Getting Back to basics: Creating Impact Oriented Bean Seed Delivery System for the Poor (and Others) in Malawi, Mozambique and Tanzania

Annual Report 2007

For
The McKnight Foundation's
Collaborative Crop Research Program

Rowland Chirwa (Breeder) CIAT-SABRN Coordinator
Louise Sperling (Seed Specialist) CIAT-Rome
Jean Claude Rubyogo (Seed Specialist) CIAT-Africa
Frank Tembo (Research Assistant) CIAT-Malawi
Elisa Mazuma (Plant Pathologist), NBRP Leader DARS- Malawi
Manuel Amane (Agronomist), NBRP Leader IIAM-Mozambique
Catherine S Madata (Breeder) NBRP Leader, ARI-Uyole Tanzania

Executive Summary

The common bean (*Phaseolus vulgaris* L.) is one of the most important food legume crops in Malawi, Mozambique and southern highlands of Tanzania, not only for food/ nutrition security, but also for income generation to improve the livelihoods of farmers, traders and consumers. One of the limiting factors to bean crop production and productivity in these countries is limited availability of seeds of suitable bean varieties. It is important to note that preferences for varieties vary among farmers, traders and consumers, and likewise varieties vary in their adaptation to diverse environments including biotic and abiotic stress factors. This project seeks to increase bean production and productivity in Malawi, Mozambique and southern highlands of Tanzania by identifying preferred bean types and developing efficient bean seed production and delivery systems.

The project was implemented with various development partners in the 3countries. In Malawi these were distributed across all 3 regions: north, central and south, while in Mozambique the sites were limited to Tete, Zambezia and Nampula provinces, and in southern highlands of Tanzania they covered Rukwa, Iringa and Mbeya regions.

In all countries NARS partners sensitized the participating stakeholders about the project. In addition they drew plans on how to implement the project.

Seed of the selected bean varieties and lines were assembled and packaged for the participatory variety selection experiments with partners. The number of partners and trials varied from one country to another. The sites were distributed to all 3 regions: north, central and south in Malawi, covering 18 sites under the supervision of 8 partner organizations. In Mozambique the sites were limited to Tete, Zambezia and Nampula provinces, where 18 sites were identified working with 14 partner organizations. Where as in Tanznaia the sites covered 3 regions: Rukwa, Iringa and Mbeya, with a total of 57 sites under 16 partner organizations.

Training in participatory variety selection (PVS) were conducted for staff from partner organizations (NGOs, CBOs, traders, research institutions and government extension agents) in all 3 countries: Malawi (22 participants from 8 partner organizations), Mozambique 26 participants from 14 partner organizations) and southern highlands of Tanzania (30 participants from 16 partner organizations).

Participatory variety selection processes were conducted in all 3 countries and the preliminary results showed that stakeholders (farmers, traders, and consumers) had selected varieties of their choice based on the criteria that they use in different sites. The varieties varied from one site to another, but some were cross cutting: 5 in Malawi, 5 in Mozambique and 10 in southern highlands of Tanzania. The selection criteria were also different across sites, but some were common across sites and countries. These included such selection criteria as: high grain yield, acceptable market class, resistance to pests and diseases, palatable leaves for green vegetable, grain size, early maturity, cooking ability and taste.

Studies were initiated to take inventory and analyze the existing seed systems in Malawi, Mozambique and Tanzania, disaggregated by wealth categories of the stakeholders in the communities. Results from Malawi and those in southern highlands of Tanzania indicated that:

1. Poor farmers had limited capacity to produce and disseminate bean seed because they consumed much of what they produced.
2. Rich farmers were able to produce but dissemination to the poor was limited because their seed was expensive and their reach was marginal.
3. The middle class farmers were ranked the best to multiply and disseminate seeds to the poor however, there is need to improve dissemination of improved seed.

Breeders' and foundation seed production for existing bean varieties were initiated with various stakeholders, in all the 3 countries in order to ensure that processes were in place to make seeds available.

Capacity of partners was enhanced to ensure that the better able to carry out PVS trials and are better organized to produce and disseminate seeds of selected bean varieties. This was done through planning meeting with partners involved in PVS and bean seed production, where roles and responsibilities of each partner were agreed upon.

Introduction

Studies throughout the sub-Saharan Africa region show that the bulk of farmer bean seed is supplied by the local sources-- farmer saved/traded seed and local seed markets (Sperling *et al.* 1996, David and Sperling, 1999). Unfortunately, these local sources are often disconnected from the innovators of new bean varieties (NARS): there are few established mechanisms for facilitating farmer exposure to new materials. Recently, NARS working on beans in Africa, via Pan Africa Bean Research Alliance (PABRA) and CIAT as a catalyst, have started to foster strategic alliances so as: a) to expose farmers to more germplasm, via participatory variety selection (PVS) methods and b) develop more integrated seed supply systems. These client-oriented thrusts are being developed in partnership with various NGOs, community based organizations (CBOs), farmer organizations (FOs), government-related organizations and private sector actors. Though fragmented to date, these efforts are slowly having results as they are giving both decentralized/farm based (local) seed producers and large seed producers access to seeds of improved varieties of their choice. CIAT's experiences from a parallel program started in Ethiopia in 2004, have been remarkable and the project achieved unusual success (Assefa *et al*. 2005). The key to success in Ethiopia was the development of a range of partnerships which built on organizational complementarities.

All the 3 NARS (Malawi, Mozambique and Tanzania), through the Southern Africa Bean Research Network (SABRN), which is part of PABRA, have already adopted the principles of innovative research and decentralized seed systems approaches, which foster strategic alliances so as: to expose farmers to more bean germplasm, through PVS and develop more integrated seed supply systems in partnership with various NGOs, CBOs, FOs, government-related organisations and private sector seed actors. However, the implementation with SABRN resources has been limited and it is hoped that this project will make a difference, and produce similar achievements to those reported in Ethiopia.

In this project we hope to capture and combine both, the seed acquisition systems which are routinely used by farmers, as well as those seed delivery channels designed for improved germplasm innovations. The aim here is to sharpen these incipient efforts (rigorously analyzing their varied strengths/ weaknesses) and to consolidate them to the extent that they become independent from an outside catalyst. Specifically we are addressing issues that are based on two major thrusts:

1. What are the clients' (farmers, traders and other consumers') criteria for selecting and accepting varieties of *Phaseolus* beans. These preference criteria may embrace agro-ecological, agronomic, organoleptic, socio-economic and other dimensions.

2. What are the factors which contribute to the efficient production and delivery of seed of new varieties to farmers: Under this thrust, we focus on the following questions:
   i) What are the most effective and efficient ways of producing bean seed? – formal vs non-formal seed systems
   ii) Which are the most efficient bean seed delivery systems? – small versus large package sizes; using formal (agricultural inputs shops and others) versus non-traditional outlets (clinics, schools, maize mills etc)

Progress towards achieving objectives

General Objective: To enhance bean (*P. vulgaris*) productivity through user-oriented germplasm selection and enhanced bean seed production and delivery systems in select areas of Malawi, Mozambique and Tanzania

Objective 1*: To identify and verify farmers' bean variety preferences in relation to diverse agro-ecological (e.g. drought and non-drought areas, presence of pests and diseases, soil fertility gradients etc.) and socio-economic criteria (market preferences, post-harvest qualities and gender/wealth)*

<table>
<tr><td>Result 1.</td><td>Through a consultative processes, diverse groups of clients: farmers, traders and other consumers were exposed to released bean varieties and promising lines where they made some selections in each country</td></tr>
<tr><td>Activity</td><td>Progress</td></tr>
<tr><td>1.1 Identify potential germplasm for on-farm testing from each national program</td><td>The national bean research programs (NBRP) from the three participating countries (Malawi, Mozambique and Tanzania) identified and assembled potential bean varieties/lines for on-station and on-farm evaluation.

In Malawi, the NBRP identified a total of 19 bean lines/varieties including both released and promising non-released bean lines, which had been consistently stable over years and locations, performing well in terms of yielding ability and resistance to biotic and abiotic environmental stresses. These bean lines/varieties were of different market classes: 4 sugar, 3 carioca, 1 khaki, 2 red kidney, 1 navy, 1 pinto, 1 small red, and 4 calima . The 4 calima types were developed for high Fe and Zn content. Farmers identified were also required to put in 1 local variety, to be evaluated along side the test lines/varieties, making a total of 20 bean entries at each site (Table 1).

Table 1. List of bean lines/varieties used in PVS trials in Malawi 2007

<table>
<tr><th>Bean lines/varieties</th><th>Bean lines/varieties</th></tr>
<tr><td>1. NUA 56</td><td>11. MC 12832-9</td></tr>
<tr><td>2. NUA 45</td><td>12. CIM 9422-2</td></tr>
<tr><td>3. NUA 35</td><td>13. VTTT926/9-4</td></tr>
<tr><td>4. NUA 59</td><td>14. VTTT925/11-7</td></tr>
<tr><td>5. VTTT924/4-4</td><td>15. BOA 5-8/13</td></tr>
<tr><td>6. VTTT924/17-2</td><td>16. SSDT 55-C2</td></tr>
<tr><td>7. VTTT924/2-4-2-1</td><td>17. ECAB 07</td></tr>
<tr><td>8. KHOLOPHETHE</td><td>18. MR 13508-8</td></tr>
<tr><td>9. PAN 150</td><td>19. UBR (92) 25</td></tr>
<tr><td>10. MC 12832-8</td><td>20. LOCAL</td></tr>
</table>

In the southern highlands of Tanzania (HSTZ), a total of 28 (25 new bean lines/varieties originating from the local breeding program and the Southern Africa Bean Research Network (SABRN) plus 3 local varieties were put together for evaluation (Table 2). The number of varieties evaluated per site varied from 6-12, depending on the agro-ecology and the variety preferences for the area. The test lines/varieties, included both released and promising non-released lines. The test lines,/varieties represented commercial classes, commonly preferred types and those that showed potential for adaptation to different agro-ecological zones (AEZs).</td></tr>
</table>

Table 2. List of bean lines/varieties used in PVS in the SHTZ, 2007

Bean lines/varieties	Bean lines/varieties	Bean lines/varieties
1. Roba 1	11. CAL(05)E10	20. CAL(05) E9
2. Njano	12. Uyole 84	21. NRI(05) E27
3. Uyole 04	13. Wanja	22. Kigoma (Local)
4. NRI(05)E13	14. CAL(05)E3	23. BILFA-Uyole
5. CAL(05)E6	15. NRISel(05)E15	24. CAL(06)E11
6. Uyole 03	16. Prelim I(06)E16SB	25. EAI L110
7. Rungemba (Local)	17. Climber Red	26. NRI(06)E17
8. BILFA 4	18. NRI(05)E27OR/BR	27. NRI RED E8
9. Sugar 131	19. CAL(05)E4	28. Sumbawanga LW
10.Urafiki		

In Mozambique the team assembled 20 (19 test line/varieties + 1 local) entries consisting of released bean varieties and promising lines based on local understanding of preferred market classes and grain size (Table 3).

Table 3. List of bean lines/varieties used in PVS in Mozambique 2007

Bean lines/varieties	Bean lines/varieties
1. AFR 703 (red)	11. CIM-SUG02-48-02 (calima)
2. Encarnado (red)	12. NUA 4 (calima)
3. PC 1459 BC2-RR9 (sugar)	13. G59/1-2
4. 925/2-7-1 (sugar)	14. G 20818
5. 12 LN O1 (sugar)	15. CIM-SUG02-17-02 (sugar)
6. VTTT 925/9-1-2 (sugar)	16. VTTT 925/3-2-1 (sugar)
7. VTTT 923/10-3 (red)	17. NUA 45 (calima)
8. PC 1549-BC2-RR9	18. GCI-LR-168-AR (large red)
9. VTTT 924/10-3-2 (Red)	19. CIM-SUG02-48 (sugar)
10. SUGAR 131 (sugar)	20. Local

1.2 Make available seed of targeted germplasm to be used in PVS trials and demonstrations

In Malawi, the identified bean lines/varieties were multiplied using irrigation facility at Kandiyani irrigation site near Chitedze Agricultural Research Station. A total of 1.5 tones of bean seed of test lines/varieties for participatory variety selection (PVS), including seed of released bean varieties for demonstrations were produced.

In Tanzania, sufficient quantities of bean seeds of potential PVS test lines/varieties as well as those released bean varieties which required further demonstrations were multiplied at Uyole Agricultural Research Station.

In Mozambique, the team used two sites (Chokwe and M'tengo Umodzi) to bulk up bean seed of test lines/varieties for PVS, together with some released bean varieties, which had not been well exposed to farmers.

In all 3 countries, seed of the selected bean lines/varieties were assembled and

packaged for PVS experimentation with partners. The number of partners and trials varied from one country to another (Table 4). The sites were distributed over all 3 regions: north, central and south in Malawi. In Mozambique the sites were limited to Tete, Zambezia and Nampula provinces, where as, in Tanzania the sites covered 3 regions: Rukwa, Iringa and Mbeya (Fig 1).

Table 4. The number of sites and partner organizations implementing PVS trials, 2007

Country	No. of partner organizations	No. of trials sites
Malawi	8	18
Mozambique	14	18
Tanzania	16	57

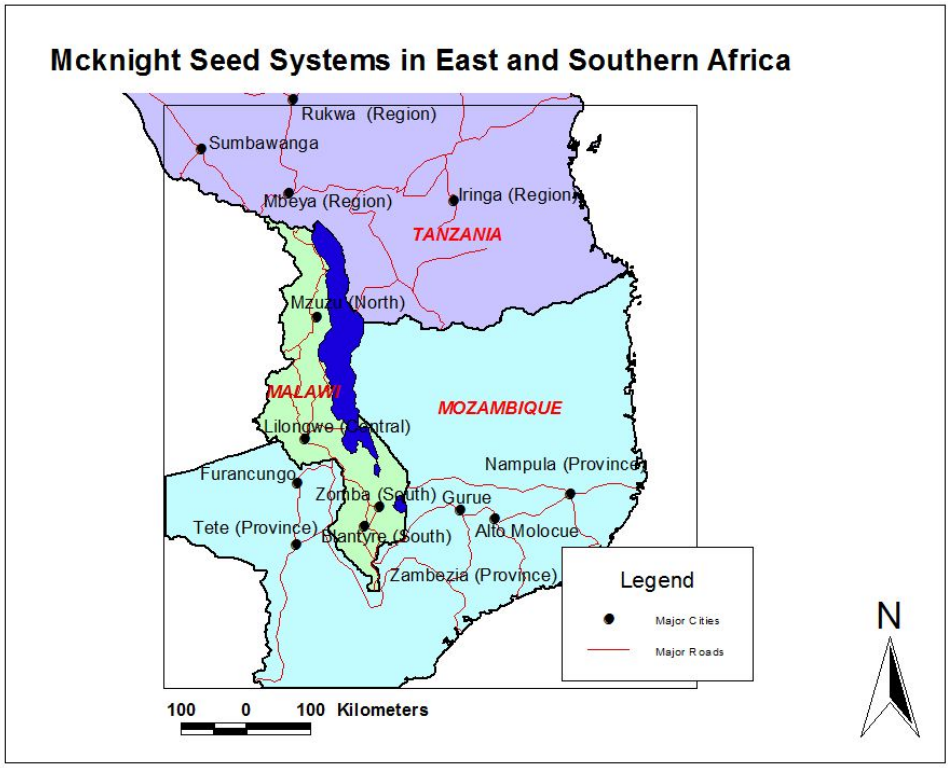

Fig 1. Map showing the areas covered by the project in southern highlands of Tanzania, Malawi and central Mozambique.

1.3 Train partners and NBRP scientists in participatory variety selection approaches and	Training in PVS was conducted for staff from partner organizations (NARS, NGOs, CBOs, traders and Government Extension agents) in all the 3 countries, where the project is implemented (Table 5).

methods

Table 5. The numbers of participants and partner organizations in PVS training sessions organized in Malawi, Mozambique and Tanzania

Country	No. of partner organizations	No. of participants
Malawi	8	22
Mozambique	14	26
Tanzania	16	30

In Malawi, the training on PVS targeted agricultural research scientists and staff from collaborating development partner organizations, including farmers who implemented the PVS trials. A total of 22 participants were trained (Appendix 1a), covering staff from eight research and development partner organizations (CARE International, SFLH of Ekwendeni Hospital, Action Aid Malawi, World Vision International, DAETS, Northern Corridor Project, CIAT-SABRN and DARS). The training covered such topics as conducting PVS trials, trial management and data collection, bean production and bean seed multiplication. In addition the participants were trained how to use different colors of ribbons to separate farmers' selected varieties (positive or negative) (Fig 2). Likewise ribbons were used to differentiate choice of varieties by gender (men, women or mixed). The three groups were created in order to capture the criteria each group uses in selecting bean varieties. Figure 3 shows a group of female farmers evaluating the bean varieties at one of the sites in Malawi

In Mozambique the course was conducted from 15 to 17 March 2007, in Angonia district. There were 26 participants from both development partner organizations and scientists of the national bean program, who were actively involved in the implementation of the PVS trials. National bean research scientists came from Lichinga, Sussundenga, Chokwe and Gurue Research Stations and staff from development partner organizations were from: World Vision-Gurue, APLA and extension agents from Angonia, Milange, Tsangano and Milange (see Appendix 1b for the list of participants). Louise Sperling explained the importance of involving a range of stakeholders in developing new bean varieties or variety selection and the relationship between variety development and supporting seed systems. The training course also included a practical exercise in the field, where participants learnt how to interact with stakeholders in order to capture their experiences and the criteria they use in choosing new bean varieties. In addition participants also learned how to use different colors of ribbon to distinguish variety preferences by different gender groups (male, female and mixed).

In Tanzania, the training took place from March 19-21, 2007. The training contents were the same as in Malawi and Mozambique covering such topics as: how to conduct PVS trials with the partners, partners roles in the evaluations, data collection and analysis, steps to follow after identification of preferred genotypes e.g. seed increase and access to a wider number of farmers . The participants came from a range of partner organizations namely District Agriculture Offices and

	Local Council, Church Based Development Organizations, Caritas of Catholic Diocese of Mbeya, NGOs and also bean researcher scientists from Agricultural Research Institute Uyole in the southern highland zone. (see details of participants in Appendix 1c).
1.4 Conduct PVS trials and demonstrations to expose farmers to a range of promising germplasm and to receive their in-depth feedback.	 Figure 2. Use of ribbons to differentiate variety preference by gender  Figure 3. Selecting bean varieties by different gender groups

Participatory variety selection (PVS) trials were conducted in 93 sites: Malawi 18, Mozambique 18 and Tanzania 57, where stakeholders (farmers, traders, and consumers) selected bean varieties - based on farmer/trader/consumer criteria. The bean crop was generally good in Tanzania compared to Malawi where it was badly damaged by excessive rainfall (see Fig 4). The average bean yield levels are illustrated in Table 7. In Mozambique the crop was hit by severe insect pest (bean stem maggot) attack. However, in each country the stakeholders selected some bean lines/varieties, and the number of varieties selected in each country varied (Tables 6 and 9).

Table 6. The number of PVS trial sites, varieties tested and selected in Malawi, Mozambique and Tanzania, 2007

Country	No. of trial sites	Varieties tested	Varieties selected
Malawi	18	20	5
Mozambique	18	20	5
Tanzania	57	30	10

In Malawi the PVS trials were implemented across the country covering areas where the collaborating partner organizations had on-going activities. Men and women farmers at each site identified a field where they implemented the PVS trial. Groups of stakeholders, organized by gender (men, women or mixed) were trained to separate positive and negative choices with different colors of ribbons. Out of the 19 + 1 varieties evaluated in Malawi, despite the poor crop yield performance, due to heavy rainfall (Fig 4) during flowering and early pod development (January-February), which resulted in flower and pod shading, farmers still selected some bean varieties (Table 9).

In Mozambique the PVS trials were implemented in Tete province (Angonia, Moatize and Tsangano, districts); Zambezia province (Milange, Alto Molocue and Gurue districts) and Nampula province (Malema district). The following processes were part of the implementation strategy of the project: a) explanation of the project to local government and communal leaders; b) explanation about the project to farmers' associations, linking to market; and c) explanation to farmers the importance of the crop in the local and outside market, which include national, regional and international markets. Farmers made selections of the preferred varieties. The evaluation was done using different colors of ribbons - disaggregating by gender and by positive vs negative selection.

In Tanzania**,** beans were assessed at specific growing periods in the field and after harvesting involving participating farmers and other stake holders. Evaluators included male and female farmers, traders (of different scales), and other consumers. Technical backstopping was provided by NARS, partner organizations and SABRN.

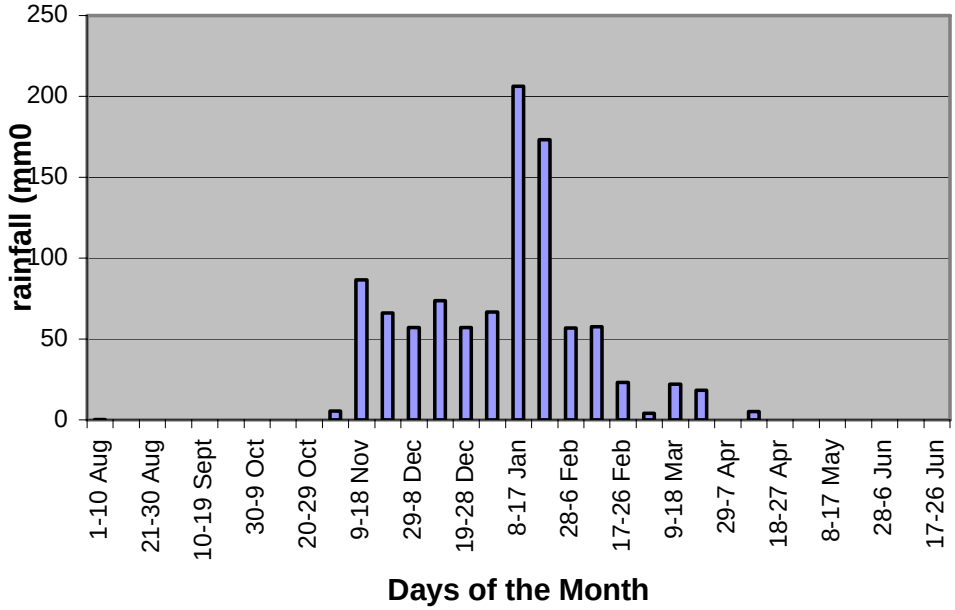

Figure 4: Rainfall data for Chitedze representing the medium altitude plains - Malawi, 2006-07

Table 7. Average grain yield of bean lines/varieties and stakeholders' preference (number of ribbons) in Malawi, 2007

Bean Genotype	Positive ribbons	Negative ribbons	Yield kg ha^{-1}
NUA 56	7.8	2.0	144.7
NUA 45	6.0	1.5	144.2
NUA 35	6.3	3.2	233.6
NUA 59	6.0	2.8	196.1
VTTT924/4-4	5.5	4.0	239.4
VTTT924/17-2	3.3	8.0	225.3
VTTT924/2-4-2-1	2.8	5.5	458.3
KHOLOPHETHE	9.0	4.3	417.5
PAN 150	6.5	4.0	472.8
MC 12832-8	7.5	2.5	498.3
MC 12832-9	4.3	3.3	466.4
CIM 9422-2	3.8	7.3	348.3
VTTT926/9-4	5.8	2.5	386.1
VTTT925/11-7	2.8	6.8	281.1
BOA 5-8/13	8.0	3.8	302.2
SSDT 55-C2	2.2	3.0	302.2
ECAB 07	2.0	7.0	372.2
MR 13508-8	0.8	11.3	407.5
UBR (92) 25	2.0	7.0	272.5
LOCAL	3.5	2.8	51.7
Mean	4.7	4.6	309.0
CV%	79.42	68.22	57.83
SE +	1.9**	1.6**	89.4*

**means in the column are significantly different at 1% level
*means in the column are significantly different at 5% level

The list of top few varieties which frequently appeared among the selected varieties across sites in each country is presented in Table 8 below:

Table 8. Varieties selected in each country

Country	Variety	Grain type and reasons for selection
Malawi	1.BOA	Miss Kelly, large, preferred grain type
	2.NUA56	Calima ,large grain preferred grain type
	3.MC1283	Carioca ,small grain, high yield
	4.PAN150	Carioca, small grain, high yield
	5.NUA45	Calima ,large grain, preferred grain type
Mozambique	1. SUG 131	Cream mottled, good for markets
	2. CAL 143	Calima, good for markets
	3. VTTT 925/9-1-2	Cream mottled, goo for markets
	4. VTTT 923/10-3	Cream mottled, good for markets
	5. PC1459-BC2-RR9	Cream mottled, good for markets
Tanzania	1. Njano	Tolerance to low soil fertility
	2. BILFA4	Tolerance to low soil fertility
	3. CAL05P213	Resistance to drought, marketable
	4. CAL05E3	Good leaves, many pods
	5. Roba-1	Good germination, diseases resistance
	6. NRI-SEL-06-E9	Drought resistance, good leaves
	7. NRI-Red-E8	Good taste, marketable
	8. NRI-05-E27	Many pods, good leaves
	9. Uyole04	Good taste, marketable
	10 Urafiki	Marketable, resistance to diseases

b) Demonstrations were conducted at several sites in all 3 countries and the number of sites as well as the number of varieties in the demonstrations are shown in Table 9

Table 9. The number of bean varieties and sites for demonstrations in Malawi, Mozambique and Tanzania, 2007

Country	No. of sites	Varieties demonstrated
Malawi	36	8
Mozambique	18	6
Tanzania	36	6

Much as the demonstration sites served the purpose of exposing stakeholders to improved bean varieties, the PVS trials apart from serving as learning plots, they also exposed many men and women bean farmers, traders, and consumers to existing and new bean varieties (Table 10).

Table 10.. The number of participants visiting the demonstrations sites in Malawi, Mozambique and Tanzania, 2007.

Country	No. of sites	Female s	Male
Malawi	18	227	313
Mozambique	18	285	255
Tanzania	36	341	401
Total	72	823	999

1.1.5 Evaluate results to highlight variety preferences/needs of diverse user groups

Stakeholders' bean variety selection criteria were established in all three countries. Although the selection criteria varied from one site to another and from country to county, there were some criteria like grain market classes (sugar, calima and dark red kidney), which were common in all 3 countries. In addition stakeholders pointed out time to cook, taste and quality of leaves as green vegetables as some of the cross cutting selection criteria, which are considered when they are evaluating the performance of new bean varieties.

Summaries of selection criteria in each country were as follows:
Malawi
1. Positive criteria
a) Both male and female stakeholders had similar positive selection criteria for new bean varieties – not in ranking order

- Acceptable grain color
- Lots of pods
- Large grain size
- Potential for markets
- Bush growth habit - non-climbing

b) Females had additional positive criteria:

- Early maturity
- Good leaves for vegetables

2. Negative criteria
a) For negative criteria both male and female stakeholders agreed against:

- Climbing growth habit, which was disliked for requiring staking materials

b) Females were also against:

- Small seeds – a negative criteria towards marketability, although some, particularly female farmers said they would go for small seeded varieties because they are good for food security – less likely to be taken to the market.

Mozambique
In general, farmers have their own criteria for selection, which were desegregated by gender. Men, tended to select based on market aspects. Women selected taking into consideration of food security. For example, carioca which was said to have no good market characteristics was considered by women as good for food

security, because men cannot take it to the market – 'difficult to sell'. The mixed group (men and women) was also more market oriented. Some of the common criteria for selecting bean varieties in Mozambique were:

- High yield
- Acceptable market class
- Resistance to pests/diseases
- Good quality leaves

Tanzania

The choice of varieties varied within and between districts, although there were some similarities. Farmers' selections were very broad and more than one variety was selected per village. In many locations the preference was for yellows/creams, calima and dark red kidney. Large white varieties were also preferred in some locations, particularly, in Mbozi district. Sugar bean types were not very popular except in Mbarali district. Generally, the choice of varieties depended on the following selection criteria, adopted from Njombe district, and they are used here as an example (Table 11). Note that these preference criteria are not arranged in order of importance.

Table 11. Farmers' Selection Criteria in Njombe district, 2007

	Criteria
1	Germination ability
2	Good canopy cover
3	Many leaves
4	Many flowers
5	Many pods
6	Disease resistance
7	Insect damage resistance
8	Early maturity
9	Seed color
10	Seed size
11	Marketability
12	Cook ability
13	Palatability
14	Broth quality
15	High Yield

Objective 2*: To develop impact-oriented bean seed production and delivery systems geared to delivering a range of products to a range of users. Ability to scale 'up', to scale out geographically, and to reach marginal user groups will be particularly a key*

Result 2.1	Means of seed acquisition and dissemination were established and seed production has been initiated
Activity	Progress
2.1 Make inventory of existing seed systems /seed diffusion channels and means of seed acquisition	Studies were initiated to take inventory and analyze the existing seed systems in Malawi, Mozambique and Tanzania. Tanzania A total of 242 farmers supported by 18 partner organizations were sampled for the study on seed systems (seed production and diffusion/marketing). The highlights from the study are as follows: • Very poor farmers' capacity for seed production and dissemination was very limited because they consumed seed. • Rich farmers were able to produce but dissemination to the poor is limited because they usually sell seeds at expensive prices and they are not easily reachable • The middle class farmers were ranked the best to multiply and disseminate seeds to the poor however, to improve dissemination of improved varieties, farmers suggested that there should have training in seed production (20%), establish decentralized (each village) demonstrations for improved varieties and practices (30.8%), facilitate the farmers (poor, rich and middle) to form groups for learning and share experiences and seeds (30.0%). Others (19.8%) did not have any suggestions. • The majority of farmers (74%) find it difficult to access seed of improved varieties • The off-farm sources of improved bean seeds were researchers and extension staff (small quantities through on-farm trials), seed credit in kind from NGOs, cash or /and credit in kind from other farmers (local seed producers) and exchange of beans seeds with seeds of other crops. • In addition to the improved varieties namely Uyole 96, Uyole 98, Kablangeti, Uyole 2003, Kabanima, Uyole 84, Uyole 2003, Uyole 2004, Bilfa, Wanja, Urafiki, Msafiri, DRK and TM, a large proportion of farmers (46.1%) planted local varieties.

	Malawi: A total of 180 farmers supported by 11 partner organizations were sampled and interviewed. The highlights of the study findings were revealed as follow: • The capacity for poor farmers to produce seed and disseminate was limited because they were cultivating on marginal lands and they spend most of their time in other people's field exchanging labor for cash, food or seed. • Rich farmers were able to produce seed but dissemination to the poor was limited because they were contracted to large scale farmers or agricultural companies. • The middle class farmers were ranked the best to multiply and disseminate seeds because they had land and the majority (66.7%) had the capacity to supply seed to other farmers. • The existing varieties identified in the study areas were: Maluwa, Kholophethe, Kambidzi, Nagaga, Napilira, Sapatsika, and local varieties such as Phalombe (dark red kidney), Nanyati (sugar bean) and Chimbamba (dark red kidney). • There is a wider distribution of seed by service providers, for instance the majority of farmers (60% of the interviewees) acquired seed of improved varieties from non governmental organisations. However, this source was said to be limited in terms of reach; sustainability volume. The other sources were government extension, other farmers, and recycled seed from previous harvest. • Seed of improved varieties was acquired largely (52%) on loan with repayment after harvest where non governmental organisations were implementing seed interventions. The other acquisition means were cash, free distribution and seed exchange in kind • However, the majority of farmers (68.6%) find it difficult to access seed of improved varieties not only because of distance; and limited sources but also lack of knowledge about improved varieties • To improve dissemination of improved bean varieties, the majority of farmers (48%) suggested provision of seed on credit to their groups/clubs. The other means to accelerate the dissemination of improved varieties included: training in seed production; establishment of decentralized demonstration plots in the groups; and establishment of seed banks in the communities. .N.B: Most of the points suggested by farmers were similar to the strategic elements which will be used by the project to enhance

<table>
<tr><td></td><td>farmers' access to seed of improved varieties.

Mozambique

A total of 150 farmers and 7 partner organisations were sampled. Data on existing bean delivery channels has been collected and analysis is in progress. However, preliminary findings indicate the following:
• The majority of farmers' accessed seed from the market. The other sources are other farmers; non governmental organisations and government extension
• Accessibility of improved varieties was difficult for smallholder farmers. Limited accessibility was a result of lack of knowledge and scarcity.</td></tr>
<tr><td>2.2 Produce breeder/foundation seed</td><td>Malawi:
Foundation seed was bulked up, packaged, and labeled. A total of 2,890 kg (Approx. 3.0 tones) of seed was produced of the eight released varieties at the Kasinthula Research Station in Southern Malawi under irrigation between June and October 2007. The seeds had been distributed to 90 sites under 9 partner organizations. Part of this seed will be used for demonstration plots for the second year of the project, to assist in creating awareness about the existence of the released varieties, and the other part will used for further seed multiplication with partners.

In addition private partners were also engaged in producing certified seed and – Farmers World alone produced over 270 tons of SUG131, a sugar bean variety.

In Mozambique Breeder's seed of the different bean varieties was produced at Chokwe, Sussundenga and Lichinga Research Stations. The table below presents the quantities of breeder's seed produced at different research stations. The breeder seed is normally produced using irrigation facilities to produce good quality, disease free seed.

<table>
<tr><td>Research Station</td><td>Amount of foundation seed produced (kg/ha)</td></tr>
<tr><td>Chokwe</td><td>270</td></tr>
<tr><td>Sussundenga</td><td>200</td></tr>
<tr><td>Lichinga</td><td>290</td></tr>
<tr><td>Total</td><td>760</td></tr>
</table>

Individual farmers in Angonia and Tsangano and farmers' associations in Gurue were involved in the production of certified and quality declared seed of released varieties. During this</td></tr>
</table>

	reporting period, they were involved in seed production of the following varieties: SUG131, CAL143, Bonus, Diacol calima and Ica Pijao. The seed growers were backstopped by either community based organizations (CBO) –APLA or non-governmental organizations (NGO) - World Vision with support from IIAM scientists working in those areas. Tanzania: A total of 10,000 kg of breeder and foundation seeds were produced at Uyole Agricultural Research Institute farm. About 500 kg of breeder/foundation seeds of 3 varieties were sold to Nkasi District Council in Rukwa Region for production of quality declared seed (QDS) by farmer groups selected and supervised by government extension agents. At village level, all the villages which planted the PVS trials, increased the remnant seeds of all varieties after planting the trials, so that more farmers could get seed in the subsequent evaluation because seed was only enough for a few farmers in the first year. Farmers also saved seeds of varieties of their choice from the PVS trials after harvest for further seed increase. Farmer groups in the villages where PVS trials were conducted were also provided with 6 kg of starter up seeds of a released variety. Most farmer groups harvested 25 to 60 kg of seeds from the 6 kg of seeds that were provided.

Objective 3*: To enhance skills and knowledge of partners*

Result 3	Partners' skills and knowledge enhanced to better understanding seed systems and effectively implement participatory variety selection with various stakeholders.
Activity	Progress
3.1 Introduce partners, farmers groups and scientists to the project	Malawi: A meeting to introduce partners to the project was organized at Chitedze Research Station. A total of 12 partner organizations were invited including the management staff from the Department of Agricultural Research Services. The partner organizations included CARE, ACTION AID, WORLD VISION, DAETS, CRS, IRLADP, SFLH, Northern Corridor, Concern Universal, Commercial Farmers (Dimitri). The objective was to introduce the project and plan for next steps of how the project is to be implemented. The meeting also defined roles and responsibilities of the partners in the course of project implementation.

	A planning meeting with partners involved in PVS and bean seed production was conducted. This meeting was conducted to identify which sites would implement PVS trials. Activities to be done during the course the year were defined. Roles and responsibilities of each partner were formulated (Appendix 2). Protocols for implementing PVS were discussed and a consensus was reached. Consultative meetings with partners interested in bean production were conducted as part of the process to strengthen partnerships to conduct PVS, demonstrations and seed multiplication. It was agreed that demonstration for the released bean varieties and PVS trials would be implemented as part of the partners on-going activities in their' working areas. Some NGOs (CRS, IRLADP and Concern Universal) were very supportive of this idea. CRS is even looking forward to draft a working agreement so that responsibilities could be clearly defined and binding. It is believed that with written agreements there would be commitment on the part of collaborating partners.

Challenges

In Malawi and some parts of Mozambique the rain fed crop season starts in November - December through to April, but our grant started in January 2007, which was in the middle of the crop season. The funds were made available in July 2007, as a result some of the planned activities in year 1 were not carried out, and these will have to be done in the second year.

The unusual excessive rainfall in most bean growing areas in Malawi led to very poor crop performance, and some sites were abandoned, slowing down the progress on participatory variety selection.

Posters

1. Rubyogo J.C., Tembo F., Chirwa R. Mazuma E., Amane M. and C. Madata (2007*).* Collaborative research program for creating impact oriented bean seed delivery systems for the poor in Malawi, Mozambique and Tanzania

2. Amane, M.I.V., D. Dias, J. Kaunda, M. Donca and M.Ibraimo (2007).). Impact-oriented bean variety selection, seed production & delivery options with communities in Mozambique.

Power Presentations

1. Chirwa R. M, J.C. Rubyogo, E. Mazuma, M. Amane and C. Madata (2007) Creating Impact Oriented Bean Seed Delivery Systems for the Poor in Malawi, Mozambique and Tanzania. Presented at a CCRP triennial guarantee conference "communities to community" held at Dolce Chantilly Hotel, France December 2007.

2. Chirwa R.M. J.C. Rubyogo, L. Sperling and F. Tembo (2007). Creating Impact Oriented Bean Seed Delivery Systems For The Poor In Malawi, Mozambique and Tanzania. Presented at a CCRP Legumes Community of Practice conference held at Cresta Hotel, Lilongwe, Malawi September 2007

3. Madata, C.S. The Mcknight Foundation Collaborative Crop Research Programme - Progress Report From The Southern Highlands Of Tanzania. Presented at a CCRP Legumes Community of Practice conference held at Cresta Hotel, Lilongwe, Malawi September 2007

4. Amane, M. (2007). Impact-oriented bean variety selection, seed production & delivery options with communities in Mozambique. Presented at a CCRP Legumes Community of Practice conference held at Cresta Hotel, Lilongwe, Malawi September 2007

5. Mazuma, E., S. Kazombo, H. Jinazali-Kabuli, Jean Claude Rubyogo and R. Chirwa (2007). Getting back to basics: creating impact - oriented bean seed delivery systems for the poor (and others) in Malawi. Presented at a CCRP Legumes Community of Practice conference held at Cresta Hotel, Lilongwe, Malawi September 2007

References

1. Assefa, T, J.C. Rubyogo, A. Deressa, R. Kirkby, R. Buruchara, L. Sendegeya and L. Sperling 2005. Creating partnerships for enhanced impact; bean variety delivery in Ethiopia. EARO report.

2. David, S. and L. Sperling (1999). Improving technology delivery mechanisms: lessons from bean seed systems research in Eastern and Central Africa. Agriculture and Human Values, 6:381-388.

3. Sperling, L. U. Scheidegger and R. Buruchara (1996). . Designing seed systems with small farmers: principles derived from bean research in the Great Lakes Region of Africa. Agricultural Administration (Research and Extension) Network Paper, No. 60. London: Overseas Development Institute.

Appendix 1a. : List of Participants for the PVS Training course in Malawi 2007

NAME	ORGANISATION	POSITION	ADDRESS
Simeon Phiri	CARE Malawi	Field officer	P/Bag A89 ,Lilongwe
Christopher C.Mwale	Action Aid-Mw	Programme Facilitator	P.O.Box 30735
Edward Kamvakonola	Action Aid-Mw	Programme Facilitator	P.O.Box 65,Dowa
Edward R. Shela	Northern Corridor	Member	Box 218 Ekwendeni
Levison T.Nyama	Min. of Agric	Agric.Dev. Extension .Officer	Box 13 ,Ekwendeni
BJV.Msukwa	Min. of Agric	Agric.Dev. Extension .Officer	Box 4 Mponela
S.M.Chima	Min. of Agric	Agric.Dev. Extension .Officer	Box 49 Nsalu Lilongwe
Lizzie Shumba	Ekwendeni Hospital	Project Coordinator	Box 19 Ekwendeni
W.F.Chibwana	Min. of Agric	Agric. Research Technician	Box 158 Lilongwe
Lizzie Kalolokesya	CIAT- Mw	Research Assistant	Box 158 Lilongwe
Alfred Kambwiri	CARE Malawi	Project Coordinator	P/Bag A89 Lilongwe
E.D.L.Mazuma	DARS	Team Leader –Beam Improvement Programme	Box 158 Lilongwe
Edson Musopole	Action Aid-Mw	Food Security-Program. Coordinator	Box 30735 Lilongwe
Annie Mtimuni	Min. of Agric	Agric.Research Assistant	Box 158 Lilongwe
K.E.Habonga	Min. of Agric	Agric. Extension Dev.Coord.	P/Bag 36 Lilongwe
Charles Nzawa	Action Aid-Mw	Programme Coordinator	P.O.Box 65,Dowa
Andrew Chapusa	Action Aid-Mw	Programme Coordinator	P.O.Box 30735 Lilongwe
Dama Chirwa	Ekwendeni Hospital	Chairman	Box 19 Ekwendeni

Appendix 1b. List of Participants for the PVS Training in Mozambique, 2007

NAME	ORGANISATION	POSITION	ADDRESS
Manuel Amane	IIMA	National Grain Legume Coordinator.	AV.DAS FPLM, 2698,Maputo, Mozambique
Patricio F.Bento	APLA	Director of APLA.	
Celestina Jochua	IIMA	Researcher	Chokwe , Gaza.
Nelson P.Jackson	World vision	District project Coordinator	Zambezia -Mozambique
Marcos A. Massas	World vision	District project Coordinator	Molocue - Mozambique
John B.Kaunda	IIMA	Researcher	Box 238,Lichinga, Mozambique
Miquel V.Murwacama	IIMA	Technician	P.O.Box 238 , Niassa
Luis Jumila	IIMA	Technician	FPLM , Maputo
Francisco C.Edwardo	D.D.A Tsangano	Extensionist	D.D.A. Tsangano
Sebastiano M.Categulo	D.P.A.Tete	District Supervisor	Mtengowambalame
Rui Lui Nota	IIMA	Technician	Chokwe
Sansao B. Honwana	World vision	District Coordinator	Gurue up6
Yosmin Lopez	APLA	Admin Secretary	
Domingos Dias	IIMA	Agronomist	C.P. 42 Manica
Francisco P. Santana	APA	Technician	
Satar Armando	DDA -Milange	Agronomist	DDA -Milange
Nunia F.Chawi		Agronomist	DDA -Milange
Leonardo D. Trindade	APLA	President of Assembly	Villa ulongwe
Marques .C.B.Donca	IIMA	Technician	Box 36 Nampula
Damiano Pitala	SDAEA	Rural Ext. Supervisor	C.P.No.32 –Angonia-Tete
Dynes Pio	IIMA	IIMA	A.I. Ntengo-umodzi
Rual Assis	D.D.A Tsangano	District Director	D.D.A. Tsangano

Appendix 1c. List of participants for the PVS training in southern highlands of Tanzania, 2007

NAME	ORGANISATION	POSITION	ADDRESS
Fredrick Fanuel Masawe	Mbozi Agriculture	Village Agric. Ext. Officer	Department of Agric.& Livestock P.O.Box 94
Mulyandingu Massunga	Caritas/Dev-Diocese of Mbeya	Principal Agric.Training officer	Bara Agric. Training Centre P.O.Box 179 Caritas, Mbeya Tanzania.
Rehema Omar Maulidi	Mbeya District Council, Agric.Department,	Extensionist	Box 253 Mbeya Tanzania.
L.M.Mbwaga	ARI-UYOLE	A.G.Field officer	Box 400 ,Mbeya. Tanzania.
Zainabu S. Majubwa	ADP- Mbozi Agric	Agric. Field Officer	Box 204 Mbeya ,Tanzania.
Henry Wallace Kiondo	Mbozi District Council	Ward Agric.Officer	Box 94 Kilimo Mbozi Tanzania
Edward S. Mugaya	Mbozi District Council	Ward Extension .Officer	Box 94 Kilimo Mbozi Tanzania
Benson J. Minja	LAELA Agric.Centre Rukwa	Agric. Instructor & Extensionist	P.O.Box 21,LAELA, Rukwa.
Adson Sheyo	Agriculture	Ward Extension .Officer	P.O.Box 4504 ,Mbalizi Mbeya
Kassim S.Mongomongo	ADP- Mbozi Agric.	ADP Extensionist	P.O.Box 204 ,Mbozi
Alson A.Mbogela	Mbeya District Council,Agric.Depart	Extensionist	Box 599, Mbeya
Andrew K.Mwakajira	Mbeya District Council, Agric.Department,	Extensionist	Box 1610 , Mbeya
Yona J Mahali	ADP- Mbozi Agric.	ADP Extensionist	Box 204 Mbozi
Peter M. Lanjau	Mbozi District Council	SMS Plant Protection	Box 94 ,Mbozi
Joseph J. Mwampashi	Mbozi District Council	Farmer	Box 94 ,Mbozi
Juliana A.Mwakasendo	ARI-UYOLE	Agric.Head of Socio Economics	Box 400 Mbeya
Elimpa Kilanga	ARI-UYOLE	Zonal Res.Ext.Liason Officer	Box 400 Mbeya
Shila Mwashala	Caritas Mbeya	Extensionist/ Project Supervisor	Box 253,Mbeya
Joram Masika	Caritas Mbeya		Box 179 Mbeya
Danford Mandari	ADP- Mbozi Agric		Box 94 Mbeya
Magaret M.Mkuchu	ARI-UYOLE	Principal Agric. officer	Box 400 Mbeya
Renato C.Makafu	Mbozi District Council	Ward Agric Extension .Officer	Box 76 Njombe
Luckson N.Mwakalindile	Caritas Mbeya	Extensionist	Box 179 Mbeya

Nyasebwa C. Enock	Mbeya District Council	District Crop Officer	Box 599 Mbeya
Betweh R.Fungo	Mbeya District Council	Agric. Field Officer	Box 599 Mbeya
Victor Elnshau	ADP- Mbozi Agric	Director	Box 204 Mbozi
Lameck J. Kasege	Mbeya District Council	Agric. Field Officer	Box 599 Mbeya

Appendix 2: The 2007-08 Annual work and action plan for Participatory variety selection program with collaborating partners developed in June 2007

Action plan for Aug 2007 to Jul 08

Activity	Responsible	Others to be involved	Target	Calendar July 2007 – June 2008												Indicators (tracking changes)
				J	A	S	O	N	D	J	F	M	A	M	J	
Identify potential genotypes for on farm testing	DARS	Partners	20													Number of genotypes
Increase/multiply germplasm and preferred seed for on-farm testing and multiplication	DARS	Partners	3 tones 2 tones													
Train partners in bean seed production (pests, diseases, soil fertility, seed quality requirements, storage and post harvest handling)	DARS /CIAT	Partners	6 per partner													
Train farmers in bean seed production (pests, diseases, soil fertility, seed quality requirements, storage and post harvest handling)	Partners	DARS	20													
Conduct baseline survey on seed systems (seed availability and channels and accessibility)	CIAT	DARS, Partners	1													
Design monitoring indicators	DARS	CIAT, Partners	1													
PVS site selection	Partners	DARS	36													
Mobilize /sensitize farmers for PVS	Partners	DARS, CIAT	36													
Distribute Seed for PVS and clear instructions	DARS	Partners	82seeds /variety/ site													

Conduct PVS trials	Partners	Farmers	36													
Conduct Field days	Partners	Farmers, DARS	36													
Analyze results from PVS trials	DARS	CIAT	2 reports													
Mobilize/sensitize seed producers of preferred varieties	Partners	Farmer organization	36													
Distribute seeds of preferred varieties	DARS	CIAT, Partners	2 tones													
Multiply seeds of preferred varieties	DARS	Farmers	3 tones													
Technical Backstop/follow-up	Partners	DARS, CIAT														
Develop and Produce training manuals	CIAT	DARS														
Planning and Review meetings																
Site visit to PVS trials planted in winter and summer	DARS	CIAT/Partners /Farmers	Partners/ CIAT/ DARS													