

Better beans for Africa...



... thanks to the work of the Pan-Africa Bean Research Alliance (PABRA). In 2006, the Alliance celebrated 10 years of achievements and assessed the challenges that lie ahead

Facts and figures

- African smallholders grow over 4 million hectares of beans annually, providing food for more than 100 million Africans.
- Eastern Africa has the highest per capita consumption of beans in the world, some 50 to 60 kg of beans per person per year.
- At 22%, beans are rich in protein; they are also a good source of iron, zinc, fibre and complex carbohydrates.
- Beans provide a significant and growing source of income for rural households, with annual African sales worth over US\$ 580 million in 2005.





Beans in Africa

Originally native to South America, the common bean (*Phaseolus vulgaris* L) is now widely grown across Africa, mainly by women farmers. As a legume, beans improve soil fertility as well as household food supplies and incomes.

An Alliance for progress

Established in 1996, the Pan-Africa Bean Research Alliance (PABRA) is a consortium of regional bean networks that brings together national agricultural research groups, scientists at the Centro Internacional de Agricultura Tropical (CIAT) and representatives from donor organisations. PABRA's goal is to enhance the food security, income and health of resource-poor farmers in Africa through research on beans.

To achieve this goal, PABRA works in partnership with farmers and rural communities, non-government organisations (NGOs), traders and other private sector partners. The major beneficiaries of PABRA's work are rural women, who are primarily responsible for the crop's production and post harvest handling. Other important beneficiaries are the urban poor, who rely on beans for protein.

PABRA facilitates collaborative research among its partners. This involves planning, priority setting, monitoring and evaluation, in addition to implementation. The collaborative approach

delivers economies of scale by allowing the sharing of knowledge, the exchange of germplasm and the dissemination of technologies and methods across national frontiers.

The Alliance also facilitates capacity building. With PABRA support, the regional networks identify, develop and deploy national expertise in a range of areas such as plant breeding, farmer participatory research, seed dissemination, agroenterprise development, and integrated pest and disease management (IPDM). Thanks to increased emphasis on capacity building, the number of national scientists working at the regional level as PABRA resource persons has risen from 5 in 2003 to 23 in 2005.

Key partners in collaborative research and capacity building in the field of plant breeding are the University of Nairobi, Kenya, and Chitedze Agricultural Research Station, in Lilongwe, Malawi.



PABRA has two well established regional bean networks:

- The Eastern and Central Africa Bean Research Network (ECABREN), and
- The Southern Africa Bean Research Network (SABRN).

Efforts are under way to create a third network in West and Central Africa. The established networks are affiliated with their respective sub-regional organisations – the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and the Southern Africa Development Community's Food, Agriculture and Natural Resources Unit (SADC-FANR). The emerging West and Central African network will be affiliated with the West and Central African Council for Agricultural Research and Development (WECARD).

The 18 countries participating in PABRA are Angola, Burundi, Cameroon, DR Congo, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Rwanda, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

PABRA is facilitated by CIAT, which is also a partner in the Alliance's strategic research. The Alliance is governed by a steering committee that meets annually with network participants and donor representatives to review past activities and plan future ones.

A decade of achievement

Since 1996, Alliance partners have successfully tackled difficult research problems such as bean pests and diseases and poor soil fertility. They have also achieved rapid progress in disseminating new bean varieties.

Stopping the rot

The early 1990s were a bleak time for bean farmers and consumers in Eastern Africa's more intensely



Climbing out of hunger and poverty

The improved climbing beans developed and disseminated by PABRA partners yield three times more than traditional bush beans. Their resistance to root rot makes them well suited to the densely populated humid highland zone where this disease is most destructive. And their vertical growth means they take up less space in the field, allowing more room for other crops.

Rwanda, where these varieties first took root in Africa, is leading the regional research effort. ISAR is breeding new varieties that combine resistance to diseases and pests with other desirable traits.

Climbing beans continue to spread beyond Rwanda to other countries. They have been widely adopted by farmers in the highlands of southwest Uganda, central and western Kenya and northern Tanzania.





cultivated areas: bean root rot disease decimated harvests, causing severe food shortages and high prices.

To solve the problem, scientists from CIAT

and the Institut des Sciences Agronomiques du Rwanda (ISAR) conducted intensive research that resulted in the identification of bush and climbing bean varieties with resistance to the disease. Besides being more widely disseminated in Rwanda, these varieties were introduced to western Kenya and southwest Uganda. An impact study in western Kenya showed that, by 2001, up to 80% of households had adopted at least one of the resistant bush varieties, leading to improved food security.

The use of resistant varieties has been combined with an IPDM approach that draws on indigenous knowledge in addition to that of researchers. Results show that this combination is effective in countering both bean root rot and other diseases and pests.

Towards healthier ecosystems

PABRA adopts a holistic ecosystems approach to the twin problems of poor soils and crop pests and diseases. Breeding efforts to combat these problems are integrated with the development and testing of other interventions.

The Alliance has identified and promoted the use of bean varieties that can thrive in poor soils, coupling the use of these with the testing of locally available solutions such as green manures and organic soil amendments. Plant breeders have developed improved varieties that combine tolerance to low soil fertility with pest and disease resistance and other desirable traits.

To combat pests and diseases, farmers are using a battery of new technologies and practices in association with improved bean varieties. These include timely planting and the use of plant extracts from marigold, neem and other species. These IPM technologies reduce the use of chemical pesticides. The planting or field application of legumes such as *Tephrosia* restores soil fertility at the same time as warding off pests.

Some of the improved varieties developed by PABRA partners require less cooking time than traditional varieties. Women report that the consumption of fuelwood may be almost halved, reducing their labour at the same time as benefiting the environment.

Power to the farmer

PABRA has fostered the development of dynamic farmer research groups. By March 2006 there were more than 300 such groups and upwards of 5 000 participating farmers had been trained in varietal testing and seed production. Knowledge sharing among farmers has greatly accelerated technology dissemination and adoption.

National programmes have been encouraged to conduct participatory varietal selection or plant breeding with farmers. These approaches have



Growing seeds, growing a business



Haile Wako, 47, is a father of four who has been growing beans since boyhood. Haile and his family live in Boffa village in Ethiopia's Central Valley region. "I decided to grow improved beans because I knew I could make 400 birr a month," Haile says. That's equivalent to about US\$ 48, a handsome gain over the average monthly income of many resource-poor farmers in Ethiopia, which often totals US\$ 30 or less.

Since 2001, Haile has been an outgrower for Ethiopian Seed Enterprises, producing foundation seed for local communities, NGOs and cooperatives. He is also a seed trader in his own right. Using the proceeds from beans, Haile has bought a water pump and a lorry and built a brick house for his family. He has also leased extra land so that he can expand his bean enterprise.



Reaching the unreached

With CIAT support, national researchers and extension workers have adopted non-conventional approaches to technology dissemination, involving such outlets as health centres, grain traders and even soft drink kiosks in their efforts to reach new users.

This initiative, known as the concerted partnership approach, has been highly successful. In just 18 months from its launch in 2003, some 2.5 million households in East, Central and Southern Africa received improved bean varieties. In other words, the initiative has already outstripped its original target of 2 million households by 2008. In Ethiopia alone, in just one year's campaign, 137 tonnes of improved seed were disseminated to farmers, many of them poor farmers who were testing improved germplasm for the first time.

Critical to success has been the packaging of seed in small, affordable quantities. When packets with as little as 50g of seed can be used, 50 tonnes is enough to reach a million farmers.

More than 80 partners have now joined the initiative, signing agreements with national research institutes to collaborate in seed production and/or dissemination.

ensured that new varieties have been made available to farmers long before their formal release.

To speed up the dissemination effort still further, PABRA has supported the development of community-based seed production as an agro-enterprise. Technical manuals on the subject available in eight languages have been developed and supplied to farmers and extension organisations.

Millions have benefited

By 2004, a total of 245 new bean varieties had been disseminated in the 18 PABRA countries. Impact studies conducted from 2003 to 2005 indicated that, in just 7 of these countries, some 35 million farmers were sowing the new varieties, which covered nearly half the area planted to beans. Once tested, an improved variety was likely to be adopted permanently, suggesting that the new technologies are well suited to the needs of farming families.

To increase the number of people benefiting, a fresh target was set in 2003: to reach a further 2 million households by 2008. A concerted partnership approach was developed to meet this target (see box).



Beans for wealth and health

According to the impact studies, farmers adopting improved varieties reported higher yields, with reduced losses to pests, diseases and poor soils; improved family nutrition and health; and higher incomes.

In some countries bean research and development has brought spectacular economic returns. For example, in Tanzania the internal rate of return to research investments over the 20-year period from 1985 to 2005 was estimated at 60%. In eastern DR Congo, farmers' incomes from beans have increased nearly fivefold.

Higher incomes are generated not only from increased bean sales for consumption but also from the sale of seeds, which is now a lucrative enterprise in some countries.

Bean technology is wealth-neutral: farmers in several countries, particularly Rwanda, reported

According to PABRA's monitoring and evaluation studies, improved practices to counter pests and diseases and poor soils had reached some 400 000 farmers by 2005. Although this figure lags well behind the numbers adopting improved varieties, it represents a promising start on which the partners can build on in the future.



that poor or very poor members of the community were just as likely to adopt the new technology as better off farmers. Many adopters are women, who have seen their incomes rise substantially as a result. To reduce the risk that men will try to appropriate the income gains by taking over what is traditionally a women's crop, PABRA has sought to



build the capacity of women's groups and their service providers in starting and running an agroenterprise.

Farmers reported additional benefits in the form of exposure to new providers of services such as credit and input supply as well as new information on health and nutrition.

What next? Future challenges

Beans are vital to Africa's struggle to reverse its current decline and start moving towards the Millennium Development Goal (MDG) targets of halving hunger and poverty by 2015. PABRA's second decade will thus be even more

challenging than its first. What should the Alliance be doing?

PABRA's focus on seed-based technologies has served it well and plant breeding, as the source of these technologies, will continue to be a key activity. The fight against pests and diseases must intensify and broaden, since new threats will constantly arise. Besides bean root rot, other critical diseases that need tackling include angular leaf spot, anthracnose, leaf rust, common bacterial blight and bean mosaic virus, while priority pests include bean stem maggots, aphids and cutworms. In both cases, selection and breeding for resistance or tolerance will, as now, be combined with IPDM approaches that maximise the gains to farmer and ecosystem health.

Beans are highly vulnerable to climatic stresses, especially drought. At least in parts of the region, this is likely to become more of a threat as global warming takes hold. The past few years have seen increasing efforts by PABRA partners to develop varieties that combine drought tolerance with other desirable traits. These efforts must continue and intensify, with the resulting new varieties being screened and tested for early dissemination and release.

Efforts to disseminate seed-based and other technologies must be redoubled. The adoption patterns revealed by the impact studies point to two needs: first, to launch dissemination efforts in areas that have so far been neglected, since this is the way to reach poor and marginalised farmers with little previous exposure to new technologies; second, to expand the number of varieties on offer, thereby creating greater stability of production and food security through increased diversity. The dissemination of knowledge-based technologies (such as IPDM), which always lags behind that of seeds, should receive special emphasis.

The continuing spread of HIV/AIDS calls for increased efforts to enhance the contribution of beans to the nutrition of people living with the disease. This will mean more than developing

Beans and the fight against HIV/AIDS

HIV/AIDS has crippled smallholder agriculture in large areas of Africa. Farmers lose working family members and generational agricultural knowledge in addition to food security, income and assets. Food may become scarce and diets less diverse, leading to chronic and hidden hunger.

PABRA addresses the nutritional needs of people affected by HIV/AIDS through the development of beans rich in iron and zinc. The Alliance also pays special attention to technologies that reduce farm labour while increasing productivity. Beans are an attractive crop for families living with HIV/AIDS because they require less tillage than grain crops. Mixtures of bush and climbing types, coupled with late or early planting, can also reduce weeding time.

PABRA partners are working together to help Rwandan families living with HIV/AIDS to improve their nutrition and use better cooking methods and recipes. The project has disseminated four improved bean varieties to some 12 000 farmers whose households or communities are affected by HIV/AIDS.



and disseminating new varieties rich in minerals; also needed will be better links with community-based health and nutrition workers, who will need to be involved in promotional campaigns.

To ensure that beans remain a profitable option for smallholders as production rises, it will be

important to explore new processing options and to open up new regional markets. If prices for beans and other cash crops can be sustained, farmers should prove more willing to invest in their farms, especially in the fertility of their soils.

Enabling resource-poor farmers to adopt new technology by providing them with access to credit, inputs and information is likely to remain a critical challenge over the next decade. PABRA will work with other organisations to tackle this formidable constraint, learning from the small but growing number of success stories already evident across the region.

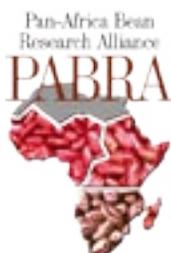
For more information, visit our website at:
<http://www.ciat.cgiar.org/africa/pabra.htm>

or contact:

Dr Robin Buruchara
PABRA Coordinator

Kawanda Agricultural Research Institute
P.O. Box 6247, Kampala, Uganda
Tel: +256 41 567670

E-mail: r.buruchara@cgiar.org
ciat-uganda@cgiar.org



The Pan-Africa Bean Research Alliance gratefully acknowledges support for its activities from the following donors: the Association for Strengthening Agricultural Research in Eastern and Central Africa, the UK Department for International Development, the Canadian International Development Agency, The Rockefeller Foundation, the Swiss Agency for Development and Cooperation and the US Agency for International Development. The views expressed are not necessarily those of these organisations.