



Innovative haricot beans (*Phaseolus vulgaris*) seed system for smallholder farmers in Dale District, Southern Ethiopia: Experiences from IPMS

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This paper documents interventions, results and lessons learned for haricot beans commodity development in Dale Woreda, based on a participatory market oriented value chain approach. The approach was introduced by the IPMS project/staff, who not only facilitated the introduction of the approach (technically and financially), but also played an important role as partner in the development process. The credit for the development results obtained goes, however, to all the partners involved in this endeavor especially the seed producing farmers, staff of the Dale OoARD, Weynenata cooperative, Hawassa and Melkasa ARC; and The International Center for Tropical Agriculture (CIAT).

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Abstract

The demand for haricot bean (*Phaseolus vulgaris*), both in domestic and export markets, has been increasing in the past decade. This development can be exploited by smallholders to increase their income through increased market participation. To assist in this development, the Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project introduced a participatory market oriented value chain development approach with the key actors: farmers groups, the Woreda OoARD, farmers' cooperative, Melkassa and Hawassa Agricultural Research Centres (ARC), and the International Centre for Tropical Agriculture (CIAT). Farmers traditionally used red colored varieties (Red Wolayita), mainly for home consumption. Shortage of high quality seed in the required quantities has inhibited many farmers from growing haricot beans. The problem is furthermore aggravated by the fact that farmers in the southern region do not keep or preserve seed stock until the next season due to the vulnerability of haricot bean seed to storage pests.

The project partners introduced/tested various interventions including variety testing, seed multiplication and market linkages using different approaches and tools. Among the five varieties tested, Nasir, Dimtu and Ibado (logomame) were identified as suitable for a more commercial oriented haricot bean production system. However, DRK and Cranscope were found to be less suitable. In 2008, 51 farmers in 7 PAs, organized in clusters, started producing seeds of improved varieties and produced about 83 qt of seeds. In 2009 the number of farmers and PAs had grown respectively to 103 and 11. However, due to poor rainfall no seeds were harvested in the same year. In 2008, the Weynenata cooperative was selected to purchase seeds from seed producers with credit provided from the IPMS innovative credit fund. About 4.3 tones of semi-certified seed were processed/stored and packed in 6,010 labeled packets. Farmers appreciated the labeling, but preferred larger sized packs.

An obvious challenge is the variability of rainfall, which affected the viability of the commercialization of haricot bean grain and seed production. Attention also needs to be paid to strengthening linkages between partners; and cooperatives in its marketing role. Linkages between the cooperative and private sales outlets should be considered for the sale of packed seeds.

Key words: Farmer to farmer, haricot bean, packaging, seed production, seed treatment, seed storage

1. Introduction

The IPMS project, funded by the Canadian International Development Agency, was established to assist the Ministry of Agriculture and Rural Development in the transformation of smallholder farmers from a predominantly subsistence oriented agriculture to a more market (commercial) oriented agriculture. The project adopted a 'participatory market oriented commodity value chain development' approach which is based on the concepts of innovation systems and value chains. Crucial elements in the approach are the focus on all the value chain components instead of only a production technology focus; the linking and capacitating of value chain partners and the assessment, and synthesis and sharing of knowledge among the partners. The project introduced this approach in 10 Pilot Learning Woredas (PLW) in Ethiopia with the objective of testing/adopting the approach so that it can be promoted nationwide. An integral part of the approach is the identification of marketable commodities and the value chain constraints and interventions. This was accomplished through a participatory process in all PLWs.

This case study is sharing the experience of Dale Woreda in establishing an alternative seed multiplication and marketing system through innovative linkages of farmers-extension, research and cooperative/private traders to increase production of marketable commodity and improve availability of sustainable input supply system.

Following the introductory section, the remaining sections are structured as follows. Section two deals with methods and approaches used in the study, while section three presents background information, including description of the PLW and the history and diagnosis of haricot bean development. In section four, value chain interventions - extension, production, input supply, marketing, and credit issues are presented. Section five dwells on results and discussion on production/income, input supply/marketing, gender/environment/labour use, organizational and institutional aspects, while sections six and seven deal with challenges and lessons learned, respectively.

2. Methods and approaches

To start the development of a commodity, IPMS used a district level participatory market oriented value chain planning approach, aimed at identifying (i) main farming systems, (ii) potential marketable crop and livestock commodities at farming system level, (iii) constraints, potentials and interventions for each value chain component, and (iv) value chain stakeholder assessment with potential (new) roles and linkages. Different value chain stakeholders were involved and consulted in this planning exercise. Secondary biophysical and socio economic data were collected, followed by open ended interviews with focus groups and key stakeholders. The results were presented in a stakeholder workshop in which

priority marketable commodities were decided upon together with key intervention areas and partners.

This initial rapid assessment was followed by some more detailed studies on selected commodities. Such studies were conducted by partner institutions and/or students and/or IPMS staff using formal surveys, interviews and observations.

To implement the program at Woreda, peasant association (PA), and community levels, the project facilitated different knowledge management and capacity development approaches and methods to stimulate the introduction of the value chain interventions by the actors concerned. The various value chain interventions are documented by the project staff in the six monthly progress reports (www.ipms-ethiopia.org) and the annual Monitoring and Evaluation (M&E) reports.

To quantify the results from individual and/or combination of interventions, the project established a baseline and measured/documentated changes. Several data sources were used to establish the baseline and to document changes and results.

2.1. Baseline information

To establish a baseline, data from a formal baseline study and some special diagnostic studies were used. The initial PRA study also contributed to the quantitative and qualitative baseline information. Amongst others, the formal baseline study used PA level interviews and records to collect information on haricot bean coverage and the number of households involved in haricot bean production. This was used to compile district level information on irrigated acreage by crop and households. In addition, studies were conducted by partner institutions and/or students and/or IPMS staff using formal surveys, interviews and observations. Series household surveys were also conducted over the years in the study area on market participation, variety adoption and haricot bean productivity. Field data were also collected, on sale of packaged seeds in small quantities.

The International Center for Tropical Agriculture (CIAT), IPMS, Hawassa ARC, and Melkasa ARC joined to conduct a special study on the bean value chain to understand the production and marketing prospect of beans. Farmers in Dale were consulted individually and in focus groups, while merchants in small stalls and big traders in Hawassa, Boricha and Shashemene town were also interviewed (Asfaw *et al.*, 2005). Furthermore, CIAT conducted a marketing study to identify the potential for haricot bean production and marketing in Southern Ethiopia (Ferris and Kaganzi, 2008).

2.2. Documenting change processes and results

Several sources were used for regular documentation of change processes and results, including six monthly progress reports, annual M&E reports, MSc thesis research, records kept by the OoARD, personal observations and diaries.

In 2009, the project also developed a set of guidelines for the PLW staff to systematically collect relevant information for the case studies including history, changes in extension services, value chain interventions (production, input supply, marketing and credit), results, challenges and lessons learned. Part of the information was obtained from the previously mentioned baseline and other sources and specially arranged key informant interviews, a commodity stakeholder workshop and a household level survey. The stakeholder meeting was organized to establish the evolution of the roles and linkages of the value chain actors.

In Dale, the 10 PAs (Debub Kege, Soyama, Debub Mesekela, Wara, Weynenata, Gjamo, Manche, Gane, Ajewa and Halile) targeted by IPMS for market development were included in the formal household survey conducted in 2009. The survey data consist of relevant production and marketing information on haricot bean including area allocation, production costs and inputs use, level of production, and marketed surplus. In selecting the sample households, with the aim of getting some idea about the effect of the different interventions, a distinction was made between households who had adopted/benefited from the various interventions and households who did not. In both sample groups, both wealth and gender criteria were considered to get a representative distribution of sample households.

Following the collection of all relevant information, a write-shop was organized to present information in a systematic manner. Drafts of the PLW specific commodity case studies were then reviewed by experts at the IPMS Head Quarter.

3. Background

3.1. Description of the PLW

Dale is located some 320 km South of Addis Ababa, in the Southern Nations, Nationalities and People's Regional State (SNNPRS). It is located at 6° 39' 20.47" to 6° 50' 28.83" North and 38° 18' 12.73" to 38° 31' 30.60.78" East (Fig. 1). According to the recent population count, there are 109,297 men and 106,396 women (CSA, 2008). More than 85% of the households in Dale are agrarian. The Woreda has an altitudinal range of 1626-2423 meter above sea level. Based on information from Awada Research Sub-station at Yirgalem, the annual mean rainfall (1989-1998) is about 1314 (IPMS, 2005). There are two cropping seasons depending upon the rain. The short rains are from March – April ("Belg") while

the long rains are from June – September (“Meher”). The Belg rain is mainly used to grow maize under sown with beans and transplanting of coffee seedlings, while during the main rains, coffee, “enset” (*Ensete ventricosum*) and fruit trees are planted/transplanted. In addition, cereals such as Teff (*Eragrostis tef*) and haricot beans as pure stands are sown during this season. However, in the last few years, the rains have shown a high degree of irregularity and poor reliability, in terms of onset and distribution, affecting the preference in type of crop grown favoring short season and drought tolerant crops such as haricot beans. Annual mean temperature ranges between 15-19 C°. In addition, the soil in Dale is mainly Nitosol with pH ranging between 5.5 and 6.5.

The diagnostic survey carried out in 2005 (IPMS, 2005) identified two major farming systems for Dale. The garden coffee/livestock system, and cereal/haricot bean/livestock system. Haricot beans were amongst the priority marketable commodities selected by the stakeholders for commodity development in both farming systems. Average land holding is between 0.25-0.5 ha in the garden coffee/livestock systems, while it is between 0.5-1.5 ha in the cereal/haricot bean/livestock system.

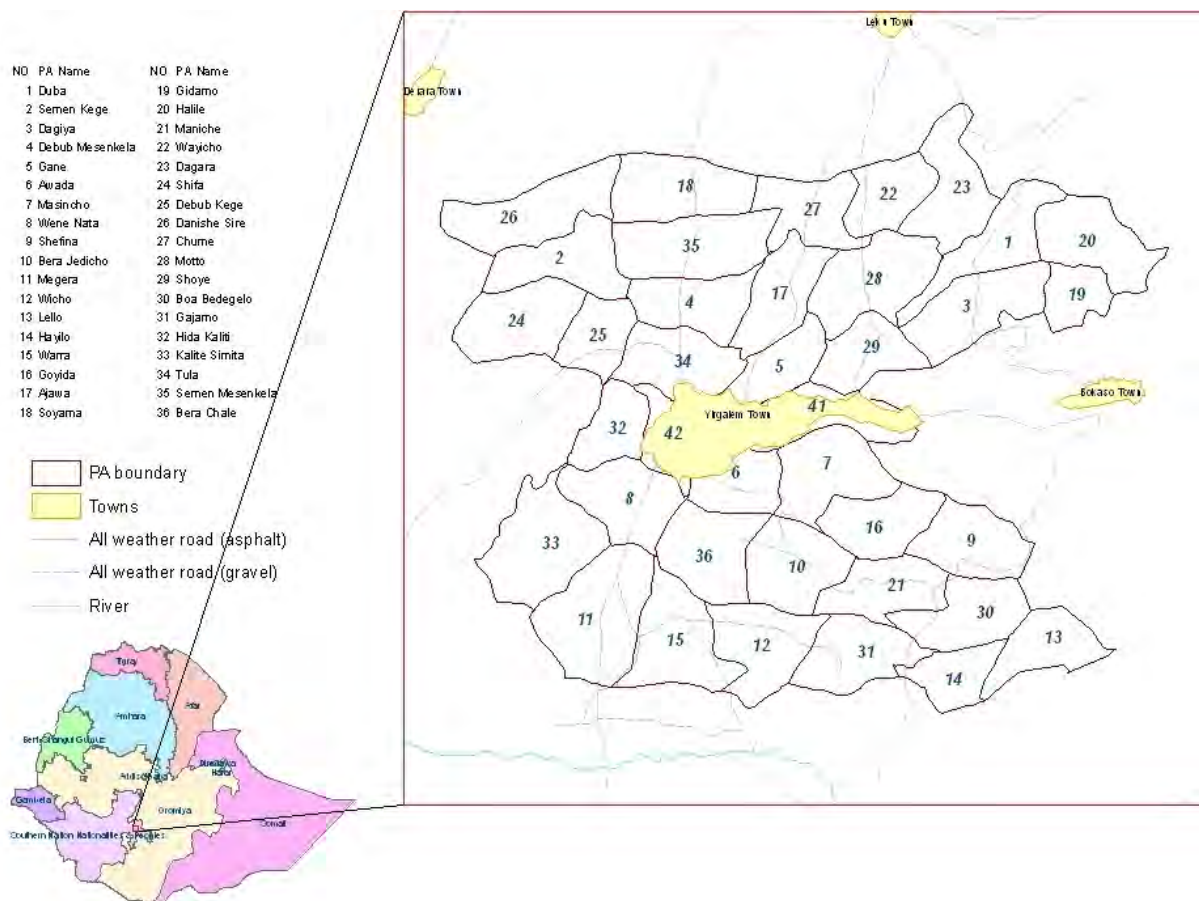


Figure 1. Location of the PLW

3.2. History and diagnosis of haricot beans

Haricot beans (*Phaseolus vulgaris*) are grown for food and cash income by farmers. In the coffee/livestock system, haricot beans are intercropped in the coffee and enset garden to provide mainly food for the household. In the cereal/haricot bean system, it is first intercropped with maize during the “Belg” rainy season again for household consumption and later during the “Meher” rainy season as pure stand, mainly for sale.

The seeds that most farmers use have been in circulation for decades. Most farmers do not keep seed stock until the next season and farmer to farmer seed supply is far from satisfactory. This is due to vulnerability of haricot beans seed to storage pests as farmers lack the resources and means to apply pesticides against these storage vermin. Most farmers therefore use the seeds from adjacent Woredas (like Boricha and Shebedino) where there is relatively advanced haricot beans marketing¹.

Major source of fresh haricot beans seed for Dale farmers have been the OoARD which acquire seed mainly from the Ethiopian Seed Enterprise, NGOs (for food security purposes) and to a lesser extent research (for farmers’ research groups). The basic seeds provided by the research system to the OoARD (as a grant or against payment), were used to establish a revolving seed bank. Farmers who acquired seed on loan will pay back in-kind (equal to the amount of seed received) which will then be given to another farmer in the next cropping season. The national research centers are supported by CIAT in acquiring new germplasm and capacity building for breeding work. The Southern Agricultural Research Institute (SARI) in Southern Ethiopia has been testing and releasing high yielding and drought tolerant varieties. However, due to limited production capacity (limited land, shortage of operational cost and others) research was not able to meet the demand for improved seed (Asfaw, 2007). Apart from the limited amount of seed, there was also a clear shortage of varieties to enable farmers to choose from (Alemayehu *et al.*, 2009).

The rapid market study (Asfaw *et al.*, 2005) indicated that farmers in Dale have possibilities to increase their participation in the commercial bean market. Such a re-orientation (from a predominantly home consumption oriented strategy) is however conditional to the development of a seed multiplication system. The

¹ A staff member of the OoARD interviewed farmers and was told that some farmers use local pots (*Insira*) to store seeds. After cleaning, the seeds will be treated generously with ash from the soil and then put in the *Insira* leaving some space at the top or mouth of the *insira* for air circulation. Then the mouth is covered with animal manure. This way, farmers can safely save up to 20 kg of seeds up to the next planting season.

rapid assessment also indicates that farmers prefer the red haricot beans due to their integration to the local diet of “enset” extract and maize porridge. The crop is grown with minimum inputs and commanding better price in the local market when compared to the white beans. In addition, the red beans integrate very well in maize and coffee garden under-sowing as well as growing in open stands during the Meher sowing period (June-September).

On the other hand, white varieties are mainly grown for export purposes. The production cost of white beans is higher than for red beans, due to the additional labor cost involved in land preparation to achieve finer land tilth and bird keeping. Farmers witnessed that birds prefer the white beans to red beans. Though productivity of the white beans is higher, lack of application of appropriate management generally results in lower productivity per unit land (Ferris and Kaganzi, 2008). There was also been an indication of the market preference for the red beans in Southern Ethiopia mainly to supply Northern Kenya’s market (informal route) (Ferris and Kaganzi, 2008). However, there is also an opportunity for the red beans to enter the world market through the formal route. To this end, the private sector has also responded favorably to the government policy and new beans storage and processing facilities are being established such as the Agricultural Commodity Supply (ACOS) which showed interest in processing and exporting the red beans in addition to the white beans.

Though research has been breeding, testing and releasing varieties, the knowledge about these varieties remains in small circles of experts leaving the majority of farmers totally unaware and unable to benefit from research result (Asfaw *et al*, 2005). Creating linkages between farmers, development workers and research is therefore a key to the development of the haricot bean in Dale.

4. The value chain development approach

To increase impact, the project introduced a new extension approach with emphasis on knowledge management, skills development and linking producers with public and private sector value chain actors.

4.1. Extension services

To bridge the knowledge/skills gap on new varieties, (seed) production and market opportunities, various knowledge/skills enhancement activities were carried out. They included training of subject matter specialists and development workers, introduction of varieties for adaptation/screening/selection in farmers’ fields and Farmers Training Centers (FTCs). A seminar on the prospect and opportunity of haricot beans for Ethiopian small holder farmers was also organized for the Woreda staff by the National Beans Research Director from Melkassa. After the knowledge sharing and trainings events, DAs went around in their PAs and selected farmers that were interested to be involved in testing and seed multiplication. Farmers were then invited to the nearest FTCs and terms

and conditions for production and collection of seed were explained to them then agreements were reached and signed. All these activities were facilitated by the project and conducted in partnership with the OoARD, CIAT, Melkassa and Hawassa ARC².

In addition SMSs and DAs conducted practical trainings in land preparation, seed drilling and other agronomic practices including fertilizer application, spacing and sowing and cultivation practices like weeding. Training on quality seed production was provided to farmers at Gane and Debub Kege FTCs where demonstration plots were established. The OoARD together with IPMS organized farmers' field days at these FTCs for hundreds of farmers including seed producers to share the experiences. Woreda crop SMSs regularly visited farmers' plots and provided technical support. In addition, researchers from Hawassa ARC together with Woreda SMS and respective DAs jointly visited and assessed farmers' plots for the quality of crop stand as well as they provided technical support to farmers and learned from each other.

This cycle of activities was repeated in October 2008 by OoARD in 36 PAs, including crop assessment performance in Gane and Debubb kege FTCs. Following this, a three days study tour was organized by project staff and staff from Melakssa ARC for farmers, Weynenata cooperative leaders and Woreda staff. The tour included a visit to Melkassa ARC, commercial beans seed producer in and around Huruta town in Arsi and to the Adma Lume Farmers Cooperative Union. The visit was an eye opener to everybody due to the scale and dimension of the operation (the huge number of contractual seed producer farmer and volume of seed and grain transacted through the union) as compared to what had just started in Dale. Upon returning to the Woreda, the group assembled to synthesize the lesson and decide the way forward. The study tour has been instrumental in planning the scaling out of the operation in Dale for 2009/10.

A poster was produced to popularize the haricot beans produced in the PLW. These posters show pictures of the new varieties and describe their quality in terms of their productivity per ha. These posters were distributed to 36 PAs and presented to thousands of farmers during the month of May in 2009 where a two weeks skill development training for farmers was carried out by the OoARD.

4.2. Production intervention

As per the agreement during a planning workshop, in January 2007, Hawassa ARC provided 8 qt of basic seeds of Nasir and Logomame (Ibado) -red speckled – varieties, Omo 95 and a small quantity of Dimtu. These seeds were distributed to 54 farmers (15 to 20 kg/farmer) and FTCs for introduction, demonstration and

² While Melkassa has the national mandate for bean research, Hawassa ARC has been delegated to deal with bean research in Dale.

revamping the revolving seed bank of the OoARD. Assessment of the 2007 variety testing was carried out in two sites. The haricot beans were evaluated by the farmers (22 women, 32 men), DAs and in Soyama and Debub Mesenkela PAs; and Gane FTC with participation of DAs and IPMS staff. Evaluation of varieties was based on criteria set by farmers (see results section).

In 2008, further demonstrations were carried out in Gane and Debub Kege FTCs, which received small red kidney beans namely Ibado, Nasir, Dimtu and Omo 95 and some white varieties (Awash Melka and Awash 1), for comparison. Demonstration also included 90 surrounding farmers (80 men and 10 women in 5 PAs (Gane, Ajawa, Debub Kege, Hida kality, Soyama). Following this, the varieties that were preferred by the farmers were presented to traders in Shashemene and Hawassa for marketability. Traders in both towns approved the selected varieties and agreed to trade them if they had access to the grain in the required amount and at reasonable quality.

4.3. Input supply/service

Following the initial variety adaptation trials in 2006 and 2007, the stakeholders discussed the establishment of a seed multiplication system during a planning meeting with CIAT, Hawassa ARC, OoARD and IPMS. Based on these discussions, CIAT and the Hawassa ARC provided basic seed (through their Tropical Legume 2 Project) and technical back up, OoARD organized the field work i.e. selection, orientation and training of farmers and regular follow up of the field work along with IPMS & Hawassa ARC. The varieties included in this multiplication were Nasir, Dimtu, DRK and Cranscope.

In the 2008 crop season, OoARD identified Weynenata multipurpose cooperative as a potential buyer and seller of improved seeds. Weynenata was selected by OoARD due to its past clean accounting record, responsible leadership and proximity to beans growing PAs to be served. However, the cooperative did not have enough cash to develop the business and therefore a credit proposal was developed, with the assistance of the OoARD and IPMS, for funding from the IPMS innovation fund.

To determine an appropriate price for the seeds, the project facilitated a one day consultative meeting for beans seed producer farmers (in 7 PAs) and the DAs from their locations, Weynenata service cooperative representatives and a bean research officer from Hawassa ARC. This was followed by a one day visit to Leku market in the adjoining Shebedino Woreda to agree upon and determine the quality and grade of beans seed to be collected and the price for different grade and quality. The researcher from Hawassa ARC assisted by describing and presenting knowledge regarding quality seed production and the experience in the country. Based on the experience gained, quality and grade of beans and their corresponding price were determined. Farmers then entered into agreement with the cooperative to sell seeds which meet the criteria.

As suggested by CIAT/SARI and based on positive experiences in other countries in Africa, packaging of beans in small packages was proposed. Beans were packed in plastic bags of 200, 500 and 1000 grams so that farmers could access different varieties at a minimum cost. It also gave an opportunity for farmers to try new varieties without great risk. The packets have labels that contain information regarding: quantity, price, variety, germination percentage, seed purity, seed amount required/ha and organization to contact for more information. This is the first exercise of its kind in the Woreda as marketing strategy and information disseminated to farmers. The first round of plastic bags that were used for packing was granted while sealing machines were lent from Hawassa ARC Tropical Legume 2 research project.

To assist the Cooperative in selling the seeds, the project partners organized seed fairs and also made linkages with CARE's Food Security program in Dale.

4.4. Output marketing

After the initial rapid market assessment studies, IPMS along with the OoARD conducted an assessment on marketability of red kidney beans in the local market of Hawassa and Shashemen (in 2008/09). Local traders expressed their interest to do business with farmers in the Woreda if the crop was available in quantity and at reasonable quality. The small red kidney beans are highly sought due to high demand for the small red kidney grains both in the country and for export across the Northern Kenya border and lately to the Far East. According to the traders, the limiting factors were only the amount and quantity produced and cleanliness of the grain from pest and foreign materials.

5. Results and discussion

5.1. Production, productivity and income

The household survey (n=114) conducted in 2009 shows that the majority of the sample households (97) use fertilizer (DAP) for haricot bean production. Table 1 presents gross margin analyses for mixed cropping patterns in Dale district. Most of the average values of selected variables under analyses are statistically higher for fertilizer users.

Table 1. Gross margin analyses of haricot bean for plots with mixed cropping in 2008

Farmer type ^a	Obs	Av. Area-mostly intercropped (ha)	Av. productivity (kg/ha)	Av. variable costs (Birr per hectare) ^b	Labour (AE per ha)			Av. value of haricot bean production (Birr per hectare)	Av. gross margin (Birr per hectare)
					Own	Hired	Total		
Users (fertilizers)	94	0.56*	489.55*	184.3***	18.8	12.5**	29.9	2217.65*	2033.32*
Non users	16	0.34	239.22	53.82	20.5	3.9	22.4	1083.65	1029.84

IPMS Household survey 2009

Note: ^a Households are categorized as users if they used purchased fertilizer.

^b Variable cost includes seed, fertilizer and other chemical costs (opportunity cost of own seed is computed using the average market price).

The household survey also provided an indication of the market participation by the farm households using fertilizers and households which do not.

Table 2. Haricot bean market participation in 2008

Farmer type	Obs	Percentage of		Average sold amount (kg/HH)
		selling households	produce sold	
Users	97	26.8	13.2	61.0*
Non-users	16	18.8	5.6	6.3
Total	113	25.7	12.2	53.3

Note: * Significantly higher than the non-users' average at 10% level.

The data suggest that market participation is higher for farmers who use fertilizers than for those who do not. However, in general most farmers seem to grow the crop for domestic use.

Evaluation of varieties was based on criteria set by farmers and included physical characteristics (grain size and color), agronomic characteristics (response to water stress and water logging) as well as yield and food quality (test and cooking characteristics) (see result section). Based on this, Nasir and Ibado (Logomame, Red mottled) are highly preferred for their color, seed shape and size, and their food quality. While Nasir, Dimtu and Omo 95 are tolerant of extended and high rainfall, Ibado performs poorly or yield is low under the same circumstance because of defoliation. Dimtu is not preferred in their traditional food (Kocho/wassa) due to black discoloration during boiling. Ibado is compatible with maize due to its climbing nature therefore highly preferred for inter cropping as well. Regarding marketability, the OoARD/IPMS staff conducted a small assessment in the major market town (Shashemene and Hawassa) and reported that red kidney beans are marketable and highly sought by traders.

As part of the seed multiplication efforts, the project also obtained information on the performance of different varieties under farmers' management, as summarized in Table 3.

Table 3. Productivity of different haricot bean varieties (per kg of seed used under farmers' management)

Variety	Observations	Mean productivity*	Std. Dev	Min	Max
DRK	22	7.04	2.81	3.00	12.50
Nasir	10	20.02	5.83	13.00	32.50
Cranscope	12	2.22	2.49	0.75	10.00
Dimtu	6	19.21	2.76	15.58	22.80

Note: * Mean shows the average seed productivity per kg of seed planted.

As can be seen from the table, DRK and Cranscope performed very poorly, while Dimtu and Nasir did as expected (also see next section 5.2)

It is noted that, at the time of the household survey, the number of farmers that produced grains from improved seeds/varieties was still very small. The overall impact will be assessed in the final project assessment.

5.2. Seed production and marketing

Production

In July 2008 the Hawassa ARC provided 9.44 qt basic seed as grant to Dale Woreda to start the farmer-based seed multiplication (see Table 4). The seeds were distributed to 51 farmers in 7 PAs. Thirty nine (39) farmers successfully multiplied the seeds, while 12 farmers (10 farmers in Soyama and 2 in Dehub Kege PAs) failed because of crop failure of the Cranscope variety, due to unexpected heavy rain in November 2008. Loss of crop was confirmed by DAs and by peers at joint field assessment and seed producers' meetings/platforms. The remaining 39 farmers produced a total of 8,331 kg of seeds. Tables 3 and 4 show performance data of the different varieties.

Following the 2008 seed multiplication, more farmers joined as seed producers in 2009. In total, 103 farmers, including the previous 39 received basic seed from research for multiplication (20kg/farmer) in 11 PAs. However due to unreliable rainfall, no viable seeds were produced.

Table 4. Amount of seed distributed, planted, and produced by variety

Seed	Variety				Total
	DRK	Nasir	Cranscope	Dimtu	
Distributed	388	175	284	97	944
Planted	388	175	279	79	921
Harvested	2175	3530	565	1501	8311

Use/Purchase and sale of seeds

Table 5 shows the use of the seeds based on seed multiplying farmers' interviews and actual observation of sales to the cooperative. The Cooperative purchased in total 4,378 kg of seeds from the farmers which is about 53% of the total amount of seeds produced. It was noted that only 23 farmers (45.1 %) who had agreed to sell their seeds to the cooperative in fact did. Some farmers did not sell because of crop failure; others did not because they sold the seed before the cooperative started buying because they felt that the price is higher in the open market and also needed the cash immediately. According to farmers' information, another 1,220 kg was sold (14.6%) in markets or to neighbors and 820 kg of the seeds (9.8%) was kept for their own seed requirement, while the rest was consumed (10.4%).

Table 5. Haricot been seed production and use pattern

Seed use		Amount (in kg)	Percentage (%)	Value (in Birr)
Sold	To cooperative	4378	52.6	26,268
	In market*	1220	14.6	7320
Consumed at home		869	10.4	5,214
Reserved for self use as seed		820	9.8	4,920
Returned (Paid back) to OoARD**		685	8.2	4,110
Gift		190	2.3	1,140
Not accounted		169	2.0	1,014
Total Harvest		8331	100	49,986

Note: * Includes exchange and sold to neighbors

** Farmer who had crop failure did not return the seeds.

To enable the Weynanata Cooperative to become involved in the purchase and sale of seeds, IPMS provided credit funds in 2008, which was channeled through the Rural Finance Fund Administration (RFFA). The following standards/prices were used to purchase the seeds from the farmers: 1st grade seed with (greater than 90% purity) at a 20% premium over the grain market value and a 15% and 10% premium for a second and third grade (>80% and 75 - 80% purity). Seed with purity less than 75% was not accepted and sold as grain. The seed was cleaned, treated for pests and stored until packaging was done at the end of July. On average, seeds were purchased at 6 Birr/kg.

The sale of the seeds by the cooperative started in the “Meher” season of 2009, but demand was limited since rainfall was low and unreliable (A total of 945 kg was sold at 10 Birr/kg). During the Belg season (March- May 2010) CARE-Ethiopia bought 2,000 Kg seed (at 10 Birr/kg) and distributed the seed to 384 HHs (74.2% male & 25.8% female headed HHs) for their food security scheme in Dale. The remaining seed was sold to farmers in Dale for planting in the Meher season in 2010. All seeds were sold at 10Birr/kg.

Based on data obtained from Weynanata Cooperative, net sales value was estimated at 4,378 kg x 4Birr/kg (sales price minus purchase price) = Birr 17,512. Cost was estimated at Birr 7,735, which results in a net return of Birr 9,777 for this transaction.

Labeled package sales

The seeds purchased by the Cooperative were packaged in packs of 200, 500 and 1000 grams, as can be seen in Table 6.

Table 6. Summary of beans seed in different packs

Variety	Total seed (in kg)	Number of packets per each volume			
		200 g*	500 g	1000 g	Total
DRK	421.0	0	502	170	672
Dimtu	1209.2	116	752	810	1678
Nasser	2748.0	240	1440	1980	3660
Total	4378.2	356	2694	2960	6010

Note: * g is gram

Based on farmers's interviews, the labeling of the packages was highly appreciated, especially since farmers clearly knew which varieties they preferred (Nasir and Dimtu).

Data from the 2000 kg of seed distributed by CARE indicated that 34.4% of the recipients preferred packages of less than 5 kg seed while 29.9%, 17.2 % and 18.5% preferred respectively for 5, 5-10 and more than 10 kg of seed per packs. Farmers actually bulked the seeds from the original packs.

From the sales to private farmers, it was observed that the smaller packages were mainly purchased by women, which grow small quantities for home consumption in their backyard. During the Meher planting season, where the majority of farmers plant pure stand (for market) several packages of small seeds were purchased at once and/or opened to get the required quantity. These sales' pattern seems to suggest the preference of some farmers for smaller packages of not less than 2,000g while the majority, 65.6%, prefers 5 kg and above (Fig. 2). Therefore, our future packaging should take this in to consideration.

5.3. Other indirect benefits/side effects

Gender and the environment

IPMS project has a deliberate policy of including women in all its interventions in order to promote gender equality. In introducing the new haricot beans seed system, women were involved at all aspects of testing and evaluating the different varieties. Women show also great interest in buying and testing these new varieties in their backyards and fields for food production and income. Actually women demonstrated their intuition at evaluation of the various new varieties for their food value (mainly integration and test in the local food and also their agronomic response to the local situations). However, the number of women engaged in haricot bean seed production was lower than men.

On the other hand, the introduction of the new varieties will also benefit the environment through diversifying crop, nutrient recycling and also improving productivity due to the new genetic vigor. For the fact that these varieties are legumes, there will be less application of nitrogen source fertilizer and hence there will be less leaching to ground water resources and hence less water pollution.

5.4. Institutional/organizational changes

As the result of the intervention in beans seed production, farmers have been familiarized with new seed varieties, selecting varieties and eventually produce quality seed for sale. The new approaches also brought various actors together and play new roles and responsibilities in sustaining farmers based seed production system to enhance production of marketable commodity. The following table summarizes the new roles and responsibilities played by partners. For farmers to be able to have access to clean seed at the right time is an achievement by itself. In most cases, late arrival, poor quality and insufficient quantity of inputs are major problems

Table 7. Bean value chain actors and their roles

Actor	Responsibility
Farmers	Allocate enough land (0.25 ha) for seed production Produce quality seed Participate in seed standardization and price setting Agree to sell seed to the cooperative
Weynenata multipurpose cooperative	Negotiate seed quality and price of sale at seed producers farm gate Bulk, clean, treat and store seed Packet, label and sell seed to farmers Inter seed production agreement with farmers
Dale Woreda office of agriculture	Identify/target farmers Train farmers Facilitate seed distribution Jointly follow up and monitor fields Technical support to farmers Participate seed quality and standardization Monitor in seed packaging and facilitate seed promotion
CARE/Food security program	Buy seed from cooperative for distribution for the food security project Facilitate training for seed recipient farmers Start seed bank system for food insecure farmers Record keeping and joint progress assessment
Hawassa and Melkassa Research Centers*	Provide basic seed for multiplication Technical backstopping for OoARD Organize planning meetings Assist in designing seed packaging and production of promotional materials Test seed germination and other quality testes (certify seed quality)
CIAT	Support national research by facilitating germplasm exchange Capacity building through transfer of knowledge and technical know how Under take specialized studies
IPMS	Facilitate commodity development and marketing intervention Play catalytic role bringing partners to work together Facilitate knowledge sharing and skill transfer Avail fund where money could not be solicited from financial institutions.
Private traders	Purchase produce

*Though MARC has the national mandate, it has given Hawassa Research Centre the responsibility/mandate to cater for beans in SNNPRS, therefore Dale is linked with ARC for beans

6. Challenges

- The supply of basic seeds from the ARC is a crucial element in the development of a commercially oriented haricot bean production system. While supply has improved over the years, attention needs to be paid to a continuous supply of improved varieties.
- As described, the risk associated with haricot bean production for seeds and grains is not without risk, due to variable and unreliable rainfall.
- Multiple actor partnership: Building linkages in multi-actors partnership is time consuming and challenging. The strength of linkage and depth of partnership depends on the commitment and will of individuals and organizations. One great challenge has been building up common understanding between partners and delivering their end of bargain on time. This is more difficult when partners have multiple priorities and cannot be held accountable for their commitment. Fostering partnership will therefore need continued attention.
- Another important aspect is the attitude of the partners as shaped by 'environment'. Farmers, OoARD and research staff were conditioned by the Food Security programs which operate in Dale by both government and NGOs. This results in a lack of business sense, and a dependency on free and/or subsidized inputs (including bean seeds). Free handouts and subsidies have roles in food insecure areas but clearly may have an under developing effect in the long term as they will not help to develop business service development (Khan, 2006).
- The cooperative handling the seed sale business had no previous experience in running an input shop and has not been properly organized and primed to handle the business. The cooperative was therefore supported by the OoARD/IPMS through seed fairs and group sales for farmers. An alternative to be explored could be linkage with local private vendors who are large in number and run their business providing valuable service at every corner of the district. This link could have helped the cooperative to sell its product throughout the district without opening its shop in every market. Such a strategy would result in the extension services being relieved from its input supply functions as well as creating a business attitude in the cooperative.

7. Lessons learned and recommendations

- The new experience of involving all multiple actors and linking research and extension with seed producer farmers had been instrumental in introducing new varieties as well as producing high quality seed in relatively large amount at a reasonable price within the Woreda.
- Seed production technology was easily and quickly adopted by farmers. The performance of the new varieties as crop and compatibility with the local diet is good.

- Market orientation has brought about a new direction in the selection of varieties new linkages. Involvement of traders together with the traditional actors (farmers, researchers and extension personnel) is the key to success in meeting the target of producing quality seed in larger quantity to promote future production.
- Packaging and labeling of seed had been an important value addition and traceability that build confidence of buyers. Labeling of the packages was appreciated by farmers, however most farmers prefer larger quantities of seeds for their production system (usually not less than 0.25 ha). The market for small packages should probably be targeted at food insecure households and for introductory purposes.
- Involvement of the primary cooperative demonstrates an alternative means of availing quality seed to farmers. Involving of the cooperative also enabled large quantity of seed to be stored safely for the next season which under the small holder condition is difficult because of storage pest.
- As market demand for varieties and quality of product will change, continuous involvement of all actors is required in the future. As long as the linkage between research (ARC) and OoARD is maintained new seeds could be acquired and reach farmers.
- Organizing the alternative beans seed system need to be established on a strong sense of business enterprise development, identifying and agreeing on the roles and responsibilities of partners and through time linking the farmers and cooperative to run the business with little support from facilitators which, in this case, has not been achieved yet.

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