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### Bean Seed Delivery for Small Farmers in Sub-Saharan Africa: The Power of Partnerships

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## Articles

# **Bean Seed Delivery for Small Farmers in Sub-Saharan Africa: The Power of Partnerships**

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*New bean varieties translate into increased on-farm yields only if farmers obtain access to desired seed. Conventional models of legume seed delivery in Africa, centralized with the National Agricultural Research Systems (NARS), prove to be slow and of limited reach. This article describes a novel strategy for seed outreach, the Wider Impact Program, initiated within the 18 countries of the Pan-Africa Bean Research Alliance. Select technical results (on bean seed quality, farmer-to-farmer diffusion, and new variety demand) informed the program design. However, it was significant modification in partnerships that served as the catalyst for achieving fast and widespread diffusion of new bean varieties. Redefining the divisions of labor within the seed supply chain, sharpening the role of each partner, and bringing diverse actors together provided the base for the network's enhanced impact. Assessments show 3.8 million households reached with new varieties from 2003 to 2005 in the six countries most closely monitored.*

**Keywords** beans, seed, strategic partnerships, sub-Saharan Africa, variety dissemination

Improved bean varieties can make a difference in small farmer agriculture. Adoption studies in several African countries show that improved bean varieties give yield increases of 30% to 50% (Kalyebara and Andima 2006) and that they are an

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economical and nonintrusive means of improving the livelihoods of poor farming households. The common bean (*Phaseolus vulgaris* L.) generally serves as the “poor man’s meat,” and small farmers particularly value its short growth cycle (about 70 days), which delivers food quickly (Sperling et al. 1996).

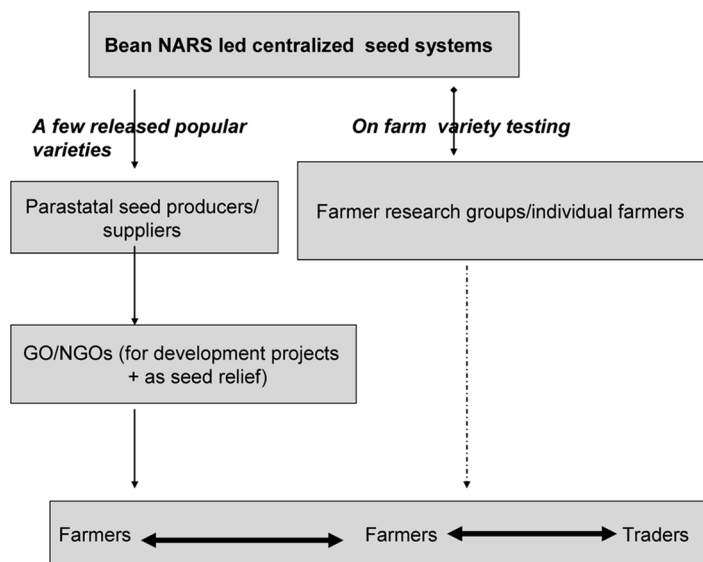
The National Agricultural Research Systems (NARS) of East, Central, and Southern Africa have devoted considerable efforts to breeding and selecting bean germplasm, focusing on key regional biotic and abiotic traits and screening for particular “market classes” (i.e., clusters of bean types sought in regional and export markets). Breeding activity has dominated the portfolios of the East and Central African Bean Research Network (ECABREN) and the Southern African Bean Research Network (SABRN) for the last 15 years, accounting for more than 60% of the research budgets (PABRA 2002).<sup>1</sup>

Bean variety research advances can translate into increased on-farm yields only if new seeds reach farming families. This article describes a novel research and development (R&D) strategy, the Wider Impact Program (WIP), which has been designed to accelerate the production and delivery of seed of new varieties among a broad range of farmers. Starting in 2003, NARS within the bean networks explicitly aimed for their research products to be intensively diffused, with the challenge being to reconceptualize “who does what” along the seed production and delivery chain. It takes more than US\$1 million to develop a successful bean variety (W. Janssen, World Bank, e-mail message, November 28, 2006), and not rendering it accessible, that is, leaving a variety on research shelves, represents a significant waste of public resources. Ultimately, the new strategy presented here helped NARS and partners reach 3.8 million households (19 million people) in a 3-year period, in the six countries most closely monitored to date.

### **The Conventional Model for Reaching Small Farmers with New Bean Varieties**

The predominant model for diffusing beans in most African countries is straightforward: NARS stand at the apex of a set of linear and vertical relationships. NARS work to develop successful beans and, after variety release, produce an initial supply of breeder and foundation seed. Government seed parastatals and sometimes a few commercial seed companies then take over subsequent production of certified seed to sell directly to select customers: mainly governmental and nongovernmental organizations (GOs/NGOs), which distribute the new materials through developmental and occasionally relief programs. Once the new varieties reach farmers, generally through subsidized or “free” programs, they are then diffused among communities: through gift, exchange, or sale at local markets (Figure 1).

This formal bean seed sector approach in Africa has faced a series of constraints that affect the volume, geographic scope, and social reach of its distribution. The private seed industry has not found the bean seed business lucrative, as once farmers get new germplasm they tend to re-sow from their own harvests for many seasons, instead of purchasing seed anew from certified sources (David and Sperling 1999). Cost-benefit analyses indicate that certified (formal sector) bean seed is two to four times the cost of seed found in local markets (Sperling 1992) and that farmers do not see these increased costs translating into comparable yield increases on the farm. Incentives to buy certified seed are few, unless the producer is aiming for a market



**Figure 1.** The organization of conventional bean seed production and diffusion in east, central, and southern Africa.

where rigorous product quality has to be guaranteed, such as an export outlet. Formal seed sector response to these constraints has been logical. The sector generally focuses multiplication on a few popular varieties, usually those for medium to higher potential areas and for commercial farmers (Sperling et al. 1996).

The trend in national certified bean seed production across select African countries shows that the supply of formal sector seed generally represents less than <2% of the total bean seed sown (Table 1). Further, the amount has hardly changed over the 4-year period 2002–2006, despite the increase in bean areas sown (reflected in the increased national seed requirements). Rather than from the formal sector, farmers seek the bulk of their bean seed from local seed channels: farmer saved, farmer-to-farmer exchange, and local markets (David and Sperling 1999; Adam and Tilahun 2001; Phiri et al. 2004.). Despite this emphasis, institutional support to these local seed channels has been limited through time and up to the present (Seboka and Deressa 2000).

The limited quantity of bean seed supplied by the formal sector is matched by a small number of varieties multiplied. While there has been dynamism in bean plant breeding and variety release in several NARS programs, there have been only modest efforts to diffuse varieties after they have been officially identified. Within a recent 8-year period, several NARS in East and Central Africa released a considerable number of varieties, on average 18 (Table 2). In contrast, relatively few of these have been subsequently multiplied by formal government channels and commercial seed companies. Ethiopia is a case in point: The national bean program released 23 varieties between 1996 and 2004 and the Ethiopian Seed Enterprise, the only actor in the formal seed sector, multiplied only three of these.

This accumulating knowledge about the limits of the conventional seed supply model spurred the quest for alternate seed chain concept and practices. Research showed formal models to be expensive, restricted in the number of varieties and

**Table 1.** The national trend of certified bean seed supply in select east, central, and southern African countries

	Ethiopia	Rwanda	Kenya	Malawi
Year 2002				
National seed requirement (tons) <sup>a</sup>	9838.0	10,909.0	70,000.0	6250.0
Certified seed supplied (tons) <sup>b</sup>	177.1	120.0	350.0	25.0
National seed requirement met (%) <sup>c</sup>	1.8	1.1	0.5	0.4
Year 2006				
National seed requirement (tons) <sup>a</sup>	19,374.0	17,500.0	71,250.0	6000.0
Certified seed supplied (tons) <sup>b</sup>	523.1	175.0	570.0	15.0
National seed requirement met (%) <sup>c</sup>	2.7	1.0	0.8	0.25
Increase in certified seed supplied: 2002 to 2006 (%)	0.9	-0.1	0.3	-0.15

<sup>a</sup>Calculations based on national area under bean crop (FAO 2005) and farmers' average seed rate of 70 kg/ha.

<sup>b</sup>Amount of certified bean seed supply from respective national seed services in the respective years: Ethiopia, ESE (2002, 2006); Rwanda, RSNS (2002, 2006); Kenya, KEPHIS (2002, 2006); Malawi, DARTS (2002, 2006).

<sup>c</sup>This reflects the ratio of the amount of certified seed supplied vs. the total national seed requirement.

quantity of seed multiplied, and ineffective in reaching small farmers. The prime research and development (R&D) challenge lay in devising a vision, a strategy for moving forward, and in implementing programs that offered solutions—and real impacts. The WIP was born to address R&D problems of failed impact.

### Background Research Informing New Strategy Design

While the WIP was initiated in 2003, prior research results proved critical for shaping directions forward. We briefly summarize findings on three themes that influenced strategy directions. These include: (a) the effects of farmer-to-farmer diffusion, the common means of delivery; (b) the quality of bean seed produced from different sources; and (c) new variety demand and marketing prospects.

**Table 2.** Variety release versus formal sector variety multiplication: Select countries in east, central, and southern Africa

Country	Number of varieties released, 1996–2004	Number of varieties multiplied by formal-sector seed channels
Ethiopia	23	3
Rwanda	20	5
Uganda	11	2
Democratic Republic of Congo (DRC)	18	4

*Note.* Source: Muthoni et al. (2007).

### **Research on Bean Seed Farmer-to-Farmer Diffusion**

Beans are a self-pollinating crop and have a low rate of out-crossing (generally <5%). This means that farmers can multiply the crop easily and control the variety type well. Given such management assets, it has also often been assumed that “a good bean variety will move by itself,” but focused research suggests otherwise.

Starting in the 1990s, studies in East and Central Africa showed that farmers’ initial diffusion of new bean varieties is generally delayed two to three seasons as farmers continue to verify the varieties. Further, farmers who serve as “key diffusers” are a small minority, for example, including only 15% in Uganda and 6% in Rwanda (David and Sperling 1999). Third, the loss of new varieties occurs commonly in stress areas, and among the poor, particularly in the early diffusion stages (Sperling and Loevinsohn 1993; Mafuru et al. 1995). Fourth, farmer-to-farmer seed diffusion, left alone, tends to be localized, partly due to inadequate information flows. Finally, seed exchange and gift-giving among farmers have been declining, as commercial transactions rise in importance. Less than 10% of farmers reported having recently received seed gifts, in surveys conducted in Burundi, Congo, Rwanda, and Uganda in the mid 1990s (David and Sperling 1999). In brief, research in four countries showed farmer-to-farmer diffusion to be neither as efficient nor as equitable as common lore would suggest.

More recent research has confirmed these trends. Impact studies in Congo, Ethiopia, Kenya, Malawi, Tanzania, Rwanda, and Uganda indicate that adoption of new varieties has been high where there have been explicit dissemination efforts by NARS, NGOs, or organized farmer groups but low where such concerted efforts have been lacking (Rubyogo et al. 2007; Kalyebara and Andima 2006).

There are exceptional cases of bean diffusion on a broad scale, without explicit intervention; for instance, K-20 is widely popular in Kenya and Uganda. Released in 1968, it took 25 years to achieve remarkable levels of adoption (Grisley 1994). Similarly, Mexican 142, released in 1972, is still the standard bean variety in Ethiopia (Teshale et al. 2006). While farmer-to-farmer diffusion can result in significant adoption, the process is slow and may have circumscribed reach.

### **Research on Bean Seed Quality**

Research on bean seed quality also shaped the strategy for bean seed product delivery. Certified seed is very costly (200–400% that of local seed), so research focused on the risks of using other seed quality types in variety promotion. Study of farmers’ own seed selection practices in Rwanda and Congo revealed that farmers are very careful about the seed source and types of varieties used (Trutmann et al. 1996). Research in Ethiopia showed that farmers themselves take specific phyto-sanitary measures to enhance bean seed quality through sorting out poor-quality materials, including visibly diseased grains (Rubyogo et al. 2009).

Researchers also compared the quality of seed from various production sources: from the formal sector, trained and untrained farmer seed production groups, and local traders. In western Kenya, laboratory analysis showed farmer-produced bean seed to be comparable to formal sector-produced seed in terms of purity, germination, and overall seed health (in fact, the formal-sector seed suffered from a higher rate of storage pathogens) (Otsyula et al. 2004). Similar analyses in Rwanda (of the bean variety *Umubano*) reported no difference in emergence, vigor, and yield

between the farmer and formal-sector samples, and the seed infection levels were too low to make meaningful comparisons (CIAT 1991). These results suggest that the health of farmer seed may be better than usually assumed and that farmers use active measures to maintain its quality (Buruchara and David 1994).

### ***Research on New Bean Variety Demand and Marketing Prospects***

The issue of bean seed demand, or variety demand, also needed clarification. Were farmers interested in accessing new research-derived varieties? Action research focused on putting small quantities of bean seed on offer, for purchase. New bean varieties were sealed in packages ranging from 50 g to a few kilos, with farmers, in effect, given the opportunity of purchasing “germplasm samples.”

This action research conducted in Rwanda, Congo, Uganda, and Tanzania confirmed that farmers will eagerly buy seed of new bean varieties, if certain marketing principles are observed (PAK 1992; Sperling et al. 1996; David et al. 1997). Seed should be packaged in small quantities, be put in heat-sealed plastic packets (to guarantee a product), and be retailed with informational leaflets (e.g., with variety names, and description of growth cycle, tolerances to diseases and moisture stress, and cooking time) to help farmers make informed choices. Via this process, farmers purchased new beans varieties at a 75% to 300% price premium over their standard local seed (David and Sperling 1999).

In summary, while the formal-sector methods of diffusion were insufficient, so too was relying on farmer-to-farmer diffusion alone. On a positive note, research showed that bean seed quality produced by various methods on farm is less of a constraint than commonly assumed and that farmers have interest in accessing new varieties, even for a price. With these technical challenges “in order” for seed and variety quality, the research shifted to examining organizational factors of seed delivery and diffusion.

## **Moving Toward Wider Impact: Process Changes**

### ***The Launch of the WIP***

Throughout the 1990s, field study identified a number of actors already involved in seed-related activities across African regions. These included those in the entire local seed system, from which farmers source over 90% of their seed (Sperling et al. 1996; David and Sperling 1999), as well as a hefty group of NGOs, community-based organizations (CBOs), and farmers organizations (FOs) that were involved in seed production for varying periods. In 2003, the Pan-Africa Bean Research Alliance (PABRA) initiated an explicit strategy called the Wider Impact Program (WIP), which aimed to catalyze and coordinate efforts among these multiple seed chain actors. The new strategy moved away from the standard approach, which puts the onus of production and delivery on centralized NARS, government extension systems, and formal seed suppliers, and toward a collaboration that builds on varied organizational strengths and that generally decentralizes the cores of action.

Seed systems operations involve different activities, ranging from the initial identification of farmers’ variety preferences, to seed production and post-harvest management, to marketing/supply of preferred varieties, to information exchange

about varieties, to building the skills of partners all along the production and delivery sequence. These operations cannot be carried out by a single organization. To leverage on partners' complementary skills, the program went through processes of (a) analyzing each type of partner's strengths and weaknesses, and then (b) sharpening their respective roles toward an integrated set of production and delivery activities.

### ***Analyzing Potential Partner Strengths and Weaknesses***

Starting in 2003, in each network country, organizations and individuals representing potential partners were invited to launch meetings generally facilitated by PABRA staff. Meetings explored possibilities for a common vision as to how and what to achieve in regard to improving bean production and supply systems. Partners critically reflected on the seed supply chain in their respective countries, on the actors, and on their own weaknesses, strengths, and comparative advantages. NGOs, CBOs, FOs, and church groups signaled that they often have close contacts with farmers, and in widely dispersed zones; they bring with them a legacy of trust as well as experience in local-level organization and facilitation. International NGOs reported their wide geographical spread of action, including in marginal, resource-poor areas. Researchers felt they had the skill sets to train in subject matter of improved bean pre- and post-harvest management, disease identification and control, and agro-enterprise development. Traders had the edge on local, regional, and international market intelligence. Table 3 (first two columns) reports the assessments emerging across countries.

### ***Sharpening the Roles of Each Actor within an Integrated and Broader Seed Chain***

As partners worked together, the definition of their select responsibilities became clearer, as well as more complementary. For instance, the production of breeder and foundation seed became the near sole responsibility of NARS. Seed parastatals and seed companies, in turn, took the lead in supplying commercial seeds of the widely adapted popular varieties. Decentralized production in actual target zones became the chief activity of locally based producers, often supported by organizations such as public extension, NGOs, or FOs. The regional research networks took on the technical backstopping and much of the training and skill building in areas where the national partners had less experience. Empowering and training partner organizations' staff were the cornerstones of widening PABRA's reach. Table 3 (third column) describes the new responsibilities associated with the WIP. This collaborative arrangement has succeeded not only because multiple organizations see advantage in working together, but also because it makes smart use of the skills and financial resources of each particular partner.

### ***Platform Development***

These initiatives have also paved the way to the formation of platforms that encourage partners to share responsibility and information on the bean commodity subsector, as well as on other innovations. For instance, in Madagascar, members of these platforms meet at the beginning and end of each season to plan and evaluate progress. They assess the partnership cohesion, discuss relative motivation of partners,



**Table 3.** PABRA partners' analysis of their seed-related capacities prior to the WIP and their agreed-upon responsibilities within the program

Partner type	Partner self-analysis of their:		
	Strengths	Weaknesses	New responsibilities within WIP
NARS	<ul style="list-style-type: none"> <li>• Variety development capacity</li> <li>• Technical information on varieties and agronomic practices</li> <li>• Strong skills in biophysical sciences</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate linkage to other bean supply chain actors</li> <li>• Lack of capacity in demand creation for improved varieties</li> <li>• Lack of capacity for seed multiplication at large scale</li> <li>• Limited financial resources</li> </ul>	<ul style="list-style-type: none"> <li>✓ Development of varieties</li> <li>✓ Production of breeder/foundation seed</li> <li>✓ Provision of information on new varieties</li> <li>✓ Support for seed production skill enhancement</li> <li>✓ Lead in monitoring &amp; evaluation (M&amp;E) and impact studies</li> <li>✓ Coordination of Wider Impact activities</li> </ul>
NGOs, FO, CBOs, public extension + development programs	<ul style="list-style-type: none"> <li>• Wide social and geographic coverage</li> <li>• Skills in demand creation and dissemination of technologies</li> <li>• Complementary projects, e.g., nutrition, agro-enterprise, poverty alleviation</li> <li>• Relatively better off financial resources</li> <li>• Skills in resource mobilization (financial and human/social)</li> </ul>	<ul style="list-style-type: none"> <li>• Inaccessibility to seed of new varieties</li> <li>• Lack of information about improved bean varieties and other products</li> <li>• Inadequate skills in pre- and post-harvest management</li> <li>• Inadequate and nonsystematic linkages to NARS</li> <li>• Distrust of seed regulatory services</li> </ul>	<ul style="list-style-type: none"> <li>✓ Decentralized testing of varieties</li> <li>✓ Support for decentralized seed production</li> <li>✓ Mobilization of communities</li> <li>✓ Local skill building (e.g., in enhancing seed quality)</li> <li>✓ Development of variety promotional materials</li> <li>✓ Development and translation of training manuals in local languages.</li> <li>✓ Additional resource mobilization (human, financial)</li> </ul>

### Commercial seed producers

- Presumed financial and organizational sustainability
- Good linkages with NGOs/GOs operations dealing with relief seeds

- Poor linkage with NARS and grain traders
- Inaccessibility to initial stocks of improved varieties
- Little commercial interest in beans beyond relief seed operations

- ✓ Marketing of certified seed of popular varieties
- ✓ Provision of business opportunities for contracted seed out-growers
- ✓ Collaboration in participatory variety screening (PVS) of pre-release and released varieties
- ✓ Support for demonstration/popularizations of new varieties and other improved agronomic practices
- ✓ Support for the skills enhancement of locally based agro-input dealers

### Grain traders

- Linkage with market (industry) and farmers
- Provision of bean grain outlets and intermediary link between farmers, consumers + large grain dealers
- Provision of information about the market needs
- Contract farmers for specific grain market
- Supply of locally accepted quality 'seeds'
- Major actor in identification of market preferred genotypes

- No/little role in the selection of preferred genotypes
- No information about new varieties
- No linkages with NARS and extension services in the promotion of new varieties
- No official recognition as 'seed suppliers'
- No systematic organization to articulate their demands and to facilitate contact

- ✓ Collaboration in the identification of preferred genotypes especially the marketable bean varieties
- ✓ Linking local seed producers with wider bean seed markets, and moving varieties beyond local zones
- ✓ Support for skills enhancement of seed producers and grain producers
- ✓ Catalyzing business opportunities for farmers

**Table 3.** Continued

Partner type	Partner self-analysis of their:		
	Strengths	Weaknesses	New responsibilities within WIP
Farmers (individual/+ groups)	<ul style="list-style-type: none"> <li>• Critical mass and numerous self help groups</li> <li>• High interest in new bean varieties (seeds/ grains)</li> </ul>	<ul style="list-style-type: none"> <li>• Poor linkage to seeds of improved varieties and grain market</li> </ul>	<ul style="list-style-type: none"> <li>✓ Testing and identification of the preferred genotypes</li> <li>✓ Producing seed locally</li> <li>✓ Diffusing/marketing of preferred genotypes</li> </ul>
CIAT + bean networks (ECABREN + SABRN)	<ul style="list-style-type: none"> <li>• Promising prebreeding and breeding germplasm</li> <li>• Partners' skills and knowledge enhancement (multidisciplinary approach)</li> <li>• Neutral and facilitating roles</li> </ul>	<ul style="list-style-type: none"> <li>• NARS focused support</li> <li>• Limited links with actors in bean industry (both grain and seeds)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Provision of potential promising germplasm to NARS</li> <li>✓ Support for skills enhancement in seed system strengthening/business skills to partners</li> <li>✓ Support and backstopping in M&amp;E and impact studies</li> <li>✓ Support in the development of resource manuals</li> <li>✓ Support for the sharing and documentation of lessons learned</li> </ul>

clarify expectations among partners present, and identify any additional partners or skills that may be required. As the platforms have evolved, they have sometimes transformed from NARS-led platforms to partner-managed ones, such as with the NGO-led platform in Ethiopia or the grain exporters' associations taking the lead in Malawi and Madagascar. Partly as a result of these shifts, nontraditional partners have also joined the platforms, for example, health-related organizations dealing with improved nutrition for vulnerable groups.

### ***Critical Factors Leading to Partnership Success***

Joint reflection among seed chain actors, within countries and across regions, has identified factors critical for the success of the WIP partnership. Central to the partnership has been technical evidence that the new varieties are high-performing and, in some cases, can open lucrative markets. All varieties on offer have been extensively tested with end users, for agro-ecologic adaptation, for consumer preference, and for market potential.

In terms of the factors for successful partnership processes, the initial drive of the NARS has been the pivotal issue. This has meant their willingness to engage partners, release varieties, avail themselves of foundation seeds and related information, and respond to specific variety demands (especially from the private sector). For ongoing success, the NARS have had to respond to evolving felt needs of partners, and to work keep the partnerships dynamic. These are not necessarily activities or approaches within the standard NARS repertoire. Within the WIP, NARS roles have basically expanded, from serving as technical experts, to working also as facilitators among diverse groups along the seed chain. Keeping up-to-date on field developments has been a WIP prerequisite.

In terms of other prime factors, the commitment of Ministries of Agriculture and other senior policymakers to principles of shared and decentralized responsibility, focused toward the single goal of impact, has also been essential. Third, readiness from all to want to bridge gaps and share skills, for instance, between researchers and industry, has been important. Finally, having large numbers of potential decentralized partners on the ground, ready to take up site-specific work, has meant that some locations have been poised to engage in WIP approaches (and others less so).

The WIP has not taken off in all PABRA network countries, especially those lacking some of the critical success features previously described. Additional constraints have also arisen: Mozambique is recovering from the lengthy war and has scanty personnel working on beans. Staff instability, high turnover in NARS, and shifting agendas in partner organizations have further limited progress in some countries.

Partnership complementary is at the core of the WIP, but that complementarity does not mean complete concordance across all agendas. Researchers have been aiming primarily for increased bean production; the NGOs are often engaged in the seed activity within a broader livelihoods program; and nonseed and nonagricultural partners, such as the nutritional clinics and HIV/AIDS programs, have usually joined to popularize varieties mainly with health concerns in mind. This means that partners in a united seed system collaboration may have different target groups for priority impact, diverse timeframes for action, and different criteria for measuring their success. These differences do not necessarily hinder integrated efforts, but they need to be known, respected, and tailored to, when necessary.

As partners have become more engaged with the WIP partnership, a good number have come to support financially their seed-related activities. Some have initiated parallel projects of their own or supported NARS to produce basic seeds and train their respective staff (e.g., Self Help Development International in Ethiopia, CARITAS Mbeya in Southern Highlands of Tanzania, Harvest Help in Zambia). Others have supported the production of resource manuals in languages appropriate to their own extension staff and farming populations.<sup>2</sup>

### Moving toward Wider Impact: Results

Within a modest couple of years, the WIP has had important achievements that serve as milestones in its quest to reach millions of farmers. These have included scaling up of partnerships and of seed production and dissemination, as well changes in the basic conceptual model guiding outreach programs.

#### *Multiplying Partnerships within and across Countries*

The program has catalyzed a significant number of complementary partnerships. Many of these have been solidified via formal Memoranda of Understanding (MoU), which stipulate time-bound objectives, describe resources on offer to carry out work, and outline processes for joint decision-making. By the end of 2006, the program had stimulated some 436 partnerships (Muthoni et al. 2007). Table 4 illustrates the type of partnerships developed in several countries in PABRA.

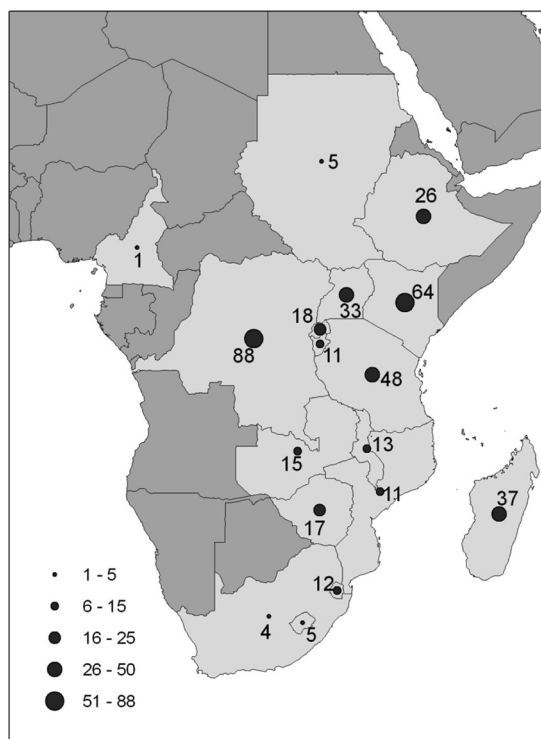
The case of Ethiopia merits specific mention. As of 2006, the Ethiopian Institute of Agricultural Research (EIAR) has partnered with 26 organizations directly and 130 indirectly. This conglomeration has allowed the joint group to produce seed to cover 60% (9,446 tones) of the national seed requirement and to supply 14 varieties (EIAR 2006). These results are up from 0.8% supply of national requirements, limited to three varieties (see Tables 1 and 2), and have been achieved in 3 years.

Partnerships have also expanded in most countries in which the bean networks operate, with the approach accelerating because of the preexisting research alliance.

**Table 4.** A typology of direct seed partners and status of partnership in several PABRA countries in 2006

Country	Government organizations	International NGOs	Local NGOs/ CBOs/FOs + processing companies	Seed companies	Total
Uganda	9	1	23	3	36
Southern Tanzania	11	2	8	0	21
Zimbabwe	3	3	5	6	17
Zambia	7	3	3	2	15
Ethiopia	13	2	10	1	26
Malawi	3	8	1	1	13

*Note.* Source: Muthoni et al. (2007).



**Figure 2.** Distribution and number of PABRA partners involved in seed multiplication and seed delivery as of 2006.

In Ethiopia, Rwanda, Malawi, Tanzania, Burundi, Madagascar, and Democratic Republic of Congo, the partnership has evolved beyond the original membership to include local and export bean traders. Farmers in several of these countries are increasingly organizing to produce key varieties for specific markets (sometimes facilitated by NGOs, CBOs, FOs, GOs, or traders), and in an interesting feedback loop NARS are becoming more efficient at releasing market-demanded new bean varieties and in making initial stocks available. For example, the Agricultural Research Institute Uyole in Southern Tanzania now takes only 2 years to test and release preferred bean varieties sent from other PABRA countries, versus the 7 years previously required.

Having noted progress, including in some logistically challenging regions, the PABRA network is now carefully monitoring and learning from shifts in partners' activities. For instance, in some cases, progress has been quickly made due to links with emergency aid organizations. As these relief agencies "come and go," their effectiveness as partners may be concentrated to short time periods. Figure 2 maps the number of existing partnerships within each PABRA network country.

### *Scaling Up Seed Dissemination and Reaching Farming Households*

As a result of partnership development, the networks have also been able to scale up seed production and dissemination. To date, rigorous assessments have been carried

out in six countries, chosen for the diverse seed system channels used for seed dissemination, such as farm-based and through parastatals and seed companies (Muthoni et al. 2007). Between August and December 2007, monitoring and evaluation (M&E) information was collected via desk-based research, consulting and cleaning partners' own substantial records, and cross-checking data through field studies. Questionnaires were administered to focus groups and individuals, covering multiple partners in each country: the national bean programs, NGOs, seed companies, bean traders, farmer organizations, and commercial farmers (see Table 5 notes).

The global tallies indicate that over 3.8 million households (about 19 million people) have accessed seed of new bean varieties during a 3-year period within the six PABRA member countries most closely monitored (Table 5). This figure is considerably more optimistic than the original network goal of reaching 2 million households in 5 years (2003–2008) in all 18 countries (PABRA 2002).

Note that these data are conservative. The amount of seed exchanged among farmers and sold in local markets was not reported and these secondary diffusions likely constitute a significant share of the seed produced.

NARS have previously released bean varieties without putting in place tracking mechanisms that indicate their degree of uptake. PABRA's M&E systems now allow for continuing quantitative data collection to assess speed and extent of outreach. The information also helps network partners evaluate their relative effectiveness within the overall network seed supply chains. The 2003–2005 results will serve as benchmarks for future network assessments.

### ***Implementing New Modes of Production and Diffusion***

The diverse partnerships actively fostered under the WIP are pointing the way to a model of outreach that is different from the standard formal sector model and different from the default "let the varieties diffuse themselves model." By focusing on key roles, and multiplying the number of partners engaged in decentralized production and delivery, the Wider Impact model aims to get varieties out sooner, faster, over a broader area, and among more client groups—all leading to significantly higher overall rates of use. Figure 3 graphs the paths conceptually. In the 17 years prior to WIP, the bean networks reached 35 million farmers (Kalyebara and Andima 2006). This contrasts with faster and potentially much broader WIP results.

### **Conclusion**

The WIP was designed to generate knowledge and test good practice on how to scale up the production and diffusion of bean seed and information. However, its strategic focus for achieving results was not on seed per se. To achieve its significant results, the program focused on forming highly complementary partnerships among actors not normally well linked within a seed supply and delivery chain.

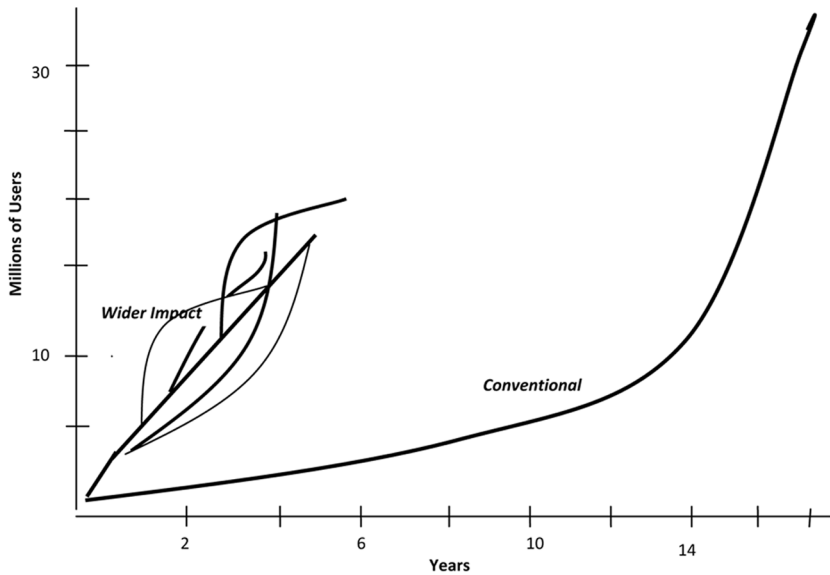
In terms of seed-related outreach per se, the WIP partnerships have resulted in a series of positive changes. These include: the scaling up of foundation and certified seed production; a rise in the number of varieties being diffused; a significant increase in the number partners multiplying and diffusing seed; a decentralization of production and distribution activity to many more zones, to marginal and even to hard-to-reach zones; a greater client awareness of the new products on offer; and widespread community mobilization to take over some of the seed supply work

**Table 5. PABRA seed dissemination (tons) and number of households (HH) reached between 2003 and 2005 in six member countries**

Country	Seed distributed 2003 (tons) <sup>a</sup>	Number of HH receiving seed 2003	Seed distributed 2004 (tons)	Number of HH receiving seed 2004	Seed distributed 2005 (tons)	Number of HH receiving seed 2005	Seed distributed 2003–2005 (tons)	Number of HH receiving seed 2003–2005
Ethiopia	12	2400	3400	680,000	1610	322,000	5022	1,004,400
Malawi	205	102,500	245	122,500	294	147,000	744	372,000
Southern Tanzania	63	31,500	152	76,000	140	70,000	355	177,500
Uganda	3601	900,250	1904	476,000	1370	342,500	6875	1,718,750
Zambia	32	16,000	56	28,000	586	293,000	674	337,000
Zimbabwe	17	3400	12	2400	1053	210,600	1082	216,400
Total seed distributed	3930		5769		5053		26,379	
Households reached		1,056,050		1,384,900		1,385,100	14,752	3,826,050

<sup>a</sup>The amount of seed supplied or bought by farmers was obtained from partner records. In cases where partners did not maintain detailed records, data were sought directly from recipients. The amount of seed provided to farmers varied by seed supplier (NARS, NGO, or commercial supplier), by country, and from year to year. In Uganda, each farmer supported by the NARS received a loan seeds of 7.1 kg in 2003 and 4.9 kg in 2004. However, farmers who purchased seed from commercial suppliers bought amounts ranging from 0.5 to 2 kg. In Zimbabwe, farmers purchased 40 kg on average from seed companies. In Zambia, households received loan seeds of 6 kg from the NARS while NGOs supplied 7.1 kg per household as loans to be repaid in double after harvesting. In Southern Tanzania, farmers received 2 kg of loan seeds from the NARS and extension agencies, but in areas where the NGOs operated, farmers received seed loans ranging from 2 to 5 kg. In Ethiopia, commercial farmers mainly from the Central Rift Valley received seed loans of 178 kg, from the NARS and private companies. Seeds were supplied on a loan basis with a cash down-payment of 25%. However, in other parts of Ethiopia, households generally received 25 kg. This was due to smaller landholdings and to lower levels of bean commercialization. PABRA's bean seed follow-up aimed for precision.





**Figure 3.** Outreach patterns of WIP versus conventional seed production and delivery models.

themselves. These results are in addition to the 3.8 million households (19 million people) already reached with new bean varieties in the six countries most closely monitored.

Despite considerable achievements, PABRA and its partner networks aim to scale out further. To do this, the network is pursuing a comprehensive research program to understand better the multiple reasons for its first successes. The costs of varied seed production modes are now being compared, as well as the cost-benefits of using different delivery channels (for example, who is reached, how fast, how far, and with what types of information). Further, scientists are selectively monitoring seed health all along the production and delivery chain, to determine how the costs of production are related to the seed quality achieved and how seed quality translates to risk experienced at the farm level.

Partnership formation and maintenance is also being examined more closely. One of the key network challenges for the next few years will be to understand how to maintain viability of partners. What incentives are needed to maintain seed supply and delivery, particularly in some of the more stressed farming systems? What elements can guide key partnerships into profitable seed-related enterprises?

The goal in the network-facilitated WIP goes well beyond seed production and delivery. PABRA networks want to identify and implement sustainable, profitable, and equitable ways to help small farmer households gain access to seed of new and desired bean varieties. This includes households that may be ecologically, socially, or economically in marginal situations. In only a few years, the networks have scaled up their scope of outreach dramatically. The next steps need to focus on targeting outreach strategies to specific end-user groups (reaching the poorest as well as the more commercially inclined) and to focus on the pivotal factors that foster the sustainability of seed partnership conglomerations themselves.

## Notes

1. At the time of writing, there were two regional bean networks in Africa. ECABREN includes member countries of Burundi, Cameroon, Democratic Republic of Congo (DRC—the eastern and western parts), Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania (the northern part) and Uganda. SABRN includes member countries of Angola, DRC (the southern part), Lesotho, Malawi, Mauritius, Mozambique, South Africa, Swaziland, Tanzania (the center and south), Zambia, and Zimbabwe. A third network was recently initiated. WECABREN includes member countries of Central African Republic, Cameroon, Togo, Congo Brazzaville, Burkina Faso, Guinea-Conakry, Senegal, Sierra Leone, Mali, Ghana, and Ivory Coast. Networks are linked under the umbrella of the Pan-African Bean Research Alliance (PABRA), which is facilitated by the International Center for Tropical Agriculture (CIAT).
2. For instance, resource manuals were translated into Amharic, Chichewa, Swahili, Luganda, Lukiga, Kirundi, Luo, among others.

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