards community-oriented models, however, brought important gains to local participating groups. Ribbon evaluations were more transparent; more farmers directly benefited on-farm, and, in the best of cases, farmers identified and distributed productive varieties with unusual speed. As institutionalisation of the approach hinges on community participation, standard research models will have to reorient towards communities' own research and development (R&D) concerns.[2] Box 3 summarises select institutional issues of the second phase of research.

Box 3. Participatory Selection with Rwanda Bean Farmers: Institutional Concerns: Phase II

1. Differences in varietal preferences among even closely-spaced farming communities suggests that participatory selection has to be coupled early with decentralised seed multiplication programmes.

2. Scaling up of a participatory selection programme implies formal sector research must partner with organised groups of farmers, rather than individuals, to share the costs and responsibilities of widespread varietal research.

3. Working through community institutions does not guarantee that community needs are served. Local power structures, for example male hierarchies, can distort the fundamental premises of a 'participatory' programme. The challenge is to identify local organisations which represent the range of farmer interests and which can serve as research partners.

4. Working with farmer groups demands that methods be developed which 'feedforward' information to communities as well as feedback insights to the formal sector. There may be important methodological trade-offs between community R&D and formal sector R&D approaches.

2. For instance, facing similar challenges in India, the KRIBHCO project is recommending that 'farmer-acceptability' data, versus the standard yield trials, be considered as sufficient evidence for varietal release (*J. Witcombe, pers. comm.*).

Emerging Research Models: A New Division of Labour

Perhaps the most important technical lesson of the five-year experiment is that farmers use a wider range of criteria than breeders for selecting varieties: observed yield is important, but so is, for instance, a variety's compatibility for growing with bananas. Furthermore, the criteria farmers use and their relative importance vary by region. If given access to appropriate germplasm, farmers have the edge in targeting for their varied local circumstances.

Institutionally, it has also become clear that farmers can organise themselves to test quite a wide range of germplasm on-farm, although the different organisational structures and protocols used will influence which and how many households can be reached and even the number of germplasm entries potentially accommodated. Research on possible arrangements for community testing needs to be carried much further.

The results of the experimental programme suggest that the standard breeding models may not be using each partner's, breeder's and farmer's talents to best advantage, particularly in areas marked by marginal, heterogenous environments. Breeders may not be the best candidates to select for the diversity of needs/preferences nor for the difficult 'composite' traits. Breeders' unique expertise lies in their capacity to generate new genetic variability. Farmers do cross and select, but at an extremely slow rate: scientific breeding accelerates the process. Breeders might also concentrate on those constraints/opportunities which are 'invisible' to farmers, such as certain pathogens and diseases. In turn, the finishing of the product, targeting the variety to a particular production system, can and should be left to farmers. To pursue this goal, farmers would need access to a wide range of germplasm (Figure 1).

Figure 1. Conceptualising a new division of breeding labour

Breeders	**Farmers**
• Create new genetic variability →→→→	←←←←
• Make accessible wide range of germplasm (local and exotic)	• Target for agronomic conditions (performance)
• Screen large amounts of material for minimum criteria	• Target for socio-economic circumstances (preference)
• Screen for key stresses invisible to farmers	

Rethinking the breeding division of labour probably also demands that the scientific community rethink how they evaluate the relative success or failure of the growing number of participatory breeding trials. In Rwanda, initial stages were marked by an exclusive focus on production or impact achievements. Our conceptual framework sought to compare the standard programme and experimental programme in terms of "end-result" variables

(such as number of acceptable varieties identified, number of disease resistant varieties identified, rates of adoption of the two sets of material, and so on). Varietal diversity of the ISAR-released v. farmer-selected material mainly came into view as an evaluation-variable when it became clear that farmers wanted many and varied cultivars. However, aside from giving farmers access to a wider range of options on-station, the experiment was not shaped to specifically enhance genetic diversity on-farm. Much more could have been done to 'promote genetic diversity' had the participatory programme been conceived with this primary goal in mind.

As the experiment evolved, it became clear that communities' capacity to serve as research partners needed to be strengthened. The technical findings alone (e.g. 'farmers can expertly target varieties') could not deliver adapted varieties to local groups. Enhancing community control and research skills therefore became a central issue in enhancing the efficiency of breeding. Within such a perspective, 'empowering communities' becomes a functional necessity for achieving cost-efficient research programmes.

Figure 2 highlights some parameters along which we might start to evaluate our participatory breeding trials, according to each programme's specific focus. Broadly, at least three perspectives presently guide such participatory experiments: some practitioners focus on production achievements, some on the enhancement of genetic diversity, and still others on the shifting of control (of germplasm and the breeding process itself) to communities and grassroots organisations. A successful participatory breeding programme should probably show positive indicators in all three categories. Relative emphasis will vary greatly according to the primary objective of the programme.

Figure 2. Participatory breeding programmes: potential evaluation criteria

FUNCTIONAL PERSPECTIVES
(orientation:products)

Production/Impact Enhancement	Genetic Diversity
# farmer-acceptable varieties	genetic profile of released varieties
# disease-resistant varieties	incidence of landrace parents
absolute production gains	
rates of adoption	

CONTROL/EMPOWERMENT PERSPECTIVES
(orientation:process)

degree to which:

farmer skills are enhanced to more effectively cross/select themselves

farmers gain fuller access to wide pool of germplasm

farmers control local testing

farmers are involved in decisions of varietal release

After the Genocide: Varietal Assessments and Reintroductions

The escalation of the Rwandan civil war in April 1994 resulted in the death of about one million people and the displacement of another two million. Agriculture, the main occupation of upwards of 90% of the population, was acutely affected as civil disruptions peaked in the midst of the normal February-June growing season. Harvest losses overall during this period have been estimated as high as 60 percent (Dr. Iyameremye, nd).

The aid community, particularly NGOs and various United Nations agencies, responded swiftly and on a wide scale to the agricultural crisis. During the subsequent growing season, September 1994-January 1995, large amounts of seed of key crops were distributed: 6970 MT of bean, 1707 MT of maize, and 7230kg of vegetable seed (MINAGRI/-UNREO/PNUD/FAO 1994).

The CGIAR has responded according to its own expertise, assessing the state of varietal and genetic erosion and developing strategies to restock germplasm in national research sites as well as on farmers' fields. The *Seeds of Hope* (SOH)[3] initiative is now multiplying collections of local material, breeding lines, and improved lines appreciated by farmers for possible reintroduction. For beans alone, 170 landraces have been obtained from national and international genebanks. The first nationwide surveys, conducted with a range of NGOs (CARE, World Vision, Swiss Disaster Relief, Catholic Relief Services and Medécins sans Frontières) have suggested that varietal loss has been less than anticipated: 45% of the seed sown during the first post-event season came from farmers' own stocks (Sperling 1995a). In October/November 1995, surveys further examined this issue of varietal loss for the most vulnerable areas, those which experienced large-scale population movements.

Methodologically, in reference to farmer participatory selection, two interesting developments can be signalled. First, SOH is looking at the complementarity and differences between farmer varietal assessments and molecular genetic assessments. Farmer assessments tend to be site specific and indicate the degree to which farmers can access desired varieties (that is, varieties which have useful traits which are available in useful combinations). Molecular assessments suggest the presence/absence of genetic characters nationwide and map region variations at community (versus farm) levels. Both programmes aim to determine the genetic and varietal needs of Rwandan farmers and to guide the rebuilding of genetic collections at ISAR (Sperling 1995b, and S. Beebe, pers. comm.).

Second, farmer participatory selection is being proffered as a major method of reintroducing germplasm at the community level, should varietal restocking be necessary (World Vision, J. Hooper, pers. comm.). As provenance data on the 170 landraces needs to be sharpened, the proposals suggest that entries be sorted roughly by high, medium and

3. Seeds of Hope is a joint rehabilitation initiative of the CGIAR. Formalised in September 1995, many African NARS have contributed germplasm, field space, and advice to the initiative: those of Burundi, Ethiopia, Kenya, Malawi, Tanzania, Uganda, Zaire, Zimbabwe and, more recently, Rwanda. In addition, some seven of the International Agricultural Research Centers (IARCs) are strongly involved in the Rwandan Agricultural reconstruction.

low-altitude adaptation and then be moved to community plots for further targeting. In the Rwandan context, farmer participatory selection thus becomes a chosen strategy for research and development initiatives but also for emergency aid and rehabilitation efforts. Let farmers help get the germplasm to where it can best be used.

References

Ashby, J.A., Gracia, T., el Pilar Guerrero, M., Quiros, CA., Roa, J.I. and Beltran, J.A. 1995. Institutionalising farmer participation in adaptive technology testing with the "CIAL". *Agricultural Administration (Research and Extension) Paper*, July 1995. Overseas Development Institute, London.

Ashby, J. and Sperling, L. 1995. Institutionalizing participatory, client-driven research and technology development in agriculture. *Development and Change* 26(4).

CIAT. 1993. *Bean Program Annual Report 1993.* International Centre for Tropical Agriculture. Cali, Colombia.

CIAT. 1991. *Bean Program Annual Report 1991.* International Centre for Tropical Agriculture. Cali, Colombia.

CIAT. 1985. *Bean Program Annual Report 1984*. Working Document No. 7. International Centre for Tropical Agriculture. Cali, Colombia.

Iyameremye, A. n.d. Le secteur agricole durement touché. *Traits d'union, Rwanda 5.* COOPIBO, Vredeseilanden and SOS/Hunger, Belgium.

Lamb, E.M. and Hardman, L.L. 1985. *Survey of Bean Varieties Grown in Rwanda.* January 1984-June 1985, final report. AID-Rwanda Local Crop Storage Cooperative Research.

Merrill-Sands, D., Biggs, S., Bingen, R.J., Ewell, P., McAllister, J. and Poats, S. 1991. Institutional considerations in strengthening on-farm client-oriented research in national agricultural research systems: lessons from a nine country study. *Experimental Agriculture* 27: 343-373.

Merrill-Sands, D., Arnaiz, M.E.O., Bingen, R.J., Farrington, J., Carney, D. and Bebbington, A.J. Forthcoming. *Conceptual Framework for Study On The Role of Farmers' Organizations in Technology Change: Current situation and future prospects.* ISNAR, The Hague, The Netherlands.

Ministère du Plan (MINIPLAN). 1988. *Enquête Nationale sur le Budget et la Consommation des Ménages.* Volume 4: consommation alimentaire en milieu rural. Décembre 1988. Kigali, République Rwandaise.

MINAGRI/UNREO/PNUD/FAO. 1994. *Compte-rendu de Réunion, 16 décembre 1994: Opérations d'urgence et réhabilitation agricoles.* Kigali, Rwanda.

Projet Agricole de Muganza (PAMU). 1993. *Rapport Annuel 1992*. Butare, Rwanda.

Sperling, L. 1995a. Emergency relief in Rwanda: Assessment of bean and seed use 1995A, Summary Report. *SOH Assessment Document 1.* Seeds of Hope, CGIAR.

Sperling, L. 1995b. The impact of war on plant genetic resources: bean varietal assessment in Rwanda 1995A. Summary Report. *SOH Assessment Document II*. Seeds of Hope, CGIAR.

Sperling, L. 1992. Farmer participation and the development of bean varieties in Rwanda. In: Moock, J.L. and Rhoades, R. (eds.) *Diversity, Farmer Knowledge, and Sustainability*. Cornell University Press, Ithaca and London.

Sperling, L. and Berkowitz, P. 1994. *Partners in Selection: Bean Breeders and Women Bean Experts in Rwanda.* CGIAR Gender Program, Washington DC.

Sperling, L., Loevinsohn, M. and Ntabomvura, B. 1993. Rethinking the farmer's role in plant breeding: local bean experts and on-station selection in Rwanda. *Experimental Agriculture* 29:509-519.

Voss, J. 1992. Conserving and increasing on-farm genetic diversity: farmer management of varietal bean mixtures in Central Africa. In: Moock, J.L. and Rhoades, R. (eds.) *Diversity, Farmer Knowledge, and Sustainability*. Cornell University Press, Ithaca and London.