Output 5: Strengthened institutional, organizational and collaborative capacity of NARS and sub-regional networks in Africa and Latin America

Activity 5.1 Strengthened capacity of NARS: increasing the knowledge and skills of scientists and staff from NARIs, NGOs and Rural Service Providers

Highlights:

- In Latin America, two PhD candidates and one MSc candidates received their degrees, while in Africa two PhD and three MSc degrees to scientists working the bean project.
- In Africa a total of 408 persons attended courses or workshops, for a total of 1497 person-days of training.
- Participatory plant breeding was strengthened regionally with a course in Kenya attended by 22 scientists from the region, including four from SABRN
- Former IPM farmer groups in central Malawi have now taken up seed production as a business.
- Interaction between breeders in Africa and headquarters increased this year, with training in headquarters in marker assisted selection and with seed shipments renewed from Africa to Colombia, leading to closer integration of the breeding programs in Latin America and Africa.
- The ECABREN program assistant acquired skills in participatory monitoring and evaluation systems to support national bean programs
- 28 Biophysical scientists, NGOs partners, and technicians from Northern Tanzania were exposed to Participatory M&E organized by PABRA/ECABREN
- ECABREN partners in Tanzania and Uganda acquired knowledge in seed systems and distribution channels
- Two researchers from ISABU and Centre Technique Horticole d'Antananarivo, Madagascar developed knowledge and skills during training in production of promotional materials carried out at ATDT/ISAR project.
- Farmers and researchers in northern Tanzania select and name nine new marketable bean lines with tolerance to bean stem maggot and angular leaf spot after four years of participatory selection. Seed bulking by farmer groups and broader evaluation of new bean lines initiated.
- A compilation on participatory breeding experiences across crops, countries and regions of Africa was completed.

5.1.1 Degree and non-degree training in Latin America

PhD candidates:

- Andrea Frei, ETH, Switzerland, completed her thesis on resistance to *Thrips palmi* in beans (C. Cardona, M. Blair, S. Dorn, H. Gu).
- Oscar Vizgarra, an Argentine PhD candidate continues writing his thesis, involving a statistical analysis of multi-locational trials carried out over a 15 year period in the north-west of Argentina (S. Beebe).
- Oscar Checa, Universidad Nacional, Palmira, Colombia, completed his studies on the inheritance of climbing ability in common bean and the importance of genotype x environment interaction in this trait (M. Blair).
- Ivan Ochoa, Pennsylvania State University, USA is finishing his thesis on genetic mapping to understand the inheritance and mechanisms of low phosphorous tolerance in common bean and the role of adventitious rooting in adaptation to low phosphorous stress (collaboration M. Blair with J. Lynch).
- Enrique Bravo from the Universidad del Valle continues his research on the molecular characterization of the NL4 strain of bean common mosaic virus (F. Morales).

MSc candidates:

- Juan Miguel Bueno, Universidad del Valle, completed his thesis on sampling methods for whiteflies on beans and snap beans (C. Cardona).
- Orlando Chaveco, a Cuban MSc student continues to carry out a physiological analysis of lines derived from the cross of DOR 364 x BAT 477, the latter of which has expressed resistance to multiple abiotic stresses. The study will reveal the physiological relationship between resistances to low P, nitrogen and drought stress (S. Beebe).
- Maria Antonia Henríquez, Universidad Nacional de Colombia, Palmira, continues her MSc thesis on "Use of Expressed Sequence Tags (ESTs) to understand the interaction of bean genotypes and *Phaeoisariopsis griseola*" (G. Mahuku).
- Juan Manuel Díaz, Universidad Nacional de Colombia, Palmira is working on evaluation of genetic diversity in Andean accessions of the common bean core collection using microsatellites (M. Blair).
- Lucy Díaz, Universidad Nacional de Colombia, Palmira is working on evaluation of genetic diversity in Mesoamerican accessions of the common bean core collection using microsatellites (M. Blair).
- Wilfredo Pantoja, Universidad Nacional de Colombia, Palmira, is working on evaluation of genetic diversity in Tepary bean accessions (M. Blair).
- León Darío Vélez, Universidad Nacional de Bogota, Colombia is studying the inheritance of intercropping ability between common bean and maize (M. Blair).

Pregraduate students:

- Gina Viviana Caldas, Universidad del Valle completed her studies on tannin QTL mapping (M. Blair).
- Maria Fernanda Montenegro, Universidad Nacional completed her thesis on the effect of insecticides on natural enemies of whiteflies (C. Cardona).
- Sergio Prieto, Universidad Nacional, completed his thesis on molecular markers for arcelin (M. Blair and C. Cardona).

- Mónica Navia, Universidad del Valle completed her work on "Elucidation of the infection process of common bean by *Phaeoisariopsis griseola*, the causal agent of angular leaf spot disease" (G. Mahuku).
- Henry Lozano, Universidad Nacional, completed his studies on "Inheritance of mineral content in advanced backcross population of common bean using the Wild QTL approach" (M. Blair).
- Sandra Jimena Valencia, Universidad Nacional, initiated studies on "Sub-lethal effects of antibiosis on the demography of *Zabrotes subfasciatus* and *Acanthoscelides obtectus*, storage pests of beans" (C. Cardona).
- Lorena Cortés, Universidad del Valle, is working on "Effect of different sources of green manure to manage root rot pathogens of common bean (*P. vulgaris*)" (G. Mahuku).
- Yenni Lorena López Galvis, Universidad Nacional, is working on "Evaluation of common bean genotypes *Phaseolus vulgaris* L. for drought tolerance under greenhouse conditions" (I. Rao).
- Lina María Rodríguez, Microbiol. Univ. de los Andes, Colombia, initiated studies on "Geminivirus resistance markers" (M. Blair).

Visiting Researchers:

- Gloria Santana, CORPOICA, Rionegro, Antioquia, Colombia (Sept 2003). Training in molecular marker techniques and indirect selection for BCMV resistance, at CIAT.
- Andrea Frei, ETH, Switzerland, (February 2004). Preparation of a publication on quantitative trait loci involved in resistance to the leaf-feeding insect, *Thrips palmi* in common bean.
- Carlos César Caula, Cuban Institute of Biotechnology, (to March 2004). Training in microsatellite mapping, marker assisted selection and gene tagging.
- Hernan Campos, Univ. San Simon, Cochabamba, Bolivia (to April 2004). Training in population evaluation and crop physiology.
- Kattia Delgado, Instituto Peruano de Leguminosas / PROMENESTRAS / PROMPEX, Chiclayo, Peru (April - May 2004). Training in Andean bean breeding and marker assisted selection.
- Dennis Flores, Instituto Peruano de Leguminosas / PROMENESTRAS / PROMPEX, Chiclayo, Peru (July – Sept 2004). Training in Andean bean breeding.
- Andrea Dávila, Centro Fitoecogénetico Pairumaní, (August-December 2004). Univ. San Simón, Cochabamba, Bolivia. Training on evaluation of genetic diversity in Bolivian accessions of common bean.
- Luz Nayibe Garzón, Universidad Nacional de Bogotá, Colombia, (Sept – Dec 2004). Training on development of molecular markers for anthracnose resistance in common bean.
- Paul Kimani, CIAT-Kenya/ University of Nairobi (August 2004). Specialization in marker assisted selection.
- Rowland Chirwa, CIAT-Malawi (August 2004). Specialization in marker assisted selection.
- Tereza Cristina Olivieras Borba, EMBRAPA-CNPAF, Univ. Federal Goias (Sept – Nov 2004). Development of fluorescent microsatellites for common bean.
- Orlando Chaveco, Cuban Ministry of Agriculture (October 2004). Training in Andean bean breeding and physiology.

- Carmenza Muñoz, University of Lyon (October – November 2004). Preparation of a publication on genetic diversity of tepary bean.
- Gloria Iriarte, CENICAFE (short visits). Preparation of a publication on advanced backcross method in common bean.

Courses:

Date	Title	Duration (days)	Total No. participants	No. Women participants	No. of CIAT/Network instructors	No. of NARS instructors
Oct. 17, 2003	The B biotype in the Cauca Valley	1	25	3	3	-
Nov 20-22, 2003		3	27	2	3	6
Dec 16, 2003	The B biotype in the Cauca Valley	1	25	nd	3	-
Jan 29, 2004	The B biotype in the Cauca Valley	1	110	nd	1	-
Apr 10, 2004	The B biotype in the Cauca Valley	1	35?	nd	1	-
May 5, 2004	Whiteflies and their control (field day)	1	76	~15	3	-
Jun 4, 2004	Pests of beans and their control	1	60	nd	1	-
Jul 27, 2004	Sampling methods for whiteflies	3	275	nd	2	-
Aug 5, 2004	The B biotype B in the Cauca Valley	1	197	nd	1	-

Workshop at CIAT Headquarters on "Common Bean and *Brachiaria* Improvement for Acids Soils"

This workshop was held at CIAT headquarters, Cali, Colombia during 25 to 26 February, 2004 to review and discuss research progress made by different partners participating in the special project funded by BNZ-GTZ, entitled "An integrated approach for genetic improvement of aluminum resistance of crops on low-fertility soils".

Workshop at CIAT Headquarters to review results of Rhizobium-bean simbiosis project

A second Workshop with the attention of nine participants from Cuba, México, Belgium and Colombia was held at CIAT Headquarters, Cali Colombia during November 14-17, 2003 to review the results of the project "Integration of biofertilisation in bean cultivation by optimizing the use of the *Rhizobium*-bean symbiosis". In this workshop a review was made to the research advances in the relation plant-Rhizobium not only for field trials but also for lab trials.

5.1.2 Degree and non-degree training in Africa

Rationale: New knowledge and tools can facilitate and improve efficiency and effectiveness of our partners. For example, molecular tools can facilitate more precise and rapid identification of genotypes carrying certain desirable genes and the characterization of pathogens and their variation. The use of the PPB approach has been credited for its consideration of the user perspective and orientation and the reduction of the period it takes to breed a variety by almost half in some cases. A start has been made in training within the networks, but many national program partners have yet to acquire such skills and apply these new tools and approaches. Some of the PABRA countries hardly have functional multi-disciplinary teams in place. For example many of the SABRN countries have only one scientist working on all aspects of beans and sometimes, including other legumes. Many of those available are young scientists with only a BSc. degree. Thus there is need for higher-level training in the region, as well as to groom others to take up more responsibilities of network activities from CIAT.

The SABRN network through its Pan African Bean Research Alliance (PABRA) continued to provide support for students who are training at Ms. degree level. CIAT-SABRN is also supervising thesis research for students sponsored by Rockefeller Foundation, and sponsored by Bean-Cowpea CRSP

PhD candidates:

- Geoffrey Tusiime PhD, Makerere University, has completed a degree and thesis titled "Variation and detection of *fusarium solani* f. Sp. *phaseoli* and quantification of soil inoculum in common bean fields".
- Julius Mukalazi, PhD, Makerere University, has completed a degree and thesis titled "Pathogen variation and quantification of *Pythium* species in bean fields in Uganda".
- Virgina Gichuru, PhD, Makerere Universit, continues study on "Characterization and pathogenicity of *Pythium* isolates on crops, which are intercrops of beans in South Western Uganda"
- Otsyula Reuben PhD, Makerere continues study on "Study of inheritance and development of root rot (Pythium) resistant varieties using marker assisted selection in common beans".
- Claire Mukankuzi PhD, University of Kwa Zulu-Natal continues study on "Breeding beans (*Phaseolus vulgaris*) for resistance to Fusarium root rot (*Fusarium solani* f.sp *phaseoli*) and large seed size in Uganda".
- Geofrey Kananji, PhD, University of Natal, South Africa continues study on "Improvement of dry bean resistance to bruchid in Malawi".

MSc candidates:

- Kennedy Muimui, MSc, University of Nairobi, Kenya, has completed a degree and thesis titled Inheritance of resistance to common bacteria blight and selection for multiple resistance to rust and angular leaf spot in yellow and navy bean genotypes.

- Annet Namayanja, MSc, Makerere University, has completed a degree and thesis titled "Inheritance and marker assisted selection for angular leaf spot *(Phaeoisariopsis griseola*) resistance in common bean".
- Lianda Mauyo, MSc, Moi University, has completed a degree and thesis titled "Cross-border bean marketing patterns in the border districts of Kenya and Uganda".
- Walter Ocimati MSc, Makerere University continues study on "Effects of management options for Pythium root rots on selected crops grown in association with beans in southwest Uganda".
- Simon Bereng, MSc, University of Free State, South Africa continues study on "Screening bean germplasm for low P tolerance under acidic soils with and without lime application in Lesotho".
- Barthlomew Y. E. Chatayika, MSc, University of Malawi (Bunda College of Agriculture) continues study on "Mode of inheritance for angular leafspot and common bacterial blight resistance in common bean".
- Mathias Zulu, MSc, University of Zambia continues study on "Pathogenicity identification, severity and distribution of anthracnose *(Colletotrichum lindemuthianum)* of common bean (*Phaseolus vulgaris*) in northern, luapula and northwestern provinces of Zambia"**.**
- Augustine Musoni, MSc, University of Nairobi continues study on "Inheritance of fusarium wilt (*F. oxysporum f.sp. phaseoli*) and selection for multiple disease resistant and marketable climbing bean varieties".
- David R. Macharia, MSc, University of Nairobi continues study on "Transfer of angular leaf spot, anthracnose and tolerance to low soil fertility in red mottled and red kidney beans".
- Lunjalu, J.O., MSc, University of Nairobi continues study on "Effects of cooking on nutritional value of high iron and zinc beans".
- Mark Korir, MSc, Moi University continues study on "Bean marketing along the Tanzania-Kenya border".
- Kibyego, Michael, MSc, Moi University continues study on "Bean marketing in Nairobi and its environs".
- Ngongo Mulangwa from INERA started his degree training program for the 'Diplôme d'Etudes Approfondies' or MSc at the Institut des Sciences Agronomiques, Yangambi, DR Congo.
- Sophia Komba, MSc, continues study on "Socio-economic benefits and impact of IPDM technologies to farming communities in Hai district, northern Tanzania".
- Frida Bengtsson and Jennifer Joy West, MSc, Agricultural University of Norway, continue study on "Seed Relief, HIV/AIDs and Agro-Biodiversity; a case study from MBere District, Kenya".

Courses and workshops:

Date	Title	Duration (days)	Total No. participants	No. Women participants	No. of CIAT/ECABREN instructors	No. of NARS instructors
Oct 25, 2003	Training on Partnerships in the aspect of seed production for researchers, Arusha, Tanzania	1	9	3	1	0
Dec 8-12, 2003	Meeting with stakeholders at Mpigi, Wakiso, Masindi and Apac (Uganda)	4	70	18	1	2
Mar 2-3, 2004	Bridging the gap between relief and development: Best practices in seed stress situations	2	40		1	
Mar 8-12, 2004	Seed Aid and Germplasm Restoration in Disaster Situations: Synthesis of Lessons: launch meeting	2	11	1	1	
Mar 18-19, 2004	Workshop on decentralized seed systems in East Zambia	2	30	5	2	2
Ap 13-17, 2004	Regional planning and steering committee meetings, Nairobi, Kenya	6	38	10	1	2
Apr 18-24, 2004	Participatory Plant Breeding:Country-specific Workplan Formulation and Basic Skill-building	5	22	3	3	
Apr 26-30, 2004	Community based seed production of improved open pollinated varieties in Arusha Tanzania in collaboration with ICRISAT, CIMMYT, IITA and SADC Seed Security Network	4	30	-	2	5
May 6-7, 2004	Participatory Monitoring & Evaluation skills, Arusha, Tanzania	2	28	9	2	0
May 13-14, 2004	Climbing bean project Stakeholders meeting in NZ, Moshi, Tanzania	2	37	14	1	3
May 26-27, 2004	Training/Demonstration for stakeholders on bean recipes, Tengeru, Tanzania	2	21	11	0	3
May 28-30, 2004	National workshop for Kenya Bean Research Team	3	20	5	2	7
Jun 1-2, 2004	Seed production, distribution & marketing to SARI bean Programme and its stakeholders, Arusha, TZ	2	19	6	0	4
Jun 9 – 10, 2004	Bean Seed Dissemination Workshop	2	28	0		
Jun 9-10, 2004	Ethiopian workshop for Stakeholders in Bean Research Development	2	30	0	1	4

Courses and workshops:

Date	Title	Duration (days)	Total No. participants	No. Women participants	No. of CIAT/ECABREN instructors	No. of NARS instructors
Jun 15-16, 2004	Workshop on decentralized seed systems for CARITAS Rwanda projects	2	26	6	1	3
Jun 21-26, 2004	Proposal writing retreat, Arusha, Tanzania	6	10	2	0	0
Jun 27-Jul 2, 2004	Seed Aid and Germplasm Restoration in Disaster Situations: Synthesis of Lessons: case analysis	5	18	2	1	
Aug 16-17, 2004	Review workshop on decentralized seed systems in northern Tanzania	2	28	5	1	2
Sep 10, 2004	Climbing bean project-Stakeholders meeting in western zone, Bukoba, Tanzania	1	32	6	0	2
Sep 27-29, 2004	Community based seed production of improved open pollinated varieties in Maputo –Mozambique in collaboration with ICRISAT, CIMMYT, IITA and SADC Seed security network	3	25	6	2	5
Sep 27-30, 2004	ECABREN Regional variety selection & proposal development meeting in Nairobi	3	11	2	0	0
Oct 5, 2004	Workshop on decentralized seed systems for Swaziland sector seed stakeholders	1	24	5	2	2
Oct 7, 2004	Workshop on decentralized seed systems for Lesotho seed sector stakeholders	1	8	3	2	2

5.1.3 Trips and attendance of Headquarters staff at meetings

The Bean Project Manager made the following trips:

- September-October, 2003, Nairobi. Biofortification Organizational Workshop.
- September-October, 2003, Berne, Switzerland and UK. Visit to donors.
- April, 2004, El Salvador. Annual meeting of PCCMCA.

The Mesoamerican bean breeder visited the following countries:

- October, 2003, USA. BIC Biennial meeting in California
- November, 2003, Nicaragua. Attend workshop on participatory breeding for drought tolerance.
- January, 2004, Nicaragua. Revise harvest of drought trials and plan follow up.

- March, 2004, South Africa, Zimbabwe, Malawi, Mozambique. Plant breeder's conference in South Africa and field tour of SABRN.
- May, 2004, Rome. Planning workshop for End User project of HarvestPlus.
- May, 2004, Kenya. Discussions on planning of bean bioefficacy trial.
- August, 2004, Nicaragua. Field visit to review progress on drought project and consultation on INTA-CIAT collaboration.
- October, 2004, UK and Denmark. Workshop on *in vitro* methods for estimating bioavailability of minerals in humans.

The Andean breeder/germplasm specialist visited the following countries:

- January 8-15, 2004, San Diego, California, USA. Plant & Animal Genome Conference – co-organized Generation Challenge Program markers meeting.
- January 29-31, Medellin, Colombia. Visit to field experiments and plan for collaborative activities with CORPOICA.
- March 14-18, 2004, Durban, South Africa. South African Plant Breeding Association Meeting –presented a poster on marker assisted selection and met with colleagues from Eastern and Southern Africa regions.
- March 19-31, Malawi, Mozambique, South Africa, Zimbabwe. Coordination on breeding objectives in the region and evaluation of nurseries.
- April 24-29, 2004, Universidad Autónoma de México, Cuernavaca, Mexico. Seminar presentation and coordination with UNAM team on generation of EST sequences for common bean.
- June 8-10, 2004, Sacramento and University of California – Davis, California, USA. USAID-Linkage program conference and coordination with bean research colleagues at UC-Davis.
- June 12-18, 2004, University of Geneva, Geneva, Switzerland. Presented paper at the Phaseomics III conference and met with colleagues to discuss progress on TILLING / mutagenesis.
- June 20-25, 2004, Instituto Agronomico del Mediterraneo, Zaragoza, Spain. Attend the Genotyping Workshop of the Generation Challenge Program.
- July 1-5, 2004, Bolivia. Attend "Congreso Nacional de Productores de Frejol," coordinate with PRONALAG and present Biofortification activities to Bolivian bean producers organization.
- September 12-17, 2004, EMBRAPA–Centro Nacional de Pesquisa Arroz e Feijão, Brazil. Coordination with plant breeding and genetics units, presenting two seminars on the Generation and Harvest Plus challenge programs.
- September 21-24, 2004, University of Queensland Brisbane, Australia. Attend Generation Challenge Program annual meeting.

The bean entomologist:

- November, 2003, Texcoco, Mexico. Evaluate Apion nurseries.
- March, 2004, Chota, Ecuador. Visit whitefly management trials.
- May, 2004, Beijing, China. Attend International Plant Protection Congress.

The bean virologist:

- February 2004, El Salvador and Yucatan, Mexico. Tropical Whitefly Project.

The plant nutritionist:

- January 5-9, 2004, Okayama University, Kurashiki, Japan. International Symposium on Frontier Research to Improve Crop productivity on Acid Soils
- January 9-17, 2004, JIRCAS, Tsukuba, Japan. To review the on-going collaborative research on nitrification inhibition in *Brachiaria humidicola.*
- February 1-4, 2004, University of Hannover, Hannover, Germany. To review progress in aluminum resistance research supported by BMZ-GTZ.
- March 16-18, 2004, CATIE, Turrialba, Costa Rica. International Workshop on "Adaptation to Climate Change, Sustainable Livelihoods and Biological Diversity"
- April 18-21, 2004, San Salvador, El Salvador. PCCMCA (Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos y Animales).
- 31 July-5 August, 2004, Sendai, Japan. International Symposium on Plant-Soil Interactions at Low pH (PSILPH).
- August 6-8, 2004, Okayama University, Kurashiki, Japan. International Symposium on Al Stress Research in Plants: Present Status and New Directions for Future.
- July 5-9, 2004, Agropolis, Montpellier, France. Generation Challenge Program Workshop on Phenotyping and Water Deficit.

The bean pathologist:

- July 11-16, 2004, Kampala, Uganda. Discussion on the workplan to implement molecular techniques for detection of *Pythium* species that cause bean root rots.

Meetings and Workshops:

The bean project manager:

- Annual meeting of PCCMCA. El Salvador
- Biofortification Workshop in Nairobi
- Planning workshop for End User project of HarvestPlus in Rome
- Workshop on *in vitro* methods for estimating bioavailability on minerals in humans in UK and Denmark

The Mesoamerican bean breeder visited the following countries:

- BIC Biennial meeting in California, USA
- Workshop on participatory breeding for drought tolerance in Nicaragua
- Plant breeder's conference in South Africa
- Discussions on planning of bean bioefficacy trial in Kenya

The bean entomologist:

- International Plant Protection Congress. Beijing, China.

The plant nutritionist:

- International Symposium on Frontier Research to Improve Crop productivity on Acid Soils held at Research Institute for Bioresources, Okayama University, Kurashiki, Japan.
- 6th International Symposium on *Plant-Soil Interactions at Low pH* (PSILPH) held from 31 July to 5 August, 2004 by the Japanese Society of Soil Science and Plant Nutrition, Sendai, Japan.
- International Symposium on "Al Stress Research in Plants: Present Status and New Directions for Future". Satellite Symposium of the 6th PSILPH in Sendai. Research Institute for Bioresources, Okayama University, Kurashiki, Okayama, Japan. 7 August, 2004.
- Generation Challenge Program Workshop on Phenotyping and Water Deficit held at Agropolis, Montpellier, France (5-9 July, 2004).
- International Workshop on Adaptation to Climate Change, Sustainable Livelihoods and Biological Diversity" held at Turrialba, Costa Rica. March 16-18, 2004.

The Pathologist Research Assistant:

- Workshop to train technicians (65) on the agronomic management of snap and dry beans and integrated disease management, held in Ibagué, Tolima, Colombia. June 4, 2004.
- Workshop to train technicians (110) on the agronomic management of snap and dry beans and integrated disease management, held in Bogotá, Colombia. June 24-25, 2004.
- Workshop to train technicians (110) on the agronomic management of snap and dry beans and integrated disease management, held in Pitalito, Huila, Colombia. July 30, 2004.

Awards

- The "Hernan Alcaraz Viecco 2004" award was given to Isaura Rodríguez, Héctor Morales, Juan M. Bueno and César Cardona, for the best paper presented during the XXXI Congress of the Entomological Society of Colombia, SOCOLEN in Bogota, CO., entitled "El biotipo B de *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) adquiere mayor importancia en el Valle del Cauca"
- S. Beebe received the Meritorious Service Award from the Bean Improvement Cooperative at its annual meeting in Sacramento, California, October 2003.

5.1.4 Trips and attendance of African staff at meetings

The Plant Pathologist/PABRA Coordinator made the following trips:

- October 17 – 21, 2003, Ethiopia. Join the SDC-PABRA representative in visiting PABRA partners, and visit bean program activities.
- October 25- 29, 2003, Malawi. Attend SABRN steering committee.
- October 30 –Nov 2, 2003, Zambia. Visit thesis research of Mathias Zulu in Lusaka
- November 8-12, 2003, Rwanda. ISAR planning meeting to develop research projects to support IPM and biotechnology activities.
- January 14-17, 2004, Rwanda. Planning meeting with ISAR.
- January 26–30, 2004, Nairobi, Kenya. Attend a stakeholders meeting on Bioscience facility.

- February 23-25, 2004, Embu, Kenya. Attend Annual Meeting on Conservation and sustainable management of below ground biodiversity.
- April 13-17, 2004, Nairobi, Kenya. Attend ECABREN Steering Committee.
- April 20 – 24, 2004, Kakamega, Kenya. Attend a PPB a skill building training workshop.
- May 4 – 7, 2004, Rome, Italy. Attend end-user meeting of Harvest plus.
- May 10 – 13, 2004, Pretoria, S. Africa. Participate development of a proposal under the challenge program on agriculture and health led by SIMA-IWMI.
- May 19 – 21, 2004, Bilene, Mozambique. Attend PABRA Steering Committee.
- May 31- June 2, 2004, Jinja, Uganda. Participate in CIAT Africa staff meeting.
- June 2-4, 2004, Nairobi, Kenya. Support national partners in developing a proposal for support under ASARECA Competitive Grant System on biotechnology.
- July 5 – 9, 2004, Addis, Ethiopia. To participate in a workshop to build capacity in biotechnology.
- September 21, 2004, Nairobi, Kenya. Join the DG of CIAT in a meeting with the Rockefeller Foundation.
- September 24, 2004, Nairobi, Kenya. Join the DG of CIAT in a meeting with the University of Nairobi.
- September 26 – 29, 2004, Nairobi, Kenya. Support and participate in the development of three CNs by ECABREN members for the ASARECA Competitive Grant System.
- October 10 – 13, 2004, Rwanda. Technical backstop visit to ISAR Bean program.
- October 14-15, 2004, Nairobi, Kenya. Participate with CIAT-TSBF to develop a full proposal for submission to Belgium.

The East African breeder maintained the following travel schedule:

- January 12-15, 2004, Kampala, Uganda. Visit NAARI bean program and develop work plans.
- January 15-17, 2004, Rubona, Rwanda. Developing work plans for ISAR and INERA bean programs and visit HarvestPlus material and meeting with ATDT manager.
- February 12-15, 2004, Kakamega, Kenya. Planning meeting with KARI-Kakamega.
- February 22-28, 2004, Cali, Colombia. To attend acid soils Workshop.
- March 15-21, 2004, South Africa. Present a paper at breeders meeting in Durban and visit ARC bean program.
- March 21-25 October 14-15, 2004, Nairobi, Kenya. Participate with CIAT-TSBF to develop a full proposal for submission to Belgium., 2004, Harare, Zimbabwe. Visit bean program in Zimbabwe.
- March 25-30, 2004, Lilongwe, Malawi. Visit bean program in Malawi and Mozambique.
- April 12-17, 2004, Nairobi, Kenya. Regional Steering Committee meeting for ECABREN.
- April 17-25, 2004, Kakamega, Kenya. PABRA PPB training workshop.
- May 10-13, 2004, Kakamega, Kenya. Adoption study seminar and visit trial sites.
- May 26-30, 2004, Nakuru, Kenya. National bean meeting.
- June 22-27, 2004, Arusha, Tanzania. Visti SARI bean program and ECABREN proposal writing.
- July 14-21, 2004, Kinshasa, Mvuazi, DR Congo. Visit INERA bean program in Western DR Congo.

- July 27-28, 2004, Arusha, Tanzania. Developing ECABREN work plans.
- July 29 -August 1, 2004, ISAR, Rwanda. Student supervision and meeting with ATDT/ISAR manager.
- August 12 -September 19, 2004, Cali, Colombia. Marker assisted breeding training.
- September 26 -October 2, 2004, Nairobi, Kenya. Regional Variety selection and development of concept notes.
- October 14-15, 2004, ILRI, Nairobi, Kenya. TSBF proposal writing.
- October 17-25, 2004, Melkassa, Awassa and Alemaya, Ethiopia. Visit Ethiopian bean programs.

The SABRN coordinator/Breeder made the following trips:

- February 16-21, 2004, Lesotho, South Africa. Supervise Ms. Student thesis research.
- February 22-29, 2004, Maputo, Mozambique. Participate in Harmonizing seed Regulations.
- March 8-11, 2004, Nairobi, Kenya. Participate in the Relief Seed Strategy meeting.
- March 14-21, 2004, Durban, South Africa. Participate in the Southern Africa Plant Breeders Association.
- March 21-25, 2004, Harare, Zimbabwe. Provide breeding support to Zimbabwe national program.
- April 25-29, 2004, Arusha, Tanzania. Attend CIAT, CIMMYT, ICRISAT, IITA and SSSN joint workshop on seed multiplication of OPV and self-pollinated crops.
- May 18-21, 2004, Bilene, Mozambique to attend PABRA Steering Committee Meeting.
- June 21-26, 2004, Maputo, Mozambique to provide support to Mozambique NARS together with the ERI team.
- July 6-9, 2004, Maseru, Lesotho. Follow up on progress for MSc. Student research.
- July 11-17, 2004, Chokwe, Mozambique to conduct a participatory variety selection with farmers.
- July 20-24, 2004, Northern Mozambique. Explore potential bean production environments in the northern part of the country with Mozambican scientists, and establish contacts with possible partners and collaborators in participatory research and seed production.
- August 16-18, 2004, Dedza, Malawi. Organize bean IPM farmers to start bean seed multiplication.
- August 15-September 15, 2004, Cali, Colombia. Visit CIAT headquarters to sharpen skills in use of molecular tools in plant breeding.
- September 26-29, 2004, Maputo, Mozambique. Attend CIAT, CIMMYT, ICRISAT, IITA and SSSN joint workshop on seed multiplication of OPV and self-pollinated crops.

The ECABREN coordinator made the following trips:

- November 3, 2003, HAI district, Tanzani. Visit R4D activities with CIAT DG.
- November 14, 2003, Katumani, Kenya. Meeting with KARI staff on strengthening coordination of national bean program.
- February 11-14, 2004, Bukavu, DR Congo. Discuss wider impact strategy with INERA scientists and development partners

- February 16-18, 2004, Kampala, Uganda. Visit CIAT Africa and attend NARI Planning meeting for Participatory M&E of Bean Research & Development in Uganda.
- February 22-24, 2004, Rwanda. Discuss bean research for development activities with ISAR scientists.
- February 24-27, 2004, Bujumbura, Burundi. Meet and discuss bean research and development activities with ISABU partners.
- March 23, 2004, Hai district, Tanzania. Visit IDPM Project sites with DFID Crop Protection Programme (CPP) Managers.
- March 24-April 4, 2004, Embu, Kenya. Attend P M&E training course.
- August 9-13, 2004, Lushoto/Hai/Arumeru districts of Northern Tanzania. Monitoring & Evaluation of Farm Africa/ECABREN - Climbing bean project.
- August 25-30, 2004, Ethiopia. Monitoring and orientation of ECABREN projects & activities at Melkasa and Awasa Research centers.

The Monitoring and Evaluation expert made the following trips:

- February 16, 2004, Namulonge, National Agricultural Research Center-Kampala, Uganda. Launching Participatory Monitoring & Evaluation in National Research and Development Institutions.
- March 15-16, 2004, Namulonge, National Agricultural Research Center-Kampala,Uganda. Working sessions with project officers on PM&E.
- March 24, 2004, Embu, Kenya. Workshop on Strengthening Participatory Monitoring and Evaluation in R&D Institutions.
- April 12, 2004, Nairobi, Kenya. Launching PM&E in ECABREN, ECABREN Steering Committee
- April 6, 2004, Namulonge, National Agricultural Research Center-Kampala, Uganda. Strategic meeting for PM&E in bean research projects.
- May 6, 2004, Arusha, Tanzania. Launching PM&E for R&D in Selian Agricultural Research Institute.
- September 21, 2004, Namulonge, National Agricultural Research Center-Kampala, Uganda. Meeting with National Bean Program Coordinator to develop work plan for PM&E in bean Program.

The Africa & Agrobiodiversity Program Senior Scientist made the following trips:

- March 1-3, 2004, Oslo, Norway. Noragric-USAID/Care Norway-funded Seed Security/Seed Aid project: presentation of project results and awareness raising among Nordic donors
- March 9-12, 2004, Nairobi, Kenya (Catholic Relief Service Offices). IDRC-funded Seed Aid and Germplasm Restoration Project: Launch meeting.
- April 18-24, 2004, Kakamega, Kenya (Kenya Agricultural Research Institute). Participatory Plant Breeding Training Course: East, Central and Southern Africa Regions
- May 31-June 2, 2004, Kampala Uganda. CIAT/Africa Staff Meeting.
- June 27-July 2, 2004, Nairobi, Kenya. IDRC-funded Seed Aid and Germplasm Restoration Project: Restoration: 25 case analysis.
- July 25-28, 2004, Ottawa, Canada, Commission on Biological Diversity. Consultation with CBD on Seed Aid and Seed Security- for vulnerable farmers.

- September 13-17, 2004, Kampala, Uganda. HarvestPlus: Reaching Enduser Coordinator Interviews.

Meetings and Workshops:

The SABRN coordinator/Breeder:

- March 8-11, 2004, Nairobi, Kenya. The Relief Seed Strategy meeting
- April 25-29, 2004, Arusha, Tanzania. CIAT, CIMMYT, ICRISAT, IITA and SSSN joint workshop on seed multiplication of OPV and self-pollinated crops.
- May 18-21, 2004, Bilene, Mozambique. PABRA Steering Committee Meeting.
- September 26-29, 2004, Maputo, Mozambique. CIAT, CIMMYT, ICRISAT, IITA and SSSN joint workshop on seed multiplication of OPV and self-pollinated crops.

The ECABREN coordinator:

- October 6-15, 2003, Nairobi, Kenya. Course on Project planning and EDF procedures organized by MDF in cooperation with ASARECA
- October 16-18, 2003, Nairobi, Kenya. 27th ASARECA Committee of Directors' meeting
- April 13-17, 2004, Nairobi, Kenya. ECABREN Regional Planning & Steering Committee meetings
- April 21 -22, 2004, Entebbe, Uganda. ASARECA/REDSO Financial Management Training workshop
- May 6-7, 2004, Arusha, Tanzania. Training workshop on Participatory M&E systems
- May 19-22, 2004, Bilene, Mozambique. PABRA Annual Steering Committee Meeting
- May 24-27, 2004, Nairobi, Kenya. ASARECA-Competitive Grant System Pre-Inception Planning Workshop
- May 31-June 2, 2004, Njinja, Uganda. CIAT Africa Staff Retreat
- June 21-26, 2004, Arusha, Tanzania. ECABREN Proposals Development Retreat
- July 5-9, 2004, Nairobi, Kenya. ASARECA-CGS Inception Call Planning and Writing Workshop
- September 7-10, 2004, Entebbe, Uganda. REDSO-CGS Meeting and Call Writing
- September 25-26, 2004, Nairobi, Kenya. ERI-PRIAM meeting for CN development
- September 27 – 30, 2004, Nairobi, Kenya. ECABREN Variety Selection and Planning Meeting

The Africa & Agrobiodiversity Program Senior Scientist:

- March 2-3, 2004. Bridging the gap between relief and development: Best practices in seed stress situations.
- March 8-12, 2004. Seed aid and germplasm restoration in disaster situations: Synthesis of lessons: launch meeting.
- April 18-24, 2004. Participatory Plant Breeding: Country-specific workplan formulation and basic skill-building.
- June 27-July2, 2004. Seed aid and germplasm Restoration in disaster situations: Synthesis of lessons: case analysis.
- May 5-7, 2004. Reaching EndUsers in HarvestPlus: Coordination and workplan meeting.

Conclusions: Many of the national program partners, especially in SABRN, are young scientists with only BSc. Degree, and the network is trying hard to provide them with higher-level training. All of them have made good progress on their thesis research, and one has submitted it for review. Further progress has been made in collaboration on seed issues with other networks run by other future harvest centers (CIMMYT, ICRISAT, and IITA) in the SADC region to sensitize stakeholders in Mozambique and Tanzania. In addition the future harvest centers in the SADC region together with the SSSN have finalized the seed regulations in the region to facilitate regional movement of seed.

5.1.5 Participatory Plant Breeding in Africa

Participatory Plant Breeding (PPB) continues to be an effective vehicle for developing and screening new varieties with farmers. NARSs in the southern and east/central African networks, have institutionalized the approach within their regional logframes and two sites in particular, Southern Ethiopia and Rwanda, use PPB as their routine approach to variety development. One particular milestone this year bears mention, the first Africa-wide compilation of PPB and Participatory Plant Genetic Resource Enhancement (PPGRE) experiences.

These proceedings emerged from an Africa-wide symposium on Participatory Plant Breeding (PPB) and Participatory Plant Genetic Resource Enhancement (PPGRE) held in Ivory Coast, May 2001. It brought together work from 19 countries, covering 13 crops, (Table 131), and, despite the relative newness of the work, embraced an impressive range of different experimental approaches.

Table 131. Africa-Wide PPB/PPGRE Proceedings

Geographic focus	Crop focus
Benin	Pearl millet
Democratic Republic of Congo	Barley
Eritrea	Bean (*Phaseolus vulgaris*)
Ethiopia	Maize
The Gambia	Rice (upland and irrigated)
Ghana	Sweet potato
Ivory Coast	Banana
Kenya	Sorghum
Malawi	Cowpea
Mali	Cassava
Morocco	Yam
Mozambique	Indigenous vegetables
Niger	Cotton
Senegal	
Sierra Leone	
Tanzania	
Tunisia	
Uganda	
Zimbabwe	
Total 19	**13 crops**

The proceedings were published bilingually during 2004 (English/French) and represent a close collaboration between CIAT/PRGA and CIRAD (Montpelier).. They have several unique features

- **Linking of PPB and PGR themes**

PPB work in Africa has mainly focused on the goal of moving new varieties and at improving production gains. However, particularly in African subsistence context, encouraging a greater diversity of intra-species variety use could potentially render increased stability in the heterogeneous and marginal production systems.

On-farm plant genetic resource work in Africa, for its part, continues to be filtered though a "conservation" or, at best, a "conservation and use" lens. Relatively few initiatives to date emphasize dynamic varietal diversity enhancement (adding value to local materials or broadening the scope of local material use) or specifically program support for dynamic farmer-based processes—such as support for farmer plant breeding or evolutionary seed management practices.

The proceedings include a small but growing number of programs that suggest how the PGR and PPB goals can be practically united—on the ground.

- **Bringing farmer breeders and farmer collaborators directly into the debate**

The proceedings include reports directly from farmers and farmer-breeders. One set of reports, drawn from those who normally collaborate in PPB projects, give farmer assessments of "what it means to work together with research institutes in plant breeding work". The other type of farmer report, from a Benin yam farmer, describes the technical nuances and processes of his own yam domestication. This process has been little documented although such domestication is critical for advancing yam evolution in West African region.

- **Broadening theme discussion beyond breeding per se—to ancillary services concerns**

To be effective, and to achieve institutionalization, PPB has to draw beyond insights and methods of breeding *per se* and address key "ancillary concerns". Two of these more prominent concerns, Intellectual Property Rights (IPRs) and Seed Production for PPB are reported within this synthetic volume.

The IPR issues as well as more general access and benefit sharing are becoming increasingly important in PPB work in the African region (and have been integrated as elements in CIAT's PPB training work). Ethiopia is just about to release several PPB–generated varieties— with the variety release committee officially recognizing that "the varieties were uniquely developed through participatory approaches."

5.1.6 Tanzanian farmers' perspectives on participatory breeding: selecting new bean varieties tolerant to bean stem maggot and angular leaf spot

Rationale: Most case studies in participatory plant breeding have reported on involvement of farmers in selection from fixed or nearly fixed lines (Weltzien, et al, 2003). This is also true of beans (Mbikayi and Bakunzi, 2004; Kapapa, 2004; Dauro et al, 2004). This approach has been referred to as participatory variety selection (PVS). Ceccareli et al (2000) suggested participatory plant breeding *per se* should refer to involvement of farmers when the amount of genetic variation is at its maximum, normally at F_2 generation. Consequently, little is known about the ability of farmers to recognize and select within a variable population. Dauro et al (2004) noted that although farmers were keen to participate in evaluation and selection, they had difficulty rejecting inferior lines and tended to select a larger number of lines than they could possibly evaluate in their home plots. In Alemaya, Ethiopia, after participating in a breeding trial for three years, farmers decided the number of lines they could accommodate in future participatory bean breeding trials for effective selection was 6 to 8 lines for women farmers with small plots, and 10-15 lines for resource rich farmers with larger plots and resources to hire additional labor (CIAT, 2002). The regional bean program has been integrating participatory selection in its formal-led breeding activities to facilitate both formal release of new varieties and rapid access of new varieties through informal seed production. In this report, we highlight selection of new bean varieties tolerant to bean stem maggot and angular leaf spot from segregating populations in northern Tanzania.

Materials and Methods: This study was conducted to determine the ability of farmers to recognize and select within a variable population at Selian Agricultural Research Institute (SARI), near Arusha, Tanzania (Ngulu et al, 2004; CIAT 2002). Farmers selected from six populations segregating for resistance to bean stem maggot (BSM) and nine segregating for angular leaf spot (ALS). The BSM populations were generated from crosses among seven contrasting parental lines (G3844, ZPV 292, EMP 81, G2005, Lyamungu 85, Canadian Wonder and Dore de Kirundo). The ALS populations originated from crosses among seven parents (UBR (92)25, LB2878, ZAA84044, LB 842-1, LB2465, 2702/2 and A409). Hybridization and advancement of the segregating populations to F_4 was conducted at the station, mainly to increase seed. Both BSM and ALS populations were also segregating for seed color and size, growth habit and other agronomic characters. Farmers and breeders made single plant selections and used them to establish progeny rows in their plots. Farmers finally selected and named bean lines that performed well in their fields. The 15 participating farmers were divided into user groups based on their preferences (Table 132)

Table 132. Socio-economic characteristics and variety preferences of user groups participating in bean selection at Selian, Arusha, Tanzania.

User group	Varietal preferences	Socio-economic characteristics
I. Subsistence small – scale bean farmers	Early maturing, fast cooking, low flatulence, tasty grain, keeps well over night, high yielding, small seeded, cream and red colored	Main farmer is a woman above 18 years of age, cultivates beans mainly for home consumption on < 1 acre of land, land preparation by oxen or hand hoe, belongs to the low middle and poor wealth categories
II. Semi-subsistence small – scale bean farmers	Tolerance to poor soils, resistance to storage pest, early maturity, possible to intercrop, brown and red color, resistance to shattering	Farmer may be a man or a woman above 18 years of age producing beans on household and/or personal plots for both subsistence and sale, cultivates beans on < 3 acre, land preparation by oxen or hand hoe, belongs to low middle and poor wealth categories
III. Market oriented farmers	High yielding, tasty grain, red and brown color, large seed types	Farmer is typically a man, rarely a woman who produces beans mainly for sale on 3-15 acres on average, land preparation by oxen or tractor, may use chemicals to control field pests, belongs to middle to high wealth categories

Results and Discussion: Results showed that market oriented farmers were disenchanted with the small quantities of seed of the segregating populations. They declined to plant and manage the populations in their fields. Only a few participated during selection. Yield, seed color and taste were important to all groups. Overall, yield and seed color accounted for 28% and 27% of the criteria used by farmer-selectors and farmer evaluators. Pod load, disease resistance, drought and seed size each accounted for 5% to 9%; the other 10 criteria accounted for less than 4% each. Cream seed was by far the most popular color (30% of selections) followed by pink, red kidney and brown-maroon. Small and medium seeded materials accounted for 82% of the selections. Marketability was important to the market oriented and semi-subsistence groups in the final evaluations. Thirty-two lines were selected from the BSM population and 13 from ALS population in 2001, after four years selection (Ngulu et al, 2002). Seed of these lines was increased and final evaluations conducted in 2002 and 2003 by all farmer groups including traders and urban consumers. Six BSM and three ALS lines were finally selected. The selections were mainly based on seed color and seed size. There was a tendency to select lines with characteristics similar to commercial/local varieties. Market oriented farmers tended to select fewer lines compared to subsistence/semi subsistence farmers. The farmer evaluators were very proud of their selections. They named the lines after the name of their village (Makiba) and used acronyms derived from farmer selectors' and researchers' names. The names of the nine lines were: Neema, Makiba, Heriipo, Siliwima, Hujuti, Ushindi, Kiimarisho, Tulizana and Hamadi. Characteristics of these lines are shown in Table 133. The nine lines were also entered into advanced yield testing to determine other potential areas to which they may be adapted and to generate additional data required for formal release. At the same time, farmers started multiplication and informal seed dissemination for the nine new varieties.

Table 133. Names and characteristics of nine bean lines selected by farmers from segregating populations in Selian, Arusha, Tanzania.

Line name	Source population	Reasons why it was selected by farmers
Heriipo	ZPV292 x Lyamungu 85	High yielding, early maturing, resistant to bean stem maggot, good taste, large seeds and red mottled grain
Kiilarisho	ZPV292 x Lyamungu 85	Early maturing, high yielding, large purple seeds, good taste and resistant to bean stem maggot.
Siliwima	ZPV 292 x Lyamungu 85	High yielding, early maturity, resistant to bean stem maggot, good taste, large purple seeds.
Tulizana	ZPV292 x Lyamungu 85	Early maturing, high yields, resistant to bean stem maggot, large purple seeds and good taste.
Hamad	ZPV202 x Lyamungu 85	Early maturing, high yields, resistant to bean stem maggot and red mottled (calima) grain type.
Makiba	UBR(92)25 x LB2465	High yielding, resistant to angular leaf spot, small seed size, climbing growth habit and cream-speckled (mulatinho).
Hujuti	ZPV 292 x Canadian Wonder	Early maturing, high yielding, resistant to bean stem maggot, large khaki seeds.
Ushindi	UBR{92}25 x LB2465	High yielding, resistant to angular leaf spot, small brown-maroon seeds, semi-climbing growth habit.
Neema	LB842 –1 x LB2878	Good yield, resistant to angular leaf spot, small red seeds and climbing growth habit.

Contributors: Paul Kimani, Festo Ngulu, S.O. Kweka and J. Musaki
Collaborators: SARI bean program

Progress towards achieving output milestones:

- Progress is underway with students training at Ms. Degree level.
- Further progress has been made in collaboration on seed issues with other networks run by other Future Harvest centers (CIMMYT, ICRISAT, and IITA) in the SADC region.
- Farmers participating in promotion of bean IPM activities, have greatly been empowered to demand other services from different stakeholders. Now they are adventuring into bean seed production as a business.
- Proceedings of a workshop to review participatory plant breeding across Africa was compiled: Participatory Plant Breeding and Participatory Plant Genetic Resource Enhancement: An Africa-wide Exchange of Experiences.

Activity 5.2 Collaborative projects developed and executed with NARS and regional networks

Highlights:

- The Swiss government extended its commitment to support the PABRA research network until 2007
- A system of competitive grants under the auspices of ASARECA is operational and CIAT is participating in project development
- A long term (6 year) project was approved by the Canadian government to improve Latin American crops for nutritional value, under CIAT's leadership
- The CIAT bean team is participating in two CGIAR Challenge Programs

5.2.1 Special projects developed in Africa

Title	Donor	Comments	Funding period	Total amount
Assisting disaster-affected and chronically-stressed communities in East and Central Africa: Focus on small farmer seed systems.	USAID		2002-2004	US$ 305,000
Supporting improved nutrition, food security and community empowerment for poverty alleviation	CIDA	To support PABRA	2003-2008	US $ 4,458,513
Seed aid and germplasm restoration in disaster situations: Synthesis of lessons learned and promotion of more effective practices	IDRC		2003-2005	US $ 126,000
Climbing bean & agroforestry interventions	FARM-AFRICA MATF	Bilateral project	2004-2006	UK£59,997
East and Central Africa Bean Research Network	USAID/REDSO	Coordination , capacity building & backstopping funds	2004-2006	$490,000

Special projects developed in Africa cont'd …

Title	Donor	Comments	Funding period	Total amount
Supporting improved nutrition, food security and community empowerment for poverty alleviation	SDC	To support PABRA. Proposal approved and funds available as of October	2004-2007	US $2,000,000
Application of marker assisted selection (MAS) for the improvement of bean common mosaic necrotic virus resistance in common bean (*Phaseolus vulgaris*	USAID/ through ASARECA Competitive Grant System	For support of NARS in Kenya, Uganda and Rwanda. MAS to be conducted at Kawanda lab. Proposal selected.	2004-2007	US $ 150,000
Increasing food security and rural incomes in Eastern, Central and Southern Africa through genetic improvement of bush and climbing beans	RF	Approved to commence in 2005	2005-2008	US $ 300,000
Bean root rot disease management in Uganda	DFID	Bilateral project with Uganda. Under review for one year extension	2005-2006	UK £ 70,443
Promotion of Integrated Pest Management (IPM) Strategies of Major Insect Pests and Diseases of *Phaseolus* Beans in Hillsides Systems in Eastern, Central and Southern Africa	DFID	Under review for one year extension for partners (Tanzania, Kenya, Uganda, Rwanda, Malawi) and CIAT	2005-2006	UK £ 81,550

5.2.1.1 Regional research subprojects under SABRN

The SABRN activities are financed through PABRA, with funding from CIDA-Canada, SDC-Swiss and DFID (UK). Table 134 shows the list of sub-project activities that were carried out by NARS partners in 2003-04, in their contribution to the PABRA framework.

Table 134. Contribution of NARS partners within SABRN to selected PABRA research and development outputs.

Output	Activity	Country	Budget $
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 stresses		
	1.2.1 Continue to generate segregating bean populations for resistance to major diseases and tolerance to major pests and low soil fertility and moisture stresses (South Africa (ALS & CBB), Malawi (low soil fertility and BSM). South Africa for ALS and CBB.	South Africa	7,500
		Mozambique	800
	1.2.2. Evaluate lines and varieties developed for low soil fertility and moisture stress in potential BILFA and BIWADA with NARIS partners, including farmer participatory approaches (PPB). BILFA in six countries in SABRN x $800 each)	Zambia	800
		Swaziland	800
		Zimbabwe	800
		Tanzania	800
		D R Congo	800
		Lesotho	800
	1.4.1. Continue to support NARS partners in breeding for specific market classes (Malawi, South Africa, Tanzania, Zambia and Zimbabwe). Malawi includes ALS, CBB, BSM, aphids and low soil fertility.	Malawi	4,400
		Mozambique	2,000
		Zambia	2,000
		Zimbabwe	2,500
		South Africa	4,100
		Tanzania	3,000
1.2.	Ten new environmentally friendly options developed for managing soil productivity (fertility), and bean pests and diseases		
	2.1.1 (a). On-farm trials to verify with farmers and promote elite bean lines with multiple disease resistance	Tanzania	2,000
		D.R Congo	2,000
	2.1.1 (b). Use botanical insecticide on bean leaf beetle (Ootheca) using IPM approach	Tanzania	2,000
	2.1.1 (c). Test ISFM options with farmers in D R Congo, Malawi, Mozambique, Swaziland, S/H Tanzania, Zambia and Zimbabwe (7 Countries x $2,000 each)	Malawi	2,000
		Mozambique	2,000
		Zambia	2,000
		Swaziland	2,000
		Zimbabwe	2,000
		Tanzania	2,000
		D R Congo	2,000
		Lesotho	2,000
1.3.	Increased access to 10 new and 50 existing technologies by at least 2 million households (1.5 million by year 4).		
	3.1.1. Dissemination of new bean varieties and improved production technologies through strategic alliances with NGOs in SABRN: Zimbabwe, D R Congo, Malawi, Lesotho, Swaziland, Tanzania and Zambia (7 Countries x $3,000 each)	Malawi	1,000
		Mozambique	3,000
		Zambia	3,000
		Swaziland	3,000
		Zimbabwe	2,330
	3.1.3. Dissemination of new bean varieties and improved production technologies through strategic alliances with NGOs in SABRN	Tanzania	1,500
		D R Congo	3,000
		Lesotho	3,000

Table 134. cont'd

Output	Activity	Country	Budget $
3.1	Increased knowledge and skills of scientists and staff from NARIs, NGOs and rural service providers to effectively address clients' needs		
	6.1.2. Produce articles for policy makers	Tanzania	1,000
	6.2.1. Support NARS to produce articles for policy makers in both networks (2 countries in each network)	Mozambique Zambia	500 500
	6.3.1. Enhance partnerships between NARIS and other stakeholders that support community interventions to institute farmer participatory research (PRIAM) activities three new sites within ECABREN (Tanzania, D R Congo and Madagascar), and Mozambique and Zambia in SABRN	Mozambique Zambia	1,500 1500
	6.4.1. Support NARS partners to conduct seminars and develop publications targeting development partners in 4 countries in each network (including participation in field days)	Malawi Mozambique Zambia Tanzania D R Congo Lesotho	1,000 1,000 1,000 1,000 1,000 1,000
3.2:	Strengthened intra-and inter-network collaboration both within and outside of networks		
	8.1.1 Impact assessment of improved bean varieties that have been widely disseminated in Malawi	Malawi	20,000

5.2.1.2 Regional research for development activities for ECABREN

During the period from October 2003 to September 2004, the ECABREN supported research-for-development activities prioritized and ranked by the stakeholders during a priority setting exercise. Moreover, breeding programs on major bean market classes continued to be managed by the lead countries as in the past. The main R4D activities implemented by the network partners to achieve ECABREN objectives are shown in Table 135. In April 2004, the network reviewed the priority setting and defined three main bean products. The implementation of the new research agenda should start once proposals are funded, but certain activities should continue to be supported with other sources of funds.

Table 135. Activities implemented in ECABREN for year 2003-2004.

ECABREN Goal: Enhanced sustainable agricultural productivity, value added and competitiveness of bean sector for increasing food security and income of rural and urban poor in ECA

Strategic Objective: Demand driven bean-based technologies and innovations utilized

Research and Development Activities

- Select, test and disseminate marketable bean varieties of bush and climbing beans that improve food and health and address the region's local and export markets
- Develop, select and disseminate drought tolerant varieties
- Package and disseminate effective integrated management options for the major pests and diseases of marketable bean varieties.
- Test and disseminate improved agronomic practices for the management of soil and water for increased and lower-cost production of marketable bean varieties
- Refine and distribute post-harvest technologies, to add value and expand bean markets.
- Work with multiple partners to improve the availability and accessibility of good quality seed of improved and preferred marketable bean varieties.
- Work with partners to make promotional materials and information more widely available in member countries for increased use of bean based technologies
- Strengthen human and physical capacity of partners to innovate and to undertake research and development activities in their institutions

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Projects submitted

- Improving competitiveness of snap beans for domestic and export markets, CN submitted to ASARECA-CGS
- Improving snap bean competitiveness for domestic and export markets, CN submitted to ASARECA-CGS
- Enhanced utilization of nutrient rich beans for improved nutrition and income in ECA, Full proposal to ASARECA/USAID-REDSO sub-grant

Consultancies:

These consultancies seek to encourage implementing organizations to reflect on seed aid and seed security issues:

- Towards More Effective and Sustainable Seed Relief" Proceedings Donor: FAO. Total budget: US 3,600 over 2 months (August/Sept, 2004)

- Agro-biodiversity and Seed Relief: leaflet. Donor: GTZ. Total budget: US 1,500

5.2.2 Projects developed in Latin America

Special Collaborative projects at Headquarters

Title	Donor	Comments	Funding period	Total amount
Characterization of South American genotypes of bean for optimal use of light under abiotic stress	European Commission / Univ. of Chile	CIAT sub-contracted by U. Chile	2001-2004	831,261 euros
Integration of bio-fertilization in bean cultivation by optimizing the use of the Rhizobium-bean symbiosis	K.U. Leuven, Belgium		2001-2005	4,002.000 B. francs
Andean climbing bean improvement for the Andean Zone	IICA/BID/ FONTAGRO		2002-2005	US 125,000
Mejoramiento de la nutrición humana en comunidades pobres de América Latina utilizando maiz (QPM) y frijol común biofortificados con micronutrientes	IICA/BID/ FONTAGRO	Pending disbursement of funds	2004-2007	US 350,000
Increasing bean and maize agrobiodiversity as an approach for improving production systems, food security and nutrition in Nariño, Colombia	ECOFONDO/ FIDAR, Colombia		2003-2006	US 8,823
Obtención de nuevas variedaes de frijol común con atributos de rendimiento y potencial para nuevos mercados, utilizando selección convencional y asistida por marcadores moleculares	Universidad Nacional de Colombia		2004-2007	US 8,235
An integrated approach for genetic improvement of aluminum resistance of crops on low-fertility acid soils	GTZ, Germany		2001-2004	690,244 euros
Bean genomics for improved drought tolerance in Latin America	BMZ, Germany	Supports drought work in Nicaragua	2003-2006	US 740,000
Desarrollo de la producción y comercialización de leguminosas alimenticias en el Perú	Instituto Peruano de Leguminosas de Grano, IPL, Peru		2003-2004	US 15,000
PROMPEX-CIAT Bean Project (Peru)	SDC, Switzerland		2002-2004	US 30,000
Technical assistance to PRONALAG team (Bolivia)	SDC, Switzerland		2002-2004	US 30,000
Improved beans for Africa and Latin America	DFID, UK	Restricted core	2004	US 260,586
Tropical Whitefly IPM Project	DFID, UK	Extension expected in 2005	2001-2004	US 90,000
A coordinated effort to mark and map important genes in common bean: Universities of California, Cornell, Michigan State, North Dakota, and Puerto Rico	USAID, United States		2000-2004	US 15,000
Genotyping, molecular marker development and QTL analysis of common bean	Generation Challenge Program		2004	US 266,000

Projects at Headquarters (continued)....

Title	Donor	Comments	Funding period	Total amount
Breeding staple crops for improved micronutrient value (for biofortification research)	USAID, United States		2002-2004	US 400,000
Biofortified Crops for Improved Human Nutrition – Harvest Plus Challenge Program	World Bank DANIDA, Denmark Gates Foundation, USA	Under Harvest Plus	2003-2008	US 3000,000
Combating Hidden Hunger in Latin America: Biofortified Crops with Improved Vitamin A, Essential Minerals and Quality Protein	CIDA	Complements Harvest Plus	2004-2010	US1,254,400

Projects submitted

- A full proposal on "Improving drought tolerance of grain legumes: Comparative physiological and genetic approaches to develop tools and methods for genetic enhancement" for CGIAR Challenge Program on Generation with CIAT as a lead center. Total budget: US$892,080 over 3 years.
- A full proposal on "Realizing the benefits of underutilized legumes: Improving and diversifying production and enhancing soil quality in semiarid to sub-humid regions of Latin America" for INCO-DEV program of the European Commission with ETH, Switzerland as a lead institution. Total budget: Euros 2 million over 3 years.
- A proposal on "Gene flow analysis for environmental safety in the tropics" for BMZ. Total budget: 1.2 million Euros over 3 years (2005-2007).
- A proposal on "Increasing Food Security and Rural Incomes in Eastern, Central and Southern Africa through Genetic Improvement of Bush and Climbing Beans" was submitted to Rockefeller. Total budget: US$ 300,000 over 3 years (2005-2007). Approved.
- A proposal on "Iniciativa Peruana de Rhizobiología : Fijación biológica de nitrógeno para el establecimiento de sistemas agrícolas sustentables y el progreso de los pequeños productores del Perú" submitted to IDRC. Total budget: CAN$ 999 625 over 5 years. Rejected.
- A proposal on "Obtención de nuevas variedades de fríjol común con atributos de rendimiento y potencial para nuevos mercados, utilizando selección convencional y asistida por marcadores moleculares" submitted to COLCIENCIAS by Universidad Nacional with CIAT. Total budget: Col$ 22,000,000 over three years (2004-2007).

- Generation Challenge Program: "Genotyping, molecular marker development and QTL analysis of common bean" US$ 266,000.
- A proposal on "Utilización de hierro y zinc en modelo animal y respuesta clínica al consumo habitual de fríjol de alta densidad mineral en mujeres y niños" submitted to COLCIENCIAS by Universidad del Valle with CIAT. Approved.

Concept notes prepared

- A concept note on "Enhancing the resilience of production systems in the Great Lakes region: a strategy to revitalize agriculture through the integration of natural resource management and marketing opportunities" was submitted to the Belgian government.
- A concept note on "Improving livelihoods of smallholder farmers in the Great Lakes region: Overcoming major production constraints in bean-based cropping systems to assure food security and to enhance income generation" was submitted to DGDC, Belgium. Total budget: 1,355 million Euros over 5 years (2005-2009).
- A concept note on "Light, water and stomata: gene targets for multiple abiotic stress tolerance" for CGIAR Challenge Program on Generation with CIAT as a lead center. Total budget: US$99,710 over 1 year (not approved for full proposal development).
- A concept note on "Improving the resilience of crop/livestock farming systems to enhance food security and income generation in SADC (South African Development Cooperation) countries" with European Commission funds. This is awaiting the call for proposals.
- A concept note on "Improving rural livelihoods in Rwanda: Promoting integrated crop, disease, and pest management (ICDPM) strategies for intensification and diversification of agricultural systems" was submitted as a bilateral project for Belgium. Total budget: 3 million Euros over 3 years (2005-2007).
- A concept note on "Empowering farming communities in rural Colombia: Informed decision-making regarding the use of pesticides in snap bean production" was submitted to IDRC – RoKOS. Total budget: Can$ 120,000 over 18 months.
- An idea on "*Doubly* green beans: Sustainable income generation for smallholder Colombian and Ecuadorian snap bean farmers with an environmentally clean product for local markets" is being consulted with CFC. Total budget: 2 million Euros over 4 years.

Progress towards achieving output milestones:

- CIAT is actively supporting the evolving research structure in eastern Africa as led by ASARECA, through technical input and through the development of projects with national partners.

Activity 5.3 Strengthen international collaboration through networks (Intra- and inter-network collaboration) and/or bi-lateral relations

Highlights:

- Four Future Harvest Centers (CIAT, CIMMYT, ICRISAT, and IITA) together with SSSN organized teamed up to sensitize various stakeholders on sustainable ways to produce and distribute seed of OPV and self-pollinated crop in Tanzania and Mozambique.

- Stakeholders selected in production to consumption chain defined three bean products for ECABREN research portfolio. These were beans for food and health; canning beans for domestic and export markets; snap bean and dry beans (white and sugar beans) for domestic, regional and international markets.

5.3.1 International cooperation under the CIDA-funded biofortification project for Latin America

In 2004 CIDA and CIAT signed a contract to extend the work on biofortification to Latin America, thus filling a gap in the HarvestPlus Challenge Program. With regards to beans, the objectives of this project continue to be increased levels of iron and zinc through five broad activities:

1. Develop populations and lines for Honduras (red seeded), Guatemala (black seeded), Haiti (large red mottled), Brazil and Bolivia (cream striped) in conjunction with local breeders.

2. With populations that have been pre-selected for high mineral potential, select improved lines with organized farmer groups and local research committees.

3. Compile sets of elite lines for international distribution: red seeded to El Salvador and Nicaragua; black seeded to southern Mexico and Cuba; large red mottled to Andean countries. In years past improved genotypes were circulated widely in Latin America through a system of international trials, and more recently, the PROFRIJOL network in Central America carried out this function on a regional level. This activity will be revived to deliver improved lines to national research institutions, to farmer groups, and to NGOs in countries outside of the primary focus countries.

4. Inform and educate the health sector and NGOs about the biofortification strategy, with an eye to diffusion of improved varieties.

5. Produce and promote improved seed through the agency of NGOs in the Central American and Caribbean regions.

In September, 2004 a workshop was held to initiate the project, with the attendance of bean researchers from Guatemala, Honduras, Cuba, Brazil and the United States. Colleagues from Venezuela and Colombia who will participate in a related FONTAGRO-funded project were also

present to assure coordination. Eventually, when products are available, it is expected that a broader representation of Latin American partners will become involved.

This project represents a rare opportunity to revive international cooperation in Latin America, as was previously carried out under regional projects in Central America and the Andean Zone.

5.3.2 Enhance regional coordination and effectiveness within and between CORAF, ECABREN and SABRN

The PABRA annual steering committee meeting was held in Bilene, Mozambique in May 2004 with the participation of most of the consortium of PABRA donor representatives (CIDA, SDC, USAID, DFID), bean networks coordinators (ECABREN and SABRN) and their steering committee chairmen and CIAT. The meeting, which was officially opened and closed by the director of INIA and deputy Minister of Agriculture of Mozambique reviewed progress, and discussed new initiatives and annual work plans. The ECABREN coordination unit hired an agricultural economist as program assistant to reinforce monitoring and evaluation of socio-economic activities in the network.

New and on-going initiatives were catalyzed at PABRA level to take advantage of economies of scale and comparative advantage of bean networks, partners and/or CIAT to foster linkages and enhance collaboration. These included implementation of the wider impact strategy (development and sharing of promotional materials, seed increase and dissemination); training and establishing of PM&E under PABRA; planning, training and execution of the Impact Assessment studies; harmonization of ECABREN and SABRN breeding strategies; application of Marker Assisted Selection using the Kawanda facilities; information exchanges and visits by pan-Africa working group resources persons (PRIAM, BILFA and IPM); bean biofortification initiatives (with support from CIAT headquarters); and enhancement of PPB skills and development of an action plan. A CIAT Africa website was launched with a PABRA sub-site. The ECABREN, SABRN and PABRA coordinators jointly reviewed progress of PABRA work plan and activities on a regular basis. The PABRA coordinator participated in SABRN and ECABREN steering committee meetings and was a resource person in ECABREN project development and technical meetings.

Contacts were initiated with IRAD in Cameroon for bean program scientists to participate in ECABRENs' regional planning meetings in April and July 2004. This was meant to give them exposure to issues, constraints and procedures for priority setting and also create contacts and profession links with colleagues in eastern Africa. It was anticipated that this would create a focus from which a West Africa (CORAF) research team would network other players in the region. ECABREN through its INERA partner in M'vuazi, D.R. Congo sent bean germplasm to CORAF countries including Central African Republic, Congo-Brazzaville, and Cameroon as these areas have similar ecologies. Germplasm was also sent to Cameroon by the ECABREN regional breeder. In addition, on PABRA request, a breeder from INERA bean program in D.R. Congo (who sent the germplasm to West Africa) and a CIAT staff (Enabling Rural Innovation) visited Cameroon and met some of the bean scientists in an effort to better understand research issues and activities and to plan future interactions.

5.3.3 Enhance partnerships within the networks (including broadening steering committee membership, more alliances between NARS, NGOs and CBOs)

A new alliance has been developed between Concern Worldwide and CIAT-SABRN to provide backstopping to Concern Worldwide in Malawi with bean-based technologies and seed multiplication. Concern Worldwide is funding the operations.

The ECABREN coordination unit continued with its strategy of inviting active partners in the bean production-to-consumption chain to its regional planning meeting, including representatives of farmers, CBOs, national and regional organizations collaborating with member countries in the ASARECA region. In addition, the network strengthened alliances by signing memorandum of understanding (MOU) with three donor-funded NGOs operating in northern Tanzania to join in the implementation of R4D activities, especially in a Farm-Africa-ECABREN funded project on dissemination and promotion of climbing bean and agroforestry interventions in northern and south-western Tanzania. ECABREN also motivated Sokoine University of Agriculture (Food department) and Lagrotech Seed Company in Kenya to be involved actively in the implementation of various aspects of newly defined network projects such as bean for food and health.

5.3.4 Implementing priority setting recommendations for achieving research for development impact in ECABREN member countries

Rationale: The ECABREN strategic objective aims at increasing utilization of demand driven bean-based technologies and innovations. Achieving this objective contributes to ASARECA's strategic objective which emphasizes enhanced agricultural productivity, value-added and competitiveness of the regional agricultural system as a means towards realizing increased economic growth and improved social welfare in East and Central Africa. To fully integrate the ECABREN research and development agenda into ASARECA's consolidated conceptual framework (CCF) and that of Pan-African Bean Research Alliance (PABRA), a review of priority setting recommendations was needed to contribute to achieving institutional goals.

Methodology: The Regional Planning and Steering Committee meetings gathered 38 stakeholders representing actors in the bean production-to-consumption continuum. The group reviewed the 11 sub-themes that were ranked and prioritized last year (see IP-1 2003 Report). Through brain-storming, the stakeholders discovered the diversity of common bean uses and potential of various market classes grown in the region. Production, post-harvest, processing, marketing, consumption, and policy factors that affect important bean markets classes were analyzed. Important bean products were defined that could lead to achieving network and partners' goals; expected results and R4D activities for each product were identified, discussed and agreed by the stakeholders for facilitating the development of project proposals.

Results and Discussion: The three main bean products agreed included beans for food and health; navy beans or canning white pea bean for domestic and export markets; snap bean and dry beans (large white and sugar beans) for export markets. The later project was thereafter separated in two distinct projects including snap bean and sugar & large white beans.

Bean for food and health was considered as the major project on which the bean network should concentrate. Due to their numerous health benefits, dry beans are not only known as a source of micronutrients and protein, but also a source of other major nutrients and components including fiber whose role in preventing health related problems is being recognized worldwide. Therefore, network partners ranked 'Bean for food and health project' as high priority (50%), followed by navy beans (26%) and finally snap bean & large white and sugar beans project (24%). The beans for food and health project has been developed and submitted for approval by the ASARECA-technical support group (TSG) of CGS for two-year funding by USAID/REDSO; whereas concept notes on snap bean and navy bean projects were developed and submitted to ASARECA-CGS through calls addressed to all NARS in the ASARECA region. The following are the projects and research aspects that should be addressed in the next three year starting October 2004 (depending on availability of funds).

Project 1: Enhanced utilization of nutrient rich beans for improved nutrition and income

- Identification and promotion of existing and new nutrient rich bush and climbing beans;
- Characterization of sustainable integrated nutrient, disease and pest management options that enhance nutrient density in existing and new bean germplasm of various market classes;
- Development and promotion of acceptable post-harvest and value adding packaging;
- Dissemination and promotion of nutrient rich beans and relevant improved agronomic practices.

Project 2: Improving navy beans for competitive local and export markets

- Identification and characterization of domestic and export market for navy beans, and improvement of linkage among market actors;
- Development, identification and adaptation of appropriate navy bean populations and varieties;
- Development, testing and adaptation of integrated disease, pest, soil nutrient and water management options for navy beans;
- Testing and adaptation of post-harvest value addition technologies for navy beans;
- Dissemination and promotion of pre-and post harvest technologies.

Project 3: Improving competitiveness of snap bean for domestic and export markets

- Characterization of potential snap bean regional and international export markets and identification of opportunities;
- Identification and adaptation of snap bean varieties that meet domestic and export quality characteristics;
- Development of improved production options for export snap bean;
- Development and promotion of post-harvest options for snap bean;
- Organization/facilitation of producers, traders, and other strategic partners to disseminate and promote snap bean technologies for ensuring growth in volume and quality of snap bean export.

Project 4: Improving competitiveness of white and sugar beans for export markets

- Research and development areas are similar to snap bean project.

Contributor: M. Pyndji, S. Kasambala and P. Kimani
Collaborators: PABRA, ASARECA MEAPU, NARIs, NGOs, CBOs, Farmers and Private sector

5.3.5 Catalyze development of a regional seed support team in collaboration with other Future Harvest Centers and the SADC Seed Security Network

Between April-September 2004, four Future Harvest Centers (CIAT, CIMMYT, ICRISAT, and IITA) together with SSSN teamed up to sensitize various stakeholders on sustainable ways to produce and distribute seed of OPV and self-pollinated crops in Tanzania and Mozambique. This involved stakeholders from various institutions including NGOs, CBOs and farmers' associations, to strengthen partnerships and collaboration.

Progress towards achieving output milestones:

- The Regional Steering Committee of Eastern and Central Africa Bean Research Network (ECABREN) ranked bean for food and health project as higher research priority in efforts to improve nutrition and health of rural and urban poor communities through increased consumption of nutrient rich beans in ASARECA region.

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Editorial contributions

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Contracts

BID/IICA Project approved by FONTAGRO
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COSUDE-PROMPEX CIAT Bean Project, Peru.
COSUDE-PRONALAG Technical Assistance, Bolivia.
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Regional Institutions: ASARECA, Food, Agriculture and Natural Resources (FANR), CORAF.

Private Sector: Pristine Seeds and Progeny Seeds (Zimbabwe); PANNAR (South Africa), Horemans Seed Companies (Zambia) and Umlimi Lokhomile Seed Co (Swaziland), Lagrotech Seed Co (Kenya), CTHA (Madagascar), Dodoma Transport Agency Ltd-Masware Farm Seed Co (Tanzania).

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Blair, Matthew, PhD, Germplasm Characterization Specialist/Bean Breeder
Buruchara, Robin, PhD, Plant Pathologist/PABRA Coordinator (stationed in Kampala, Uganda)
Cardona, César, PhD, Entomologist
Chirwa, Rowland, PhD, Plant Breeder/SABRN Coordinator (stationed in Lilongwe, Malawi)
Kimani, Paul, PhD, Plant Breeder for ECABREN (University of Nairobi/CIAT) (stationed in Nairobi, Kenya)
Mahuku, George, PhD, Plant Pathologist
Minja, Eliaineny, PhD, IPM specialist (stationed in Arusha, Tanzania)
Morales, Francisco, PhD, Virologist
Muthoni, Rachel, BSc, MPA, Monitoring and Evaluation Specialist, (stationed in Kampala, Uganda)
Pyndji, Mukishi, PhD, Plant Pathologist, ECABREN Coordinator (stationed in Arusha, Tanzania)
Rao, Idupulapati, PhD, Plant Nutritionist/Physiologist
Rubyogo, Jean Claude, BSc., Seed System Specialist (stationed in Malawi)
Sperling, Louise, PhD, Social Scientist, (stationed in Rome, Italy)

Administrative staff

Administrative staff gives support to all CIAT Africa staff at each location regardless of the project they belong to

Amuza Babi, Driver/Mechanic (stationed in Kampala, Uganda)
Baguma Athanasio, Driver/Administrative Assistant (stationed in Kampala, Uganda)
Gamba, Abdalla, Security Guard (stationed in Arusha, Tanzania)
Giraldo, Isabel Cristina, Economist, Administrative Assistant, CIAT-Bean Project Manager
Kauwa, Anthony, Driver/Mechanic (stationed in Lilongwe, Malawi)
Laizer, Emeseiki, Security Guard (stationed in Arusha, Tanzania)
Mawanda, Limani, Office Assistant (stationed in Lilongwe, Malawi)
Nassozi, Sarah, A.C.I.S., Regional Finance and Administration Officer (stationed in Kampala, Uganda)
Ndolwa, Miraji, Driver/mechanic (stationed in Arusha, Tanzania)
Ngondo, Ella, Secretary/Administrator (stationed in Lilongwe, Malawi)
Shirima, Julita, Messenger/cleaner (stationed in Arusha, Tanzania)
Tibalikwana, Mabel, Administrative Secretary (stationed in Kampala, Uganda)
Travas, Betty, Administrative Assistant (stationed in Arusha, Tanzania)
David M. Ndungu, Driver/Research technician (stationed in Nairobi, Kenya)

Research associates and assistants

Buah, Stephen, BSc, Research Assistant, Pathology/Biotechnology Lab (stationed in Kampala, Uganda)
Buendía, Héctor Fabio, Ing. Agr., Germplasm Characterization Lab.
Bueno, Juan Miguel, Ing. Agr., Entomology
Cajiao, César, Ing. Agr., Mesoamerican Bean Genetics
Castaño, Mauricio, Ing. Agr., Virology Research Unit
Cortés, María Luisa, Ing. Agr., MSc, Mesoamerican Bean Genetics
Giraldo, Martha Cecilia, Biol., Germplasm Characterization Lab.
Grajales, Miguel Angel, Agric., Tech., Mesoamerican Bean Genetics
Henríquez, María Antonia, Ing. Agr., Phytopathology
Jara, Carlos Eduardo, Ing. Agr., Phytopathology
Kasambala, Sindi, MSc, Agric Econ., ECABREN Program assistant (stationed in Arusha, Tanzania)

Macharia, David R., BSc, Breeding, University of Nairobi/CIAT) (stationed in Nairobi, Kenya)
Manrique, Germán, Ing. Agr., Plant Nutrition
Mayanja, Stephen, BSc, Research Assistant, Biotechnology Lab. (stationed in Kampala, Uganda)
*Montoya, Carmenza, Ing. Agr., Phytopathology
Mukankusi, Clare, MSc, Research Assistant, Pathology (study leave in S. Africa)
Muñoz, Claritza, Biol., Entomology/Germplasm Characterization Lab.
Mziray, Hendry, (stationed at Arusha, Tanzania)
Polanía, José Arnulfo, Ing. Agr. Plant Nutrition
Ricaurte, José Jaumer, Ing. Agr. Plant Nutrition
Rodríguez, Isaura, Ing. Agr., Entomology
Sangole, Noel, ERI (stationed in Lilongwe, Malawi)
Ssekamatte, Allen, Bsc, Research Assistant, Biotechnology Lab. (stationed in Kampala, Uganda)
Suleiman, Sebuliba, Field Assistant, Breeding (stationed in Kampala, Uganda)
Tovar, Eduardo, Biol., Mesoamerican Bean Genetics
Wagura, Joseph, Research Assistant (stationed in Nairobi, Kenya)

Secretaries

Arenas, Beatriz, Entomology
Ngalo, Eva, (stationed at Arusha, Tanzania)
Zamorano, Patricia, Breeding/Germplasm Characterization, Pathology

Technicians

Acam, Catherine, Dip., Research Technician, Breeding (stationed in Kampala, Uganda)
Astudillo, Carolina, Germplasm Characterization Lab.
Castellanos, Guillermo, Pathology
Cerón, Carlos Alberto, Mesoamerican Bean Genetics
Cuasquer, Juan Bosco, Pathology
Díaz, Orlando, Entomology
Gómez, Ivan, Germplasm Characterization
Hoyos, Agobardo, Germplasm Characterization
Joaqui, Orlando, Mesoamerican Bean Genetics
Mwase, Archangel, Technician – Breeding (stationed in Lilongwe, Malawi)
Maseko, MacFord, Technician – Breeding (stationed in Lilongwe, Malawi)
Morales, Héctor, Entomology
Ortíz, Guillermo, Germplasm Characterization
*Pantoja, Wilfredo, Germplasm Characterization Lab
Valor, Jose Flower, Entomology
Vargas, Luis Alberto, Mesoamerican Bean Genetics
Zuleta, Jesús María, Mesoamerican Bean Genetics

Trainees

Campos, Hernan, Univ. San Simon – Cochabamba, Bolivia, in Germplasm Charact. Lab
Caula, Carlos Cesar, Cuban Institute of Biotechnology, in Germplasm Charact. Lab
Chaveco, Orlando, Cuban Ministry of Agriculture, in in Germplasm Charact. Lab
Chirwa Rowland, Ph.D, CIAT-Malawi, in Germplasm Charact. Lab
Dávila, Andrea, Biol., Centro Ficoecogenetico Pairumaní, Bolivia, in Germplasm Charact. Lab
De Oliveira Borba, Tereza Cristina, Food Eng., EMBRAPA-CNPAF Univ. Federal de Goiás, Brazil, in Germplasm Charact. Lab
Delgado, Kattia, Instituto Peruano de Leguminosas/PROMENESTRAS/PROMPEX, Chiclayo, Peru, in Germplasm Charact. Lab

Flores, Dennis, Instituto Peruano de Leguminosas/PROMENESTRAS/PROMPEX, Chiclayo, Peru, in Gemplasm Charact. Lab
Frei, Andrea, ETH, Switzerland, in Germplasm Characterization Lab
Garzón Gutiérrez, Luz Nayibe, Biol. Univ. Nacional de Colombia, in Germplasm Charact. Lab
Iriarte, Gloria, CENICAFE, in Germplasm Charact. Lab
Kimani, Paul, Ph.D, CIAT-Kenya/Univ. of Nairobi, in Germplasm Charact. Lab
Muñoz, Ligia Carmenza, University of Lyon, France, in Germplasm Charact. Lab
Santana, Gloria, Ing. Agr. CORPOICA-Rionegro, Antioquia, Colombia, in Germplasm Charact. Lab

PhD Students and MSc Thesis

Bengtsson, Frida, MSc, Agricultural University of Norway
Bereng, Simon, MSc, Agronomy. University of Free State, South Africa
Bravo, Enrique, PhD, Universidad del Valle, Virology
Bueno, Juan Miguel, MSc, Universidad del Valle, Entomology (completed)
Castañeda, Diana, MSc, Universidad Nacional, Entomology (completed)
Chatayika, Barthlomew Y.E., MSc. University of Malawi, Bunda College of Agriculture
Chaveco, Orlando, MSc, Ministerio de Agricultura, Cuba
Checa, Oscar, PhD, Univ. Nacional, Palmira, Colombia, Germplasm Character. Lab (completed)
Díaz, Juan Manuel, MSc, Universidad Nacional, Palmira, Colombia, Germplasm Character. Lab
Díaz, Lucy Milena, MSc, Universidad Nacional, Palmira, Colombia, Germplasm Character. Lab
Frei, Andrea, PhD, ETH, Switzerland, Entomology (completed)
Gichuru, Virginia, PhD, Makerere University, Uganda
Henríquez, Maria Antonia, MSc, Univ. Nacional, Phytopathology
Jennifer Joy West, MSc, Agricultural University of Norway
Kananji, Geoffrey, PhD, Plant Breeding, Univ. of Natal, South Africa
Kibyego, Michael, MSc Agric. Marketing, Moi University
Komba, Sophia, MSc, IPDM in Hai district, northern Tanzania
Korir, Mark, MSc Agric Marketing, Moi University
Lunjalu, J.O., MSc, University of Nairobi, Kenya
Macharia, David R., MSc, University of Nairobi, Kenya
Mauyo, Lianda, MSc Agric Marketing, Moi University (completed)
Muimui, Kennedy MSc Genetics and Plant Breeding, University of Nairobi, Kenya (completed)
Mukalazi, Julius, PhD, Makerere University, Uganda (completed)
Mukankuzi, Claire, PhD, Breeding / Pathology University of Natal, South Africa
Musoni, Augustine, MSc Genetics and Plant Breeding, University of Nairobi, Kenya
Namayanja, Annet, MSc Plant Breeding, Makerere University, Uganda (completed)
Ngongo Mulangwa, MSc, Institut des Sciences Agronomiques, Yangambi, DR Congo
Ochoa, Ivan, PhD, Pennsylvania State University, USA, Germplasm Characterization Lab
Ocimati, Walter, MSc, Makerere University, Uganda
Otsyula, Reuben, PhD, Plant Breeding, Makerere University, Uganda
Pantoja, Wilfredo, MSc, Universidad Nacional, Palmira, Colombia, Germplasm Charact. Lab
Tusiimi, Geoffrey, PhD, Makerere University, Uganda (completed)
Vélez, León Darío, MSc, Universidad Nacional de Colombia, Bogotá, Germplasm Charact. Lab
Vizgarra, Oscar, PhD, Universidad de Tucumán, Argentina, Mesoamerican Bean Genetics
Zulu, Mathias, MSc, Plant Breeding, University of Zambia

Pregraduate Thesis Students

Caldas, Gina, Universidad del Valle, Cali, Colombia, Germplasm Charact. Lab (completed)
Cortés Lorena, Universidad del Valle, Cali, Colombia, Phytopathology

López, Yenni Lorena, Universidad Nacional, Palmira, Colombia, Plant Nutrition
Lozano, Henry, Universidad Nacional, Palmira, Colombia, Germplasm Charact. Lab (completed)
Montenegro, María Fernanda, Universidad Nacional, Palmira, Colombia, Entomology (completed)
Navia, Mónica, Universidad del Valle, Cali, Colombia, Phytopathology (completed)
Prieto, Sergio, Univ. Nacional Palmira, Colombia, Entomol. and Germplasm Charact. Lab (completed)
Rodríguez, Lina María, Universidad de los Andes, Bogotá, Colombia Germplasm Charact. Lab
Valencia, Sandra Jimena, Universidad Nacional Palmira, Colombia, Entomology

Practical Training

Guerrero, Alberto Fabio, Universidad Javeriana, Colombia, Beangenes and Oracle Databases in Andean Bean Genetics.

*Left in 2004

Acronyms and Abbreviations used

ACTA	Asociación Colombiana de Ciencia y Tecnología de Alimentos
ADRA	Adventist Development and Relief Agency
AFLP	Amplified Fragment Length Polymorphism
AHI	African Highlands Ecoregional Programme (led by ICRAF)
ARC/GCRI	Agricultural Research Council, Grain Crops Research Institute, South Africa
ASA	American Society of Agronomy
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ATDT	Agricultural Technology Development and Transfer Project
AU	Alemaya University, Etiopía
BGMV	Bean Golden Mosaic Virus
BGYMV	Bean Golden Yellow Mosaic Virus
CARE	(International NGO in Ethiopia, Rwanda, Uganda)
CBOs	Community Based Organizations
CG	Consultative Group
CGIAR	Consultative Group on International Agricultural Research
CGS	Competitive Grant System
CIAL	Comité de Investigación Agrícola Local
CIAT	Center for International Tropical Agriculture
CIDA	Canadian International Development Agency
CIMMYT	International Maize and Wheat Improvement Centre
CIPRES	Centro de Investigación y Promoción de Desarrollo Rural y Social
CMAD	Community Mobilization Against Desertification
COLCIENCIAS	Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología "Francisco José de Caldas"
CORAF/ WECARD	Conférence des Responsables de Recherche Agricole en Afrique de l'Ouest et du Centre/West and Central African Council for Agricultural Research and Development
CORFOCIAL	Corporación para el Fomento de los Comités de Investigación Agrícola Local
CORPOICA	Corporación Colombiana de Investigación Agropecuaria
COSUDE	Cooperación Suiza para el Desarrollo
CRSP	Collaborative Research Support Project
CRS	Catholic Relief Services
CSSA	Crop Science Society of America
CU	Concern Universal, Malawi
DANIDA	The Danish Agency for Development Assistance
DAO	District Agricultural Office
DARTS	Department of Agricultural Research and Technical Services, MoA, Malawi
DNA	DeoxyriboNucleic Acid
DR Congo	Democratic Republic of Congo

DRD	Directorate of Research and Development
EARO	Ethiopian Agricultural Research Organization
ECA	East and Central Africa
ECABREN	Eastern and Central Africa Bean Research Network
EEA	Estación Experimental Agrícola
EMBRAPA	Empresa Brasilera de Pesquisa Agropecuaria
ESA	East and Southern Africa
ETIAH	Estación Territorial de Investigaciones Agropecuarias de Holguín
FA	Farm Africa
FAO	Food and Agriculture Organization
FENALCE	Federación Nacional de cultivadores de Cereales
FIDAR	Fundación para la Investigación y Desarrollo Agrícola
FONTAGRO	Fondo Regional de Tecnología Agropecuaria
FOFIFA	Centre National de la Recherche Appliqué au Développement Rural, Madagascar
HAAS	Harbin Agricultural Academy of Sciences
HEM	Himo Environmental Management Trust
HRI	Horticultural Research Institute (UK)
IACR	Rothamsted (UK)
IBFA	Ikulwe Bean Farmers Association (Uganda)
ICIPE	Centre for Research in Agro-Forestry
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IDRC	International Development Research Center
IITA-SARRNET	International Institute for Tropical Agriculture - Southern Africa Regional Root Crops Research Network
INERA	Institut National des Etudes sur la Recherche Agronomique, DR Congo
INIA	Instituto Natiocional de Investigacao Agronomica (Mozambique)
INM	Intergrated Nutrient Management
INRA	Institut National de Recherche Agronomique
INTA	Instituto Nacional de Innovación y Transferencia en Tecnología Agropecuaria, Costa Rica
INPRHU	Instituto de Promoción Humana
IPGRI	International Plant Genetic Resources Institute
IPM	Integrated Pest Management
IPRA	Investigación Participativa en Agricultura/ Participatory Research in Agriculture of CIAT
ISAR	Institut des Sciences Agronomiques du Rwanda
ITA	Instituto Técnico Agrícola
KARI	Kenya Agricultural Research Institute
MAC	Medium Altitude Climbers
MAFP	Ministério de Agricultura, Florestas e Pescas (República Democrática de Timor-Leste)
MAS	Marker Assisted Selection
MIP	Manejo Integrado de Plagas/Integrated Pest Management
MoA	Ministry of Agriculture
MU	Makerere University, Uganda

NAARI	Namulonge Agricultural and Animal Production Research Institute
NARI	National Agricultural Research Institute
NARO	National Agricultural Research Organization, Uganda
NARS	National Agricultural Research Systems
NBPGR	National Bureau of Plant Genetic Resources
NEPAD	The New Partnership for Africa's Development
NGOs	Non-Governmental Organizations
NRI	Natural Resources Institute (UK)
OFDA	Office of Foreign Disaster Assistance
OPV	Open Pollinated Variety
PABRA	Pan-Africa Bean Research Alliance
PCCMCA	Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios
PPB	Participatory Plant Breeding
PRGA	Participatory Research and Gender Analysis
PROFRIZA	Proyecto Regional de Frijol para la Zona Andina
PROMPEX	Comisión para la Promoción de Exportaciones
PRONALAG	Programa Nacional de Leguminosas Alimenticias
REDSO/ESA	Regional Economic Development Services Office for East and Southern Africa
RF	The Rockefeller Foundation
SABRN	SADC Bean Research Network
SACCAR	Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training
SADC	Southern Africa Development Council
SARBEN	Southern Africa Regional Bean Evaluation Nursery
SARBYT	Southern Africa Regional Bean Yield Trial
SARI	Selian Agricultural Research Institute
SDC	Swiss Development Cooperation
SENA	Servicio Nacional de Aprendizaje
SENASEM	Service National des Semences
SGRP	Systemwide Genetic Resources Programme
SSSA	Seed System Security Assessment
SSSN	SADC Seed Security Network
TSG	Technical Support Group
UAGRM	Universidad Autónoma Gabriel René Moreno
UMATA	Unidad Municipal de Asistencia Técnica Agropecuaria
UN	United Nations
USAID	United States Agency for International Development
VICARIBE	Vivero Caribeño de grano Andino
VIVA	Vivero Internacional de Volubles Andinos
WV	World Vision