Pan Africa Beans Research Alliance

Market-led approaches to bean breeding

Conclusion

PABRA's approach to connecting and formalizing collaboration between all the key public and private organisations has led to many more varieties being developed for smallholder farmers and their value chains. This success has been a result of a range of factors and behaviors including: the continuity of leadership within PABRA management, continual striving for transparency of activities and budgets, open communication and collaborative spirit amongst alliance members, preventing duplication of work, enduring support from donors and respective African government programs and CIAT partnering and working with all of the NARS through the PABRA networks.

Two key differentiators between PABRA and other crop networks is the emphasis that alliance members and bean breeders place on (1) understanding bean markets and the drivers for buying and selling decisions by clients in the bean value chains and (2) the importance placed on not just developing improved varieties that are in high demand but also the need for released varieties to be multiplied and available to farmers through sustainable seed systems (Rubyogo *et al,* 2010). This expertise is now being capitalized on for the next generation of plant breeders through education on demand-led breeding being provided through African universities and regional research for development (R4D) partner organizations.

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CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

Pan Africa Beans Research Alliance (PABRA)

Background

Common beans *(Phaseolus vulgaris)* provide dietary protein for over 200 million people in Africa, especially women and children living in rural areas and poorer urban communities. The average annual bean consumption of 50–60 kg per person in parts of East Africa is the highest in the world. Increased productivity of preferred types of beans means that they are both a nutritious food and a growing source of income for smallholders, especially women.

Pan Africa Bean Research Alliance (PABRA) is a consortium of 30 bean-producing countries in Africa involving more than 350 partner public and private organisations, that is co-ordinated by the International Centre for Tropical Agriculture (CIAT). In the mid 1980s, PABRA pioneered using participatory plant breeding and variety selection which evolved into their current market-led approaches to bean breeding. PABRA's breeding and seed delivery strategies have developed and released over 200 improved bean varieties that have reached millions of beneficiaries. It is estimated that during 2003–2008, 7.5 million households used seed of improved bean varieties, and PABRA have impacted about 35 million people with bean-based technologies. An additional 15.8 million farming households accessed quality seed of improved varieties of their choice during 2009–2014. These new bean varieties are transforming beans from a subsistence food to a more market-orientated crop by providing consumer preferences for taste and shorter cooking time, as well as demand for specific bean types suitable for sale as fresh vegetables, or for processing or export markets. The bean varieties released between 2003 and 2015 include beans with resistance to multiple biotic and abiotic constraints, high iron and zinc content, and traits needed for specific niche markets.

Figure 1

Pan Africa Bean Research Alliance partnership model
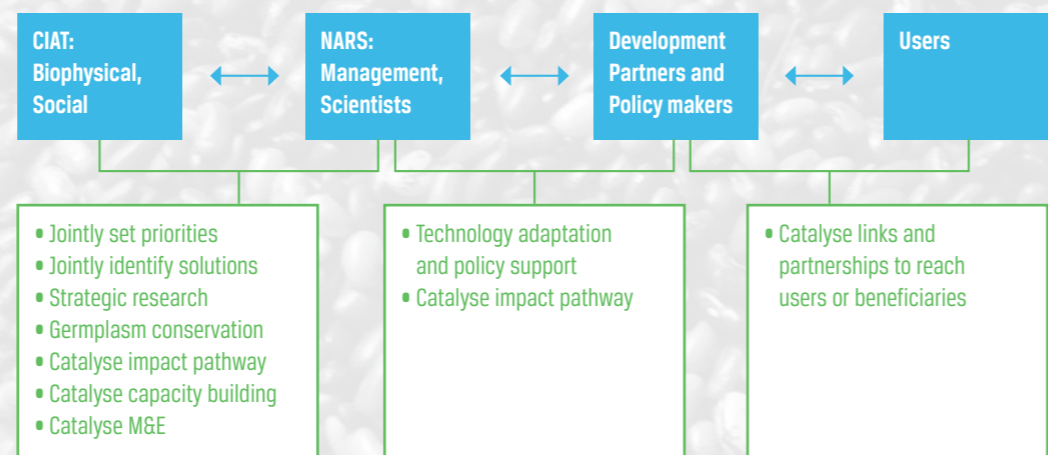
Three principal and interconnected axes of the PABRA partnership model: a) partnerships between and among CIAT and National Agricultural Research Systems (NARS); b) partnerships with actors all along the varied bean product value chains, and c) partnerships with technology end-users.

PABRA breeding approach

PABRA uses a highly collaborative approach to research whereby every participating partner benefits from work carried out by other network members.

Through joint priority setting and planning, and agreed division of responsibilities, PABRA creates improved bean technologies that serve African farmers and their value chains on a much larger scale *(Figure 1)*. The market requirements and agroecological zones for each country have been defined so that the potential utility of each variety across the PABRA network is understood. This means that, for example, a new bean variety developed in one country is shared with countries where it may be suitable which do not have the capacity to undertake an active breeding program *(Figure 2)*. The Country National Breeding programs (NARS) shown in rectangles focus on the market classes of beans in circles. This integrated approach is operated across three regional networks: Eastern and Central Africa Bean Research Network (ECABREN), Southern Africa Bean Research Network (SABRN) and the West and Central Africa Bean Research Network (WECABREN).

Demand-led breeding and capacity building

The PABRA/CIAT team is recognised as being amongst the most advanced practitioners of targeted market-led breeding in the public sector in Africa. Due to their expertise they were invited to join a Pan Africa group of plant breeders and educators in demand-led breeding to create a state-of-the-art education module for African scholars and professionals in plant breeding and crop improvement.
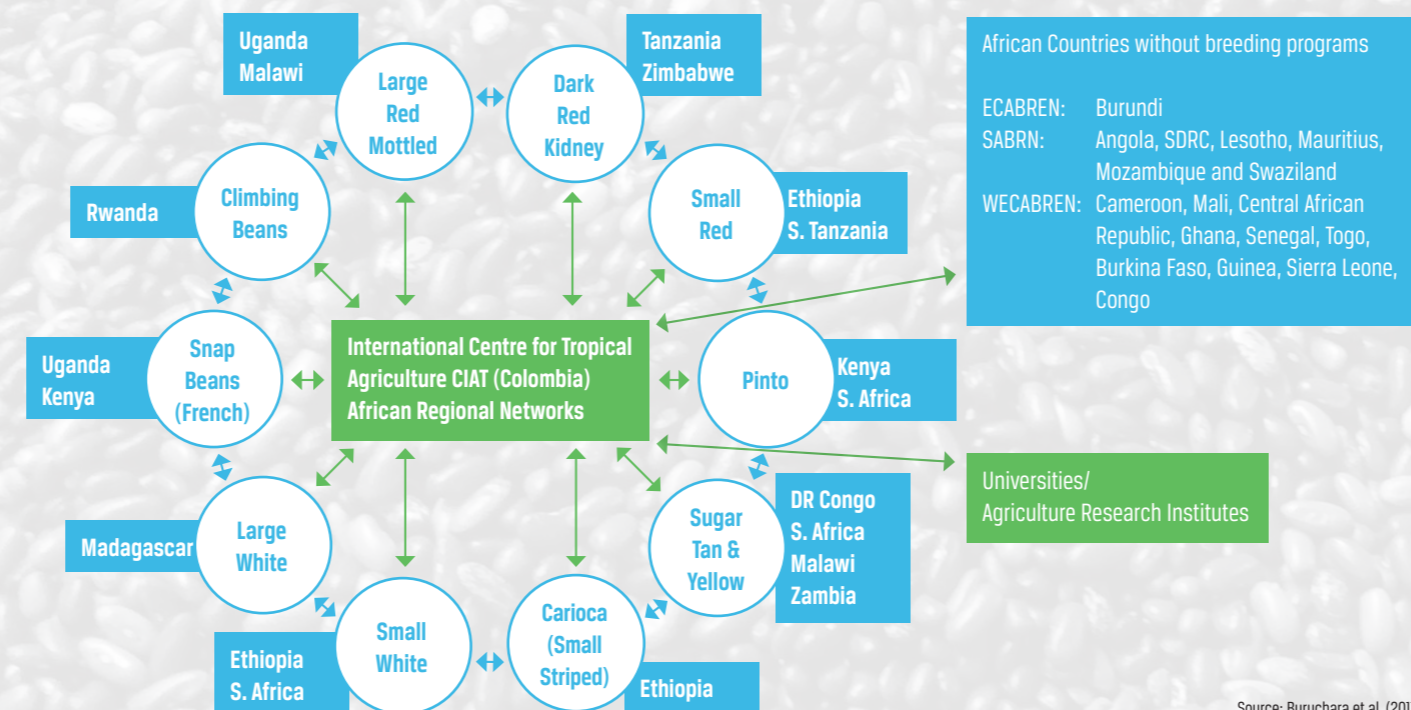
The PABRA team specifically contributed to the preparation of *de novo* teaching materials on the following themes: (1) Principles of demand-led plant breeding (Kimani, 2017); (2) New variety development strategy, stage planning and decision-making (Chirwa, 2017); (3) Project evaluation, monitoring and learning (Rubyogo *et al*, 2017); and (4) Business cases and investment decision-making (Chirwa, 2017). The training module was evaluated at a beta testing stage by an expert group of PABRA bean breeders from NARS, CIAT and universities in East, Central, South and West Africa. Their recommended revisions were included in the final version that is now being taught across Africa in postgraduate training programs.

PABRA have not just contributed to the content of the demand-led breeding education module and included specific learning examples on bean breeding, but they have also coached their own bean community in the best practices and provided continuing professional development for most of the bean breeders in the PABRA regional networks. They have taken the PABRA bean breeders to the next level of expertise using their own experience and that from international partners and private sector breeding programs. PABRA are now sharing this expertise with other crop networks in Africa as educators in demand-led breeding.

Figure 2

PABRA bean breeding strategy

Source: Buruchara et al. (2011)