

Summary Progress towards Outcomes in PABRA **2003 -2005**

Outcome 1: Increased Utilisation of Bean Based Technologies

P. I. #1: Two million households (10 million people) growing and/or consuming new varieties

P. I. #2: Two hundred thousand households using more than one Bean-Based Technology (BBT) in PABRA region.

P. I. #3: Perception of men and women on the contribution of BBTs to food security, income and fuel wood consumption

P. I. #4: Number of and volume of new varieties traded in local and regional markets in six PABRA Partner countries

Output 1.1: Five Improved Bean Varieties Rich in Micronutrients (Fe, Zn or Protein) and Ten Varieties Tolerant to Two or More Major Biotic and Abiotic.

PI#1: At least 5 varieties richer in iron or zinc by 25 to 50%, and/or 5% richer in protein, that are accepted and/or released by Year 4.

P# 2: At least 10 varieties tolerant to two or more major stresses for priority market classes accepted and/or released by Year 4.

Cumulative Progress:

Varieties Rich in Micronutrients

A dual approach has been used: Firstly to identify local landraces, advanced lines or released varieties that may already have good levels of iron and zinc ("Fast Track" materials) and secondly, to improve commercial and popular varieties through breeding.

Thirty-eight fast track lines were identified with 60 to 70 ppm iron (i.e. 20 to 40% more than the baseline of 50 ppm) and 30-35 ppm zinc (i.e. 20 to 40% higher than baseline of 25 ppm). Gofta was already a released variety in Ethiopia and Maharagi Soja in DRC. Some are resistant to major diseases of beans, while four yield better than the most popular commercial variety in Uganda (CAL 96).

Fast track materials have reached on-farm evaluation stages in more than 6 countries largely to assess their adaptation and acceptability. In eastern DR Congo, 44 farmers selected three preferred varieties, and in Rwanda two climbers and five bush lines with important disease resistances were selected for wider evaluation.

Although some varieties have been part of the wider dissemination program in countries of release, Maharagi Soja, Nakaja, AND 620, Ngwinurare, Gofta, and MLB-49-89A have also been disseminated to 12000 beneficiaries and 7 associations in Rwanda in a nutritional program targeting PLWHIV and aiming at integrating agricultural production with overall strategy for alleviating malnutrition (nutrition education, supplementary feeding and food fortification).

Iron content of leaves in fast track lines is much higher than in seed, ranging between 397 ppm to 2498 ppm with a mean of 1119 ppm. Leaf zinc concentrations are comparable to that of seed. These findings are important because some communities use both seed and grain.

In SABRN, seed of fast track lines was increased in Malawi last year, and seeds have been distributed to 9 member countries for adaptation tests.

Improvement through Breeding: In collaboration with Harvest Plus Challenge Programme, several crosses for large seeded bush and climbing beans have been made to combine higher mineral content and other useful traits like resistant to disease (ALS and BCMNV). One hundred and fifty F5 and F6 families and 1,500 F3 plants from 200 populations have been

selected with above average iron and acceptable grain type (mostly being small red and carioca seed types). One hundred new crosses involving 3,000 families to combine drought tolerance and high minerals in small-seeded beans were created and evaluated. Crosses to combine drought tolerance, iron content and ALS disease resistance in small-seeded bush beans were made at CIAT HQ. Similar crosses are being made in Congo and Kenya.

Varieties Tolerant to Two or More Major Biotic and Abiotic Stresses

Since 2003, 24 varieties belonging to some of the major market classes and some combining resistance to biotic (mainly diseases) and abiotic stresses (for low soil fertility) have been released by PABRA countries (Table 1).

Several lines are in their final stages of testing before release in a number of countries. In Kenya, 17 (12 bush and 5 climbing) bean lines with marketable grain types and combinations of resistance to diseases (angular leaf spot, anthracnose, roots, bean mosaic virus) have just undergone national performance trial evaluations which is a stage before release. In DRC - 7 bush and 5 climbing bean varieties were rated as acceptable by farmers and are candidate lines for release. In Madagascar, Zimbabwe and Tanzania a total of 9 lines are widely accepted by farmers and awaiting formal release considerations.

In the breeding pipeline, over 2,810 populations and 3,989 lines developed (in both networks) to incorporate desirable traits (resistance or tolerance to diseases, low soil fertility, early maturity etc) in major market seed classes (red mottled, red kidney, small red and yellow, climbers etc) are undergoing selection at various stages between crossing and evaluations with farmers. Main challenges are combining (pyramiding) traits in beans of different market classes, and shortage of good levels of resistance to some important traits such as root rots, bean stem maggot, drought and low fertility. Emergence of new races affecting identified resistance is another limitation.

Output 1.2. Ten New Environmentally Friendly Options Developed for Managing Soil Productivity (Fertility), and Bean Pests and Diseases

P. I. #1: At least five new options each for managing soil productivity, and bean pests and diseases, are developed with men & women farmer

P. I. #2: Extent to which men and women farmers' criteria are incorporated into new environmentally friendly options

Options for Integrated Soil and Fertility Management (ISFM) and Integrated Pest and Disease Management (IPDM) have been developed or adapted in a number of countries. The notion of “newness” has different connotation in different countries. An existing technology in one country may be introduced and adjusted /modified in another country where it may be regarded as new. Using this definition, since 2003 at least 14 new options for soil, pest and disease management have been developed / adapted in the ECABREN and SABRN regions: nine ISFM options in Kenya, Ethiopia, Tanzania, DR Congo; four IPDM adaptations in DR Congo, Kenya, Sudan Malawi and Tanzania; and a decision guide for Integrated Nutrient Management (INM) in a bean based cropping system in DR Congo.

Overall, about 410,210 men and women farmer have been recipients of both new and existing ISFM and IPDM technologies across the two bean networks.

Output #1.3. Increased Access to 10 New and 50 Existing Technologies by At Least 2 Million Households (1.5 million by Year 4).

P. I. #1: Number of rural service providers using alternative methods to disseminate and promote new and existing technologies

P. I. #2: Number of men and women farmers reached by rural service providers with new and existing technologies

P. I. #3: Perceptions of men and women farmers of their ease of access to new and existing bean-based technologies (BBTs)

As of 2005, a total of 343 service providers have been catalyzed to join as partners in the delivery of a variety of services in PABRA countries. Services include bean research-seed-diffusion continuum; capacity building and skill enhancement; promotion and dissemination of technologies, agro-enterprise development, community empowerment, community organizations etc.

To solidify partnerships as of 2005, about 80 Memoranda of Understanding (MoU) have been developed, mostly between national research institutions and key collaborators (GOs, International NGOs and UN agencies, commercial seed companies, local NGOs and CBOs). New partners for seed dissemination include international NGOs (Ethiopia), women groups, people living with HIV/AIDS, tobacco companies (Southern Africa: Mozambique, Malawi and Zambia etc), health centres and a few seed companies (especially in Zimbabwe).

Results from impact assessment surveys carried out in five countries Uganda, Rwanda, DR Congo, Ethiopia and Malawi indicate that over 30 million beneficiaries have been reached with bean based technologies, already surpassing our original 5-year target. Adoption data also from the bean impact studies shows that the proportion of farmers adopting improved technologies is 79% in Northern Tanzania, 64% in Rwanda and 53% in Uganda. We believe that these figures will be surpassed in the next two years.

The perception of (men and women) farmers of their ease in accessing new and existing bean-based technologies is assessed through a variety of methods including formal and informal surveys. A follow-up survey of the effectiveness of bean seed dissemination intervention involving the bean program of Ethiopian Agricultural Research Organization, CIAT and five international NGOs in 2004, when 137 metric tonnes were disseminated, indicated that 73% of interviewed farmers had never before had access to new bean varieties and grew them for the first time i.e. prior to this ‘concerted partnership’. These efforts targeted a new set of farmers (including a ‘poorer’ group) who gained access to new varieties in large numbers.

For knowledge intensive technologies (IPDM & ISFM), a number of approaches have been used for learning and dissemination. Approaches cited by farmers in the 2005 survey as useful sources of knowledge and information on technologies included: demonstrations at strategic locations (road side, health centres or church premises), promotional materials (leaflets, brochures & posters), farmer field schools, field days, radio broadcasts, promotion messages during agricultural shows & nutrition days, farmer exchange visits and village information centres. Other approaches perceived as effective by farmers are individual approaches where individual farmers talked to other farmers or demonstrated technology options in their individual fields. Men and women farmers use different approaches to disseminate information on technologies.

Contribution of Bean Based Technologies:

Perceived socio-economic benefit from bean based technologies (based on impact studies, uptake pathway of IPM technologies and Enabling Rural Innovation surveys at pilot sites) is increased farm production (yields) that enables farm households to have sufficient food during periods of scarcity, increased income and general family health. The additional income enabled farmers to pay children school fees, purchase extra and better food, acquire better building materials and clothing. In some instances, farmers hired additional land for cultivation and purchased livestock.

Other benefits cited were exposure to new partners for different services such as credits, inputs and new information on health and nutrition.

Number and volume of new varieties traded in local and regional markets in six PABRA partner countries

Market opportunity studies for bean and bean by - products carried out between 2003 and 2004 showed that a vibrant local and potential regional market exists. K132 (CAL 96) is the largest traded variety in Uganda. Kenya imports 50,000 mt of beans annually (principally this variety) from Uganda and 18,000 mt from Tanzania through informal cross border trade. 40,000 mt is traded locally in Uganda. In the last 2 years Ethiopia has exported about 32,000 mt of one new variety and one older variety to Europe and Middle East. In 2004, the CIAT-bred variety Napilira had the largest sale volume in one area of Malawi: 8.8 tonnes per month during the study period. This was attributed to high yielding ability and hence production due to its tolerance to low soil fertility and resistance to diseases. A case in southern Uganda is most remarkable. Participatory plant breeding (which involved traders too) started in 2002. Two years later, traders were moving two red kidney lines (RWR 1946 and RWR 2075, resistant to root rots and tolerant to low soil fertility) to points 450 km distant—in Uganda as well as to Rwanda -- before even the varieties were released (which happened only --in 2006). In 2005, the price traders paid to farmers was a very high 1500 US\$ (about 83 US cents) per kg (versus 500 US\$ for the local varieties) and sold in more distant markets for 2000 US\$). Traders recount their two-way trade in these varieties: they have farmer clients lining up for future delivery--- and traders themselves deliver to such markets as Mbabara, Bushenyi, Bundibudyo, Fort Portal (in Uganda) and Ruhengeri and Byumba (in Rwanda). Six traders moved 1.5 mt in the first season of 2005, and anticipated to move more than 3 mt the following season. Already testimony is being given that farmers now are sending children for further education. The challenge raised by traders is to link their regional efforts to markets in Kampala and perhaps Nairobi.

Outcome 2. Enhanced Capacity of 25 villages/communities in the project's 3 pilot areas to plan and manage initiatives to meet their needs

P. I. #1: The extent to which men and women jointly plan and manage initiatives to meet their needs

P. I. #2: 15 Communities involved in planning and implementing research and development activities without project facilitation

P. I. #3: The extent that new initiatives (e.g. agro-enterprises, Natural Resource Management (NRM), Farmers' Experimentation) are successful, disaggregated by wealth and gender

This component links technology generation of both varieties and of non-variety kinds (ISFM and INM) with a focus on enhancing the ability of smallholder, resource-poor farmers to access market opportunities, empowered to make decisions and demand technologies and to diversify their links with participatory technology generation. Under the Enabling Rural Innovation (ERI) programme this project begun in pilot sites in Tanzania, Malawi, and Uganda in 2002, and has since scaled out to new sites in Zambia, Mozambique, and Zimbabwe, sometimes with new local investment.

Output 2.1. Increased Knowledge and Skills of Groups and Farmers from Communities in Pilot Areas to Manage Better (Their Resource, Identify and Develop Agro-Enterprises, Better Organize Their Communities and to Link-Up with Rural Service Providers)

PI #1: 100% increase in the number of sources from which communities access information and services, disaggregated by gender

PI #2: 10 new Agro-Enterprises, disaggregated by wealth and gender, by year 3 and 15 by year 5 in each pilot area

PI #3: Farmers perceptions of the change in their ability to manage their resources better (e.g. soil and water conservation, soil fertility, income) and conflict resolution.

The number of market and technology information sources from which communities access information increased from 17 to 42 between 2003 and 2005 -- a 59% increase. Information sources are partners working in collaboration with ERI, including the Ministry of agriculture extension services (Bulindi ARDC, Malawi DARS) that provide support to participatory research; development NGO's (Africare, CIP, TIP, World Vision, PRIDE Uganda) facilitate farmers access to technologies; wholesale and local traders (Kapani meat processors, NANDO's, and immediate & distant local markets) through planned market visits provide market information; and innovative farmer groups and farmer associations (KADIFA) advise new farmers.

New agro-enterprises developed have grown from 15 agro-enterprises in 8 communities in 2003 to 22 agro-enterprises in 24 communities in 2005. These include Irish (solanum) potato, goats, groundnuts, forages, cassava, eggs, ginger, pigs, water melon, sweet corn, onions, green beans to sweet melon. A total of 814 farmers have participated in different enterprises. The average percentage of participating female farmers in agro-enterprises is 40%. Internal saving mechanisms in most farmer groups are at \$700 in Malawi; \$200 in Tororo (Uganda), and \$400 in Nyabyumba (Uganda).

An external evaluation of ERI process in Malawi was completed using a beneficiary assessment evaluation tool. The results revealed that gender and equity issues have been well addressed by the project through gender awareness training and women participation in project activities. In the agro-enterprises for bean seed multiplication, dairy and goat enterprises, women constituted a minimum proportion close to 50% of beneficiaries, and often more. There was evidence of female empowerment through participation in various committees and other capacities. As a result of the project interventions, women have been empowered to be economically active through participation in these agro-enterprises.

Output #2.2: Increased Skills of Men and Women to Achieve Gender Equity at the Community and Household Levels

PI #1: Level of confidence of women to interact within and without the community

PI #2: Perception of who has access and control over agricultural resources (land, income, labour, inputs, information) within the household

At community level women are able to speak in group meetings, participate in project activities either as project participants or as committee members serving in different capacities. Based on individual farmer survey in Malawi, in Bokosi village 50% of the farmers interviewed were female committee members in the following capacities: chairlady, treasurer for Participatory Market Research (PMR), livestock committee, and members of the market committee. In Chisewu village 40% of those interviewed were female committee members in the following capacities: secretary for the Farmer Participatory Research (FPR), secretary Participatory Market Research (PMR), and treasurer FPR.

A considerable improvement in gender relations both at the household and community levels is observed. Gender empowerment has entailed having a voice on domestic matters relating to household financial management, in particular deciding on what agro-enterprises the family should be engaged during the next season. Women are working together with their male counterparts on household chores, herding goats, and at community level, and their opinions are taken on board when making decisions that affect them. Through participatory approaches and

technical training, the communities have increased their levels of confidence when dealing with technical issues such as bean multiplication, market identification and dairy farming.

As a result of the projects interventions, both men and women in 24 communities have been empowered to be economically active through participation in 22 agro-enterprises. However, continued assistance to these communities is required before they can be considered sustainable, and this continues to be provided by the partnering organizations and, particularly in pilot areas, communities continue to be linked directly to an ERI researcher.

A study is being designed to determine the extent to which new initiatives on agro-enterprises, natural resource management and farmers' experimentation are successful, disaggregated by wealth and gender

Outcome 3. Strengthened institutional capacity of PABRA, constituent Sub-regional organisations and partners

PI # Increased Knowledge and Skills of Scientists and Staff from NARIs, NGOs and Rural Service Providers to Effectively Address Clients' Needs

PI# Ratio 3:10 of PABRA related NARI staff applying new techniques for breeding, IPM, PR and gender analysis by end of Year 3, disaggregated by gender.

P. I. #3: Extent of use & adaptation of new approaches used by institutions

Total numbers of people that have attended short course trainings in 2003, 2004 and 2005 were 320, 750 and 913 respectively; the proportion of women participants was 32%, 25.4% and 31.8% respectively. Participants were drawn from the NARI's, and partnering institutions in the private and public sectors. The trainings were in participatory plant breeding (PPB) / participatory varietal selection (PVS), biotechnology, community based seed production, integrated pest and disease management, marker assisted selection (MAS), agro-enterprise aspects, research methods, market analysis and Participatory M&E. A quick assessment of PPB work regionally indicated that 27 out of 53 (over 50%) of ECABREN and SABRN plant breeders employ participatory approaches in their plant breeding and selection work. Similar assessments are yet to be undertaken in the other key areas of training to determine extent of application of skills and knowledge acquired. Also between 2003 and 2005, 26 students enrolled in masters and PhD programs in the areas of cross border trade, HIV-AIDS & agriculture, agri-business, community development, bean improvement for disease resistance and molecular and virulence characterization, and technology transfer. Of these, 29% were women students. The students are drawn from NARIs in PABRA countries.

Some institutions and organizations are being influenced and some of their programs are now incorporating approaches for PPB & PVS, seed systems, agro-enterprise and technology development. However, studies are yet to be undertaken to determine extent of adaptation of approaches and technologies.

- Participatory plant breeding or variety selection is being integrated in breeding programs in Southern Africa
- Seed systems approaches (partnerships and delivery approaches) are now being applied by some NARIs which previously never interacted with development partners.
- Success in linking farmers to technology development and markets following extensive contact with Enabling Rural Innovations (ERI) in Tanzania has led the NGO TIP to gain support from IFAD to coordinate and scale up their success in many new districts; gains observed in PLAN-Malawi led PLAN-Zambia to seek similar PABRA/ERI support.

Bean networks have identified national and regional specialists that support PABRA work in seed dissemination, impact assessment, agro-enterprise, participatory farmer research, community participatory M & E, IPM and breeding (including for drought and soil fertility constraints). The number of national and regional specialists has risen from 5 in 2003 to 14 in 2004 and 23 in 2005. These are drawn from Uganda, Kenya, Zambia; Malawi; Zimbabwe; Madagascar, DRC, Tanzania, and South Africa.

Bean root rot diagnostic and management posters for farmers, developed in 2003, have now been translated into Swahili and local languages for use in Tanzania, Kenya and Uganda. A draft agro-enterprise development manual developed from ERI/PABRA experiences is already in use in Tanzania by TIP, which produced its own Swahili version; business manuals for farmer seed producers were translated to Portuguese; translations of farmer seed manuals into French, two main local languages in Uganda and for Tanzania were conducted in some instance with the collaboration of partners; by other partners, into ; four occasional publications (Nos. 39 to 42) on coping with drought, bean production in urban areas, local seed systems for beans in Malawi, and a baseline study on poverty and rural livelihoods in Uganda/Malawi/Tanzania, were published and disseminated. Five policy briefs on “seed systems in stress” were developed in 2004 and are available across countries.

Six small proposals were developed jointly with at least three partner countries in ECABREN and submitted to ASARECA Competitive Grant System. Two small concept notes were developed by SABRN members for McKnight Foundation. One proposal was developed in 2005 under HarvestPlus for “Reaching End-Users” with nutritionally improved crops (CIAT HQ and PABRA) with the participation of both bean networks. PABRA networks members in SABRN and ECABREN contributed to the development of research agenda and proposals under the Sub-Saharan Africa Challenge Programme of FARA and the CGIAR.

An evaluation of ECABREN commissioned by ASARECA in 2003 gave the following assessment of the perceptions the sub-regional organisation on ECABREN and other networks:

Market orientation: varietal development programmes no longer focus on abiotic and biotic constraints alone but are using development and market characteristics as evaluation criteria;

Participatory approaches: Emphasis is on increasing the utilisation of participatory methods by national programmes to enhance technology generation and dissemination (PPB, FPR, PM&E);

Socio-economic concern in research: Production constraints are now being addressed with input from socio-scientists and economics, capacity building of national partners in partnerships, impact assessments and participatory monitoring and evaluation system.

Regionality: Comparative advantage of member countries and sharing of research results (sponsoring regional scientists’ participation at regional meetings, encouraging members to publish research results, develop promotional materials and organizing study tours) has proved to be effective in generating technologies more rapidly and at lower cost. The major benefits are cited as access to germplasm, capacity building and information exchange.

Sub-Saharan Challenge Programme: ASARECA selected CIAT to be the Lead Institution in the Lake Kivu Pilot Learning Site of the SSA-CP. This was largely based on CIAT’s partnerships and experience in PABRA, and the PABRA coordinator is supporting its Inception Phase.