

# Promoting the Growth and Development of Smallholder Seed Enterprises for Food Security Crops

Case studies from Brazil, Côte d'Ivoire and India



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# 1 Preface

Farmers everywhere depend on access to good quality seed, which is fundamental to their crop production systems. Most governments have made significant investments in strengthening national agricultural production capacities, yet farmers in developing countries still face difficulties in accessing the quality seed of the varieties that they require. Guaranteeing farmers' access to quality seed can only be achieved through a viable seed supply system that can multiply and distribute seeds which have been produced or preserved. This is better achieved by the private sector, but medium- to large-scale international seed companies concentrate on high-value crops and avoid dealing in the self-pollinating, open-pollinating and vegetatively-propagated varieties on which most smallholder farmers depend for their food security as the biology of these crops makes it easy for farmers to keep their seeds for several seasons.

However, smallholders are often seen as the driving force of economic growth, poverty reduction and food security. This is also true for smallholder seed enterprises which, in the absence of large companies, provide a valid alternative for the production and distribution of food security crops.

This paper reviews case studies on smallholder seed enterprises in Brazil, Côte d'Ivoire and India, as well as relevant world literature in order to identify key issues that facilitate or constrain the development of the seed sector. The final section provides some guidelines on policy design and implementation to promote the development of sustainable seed enterprises at different stages in the evolution of national seed sectors. It provides examples of good practices and hence seeks to assist governments in identifying ways in which they can support the development of smallholder seed enterprises that will provide the most appropriate varieties to smallholder farmers in their efforts to boost food production.

FAO recognizes the contribution of smallholder seed enterprises in addressing global challenges, such as achieving the Millennium Development Goals (MDGs), adaptation to climate change and the attainment of food and nutrition security. Sustaining the growth of smallholder seed enterprises through the promotion of public and private partnerships and capacity building is an FAO Impact Focus Area. The promotion of policy design, implementation and institution building to facilitate this growth and transition to higher stages of development is an important challenge for FAO.



## 2 Introduction

Over 90% of the crops in developing countries are still planted with farmers' varieties and farm-saved seed (Almekinders et al., 1994; Almekinders and Louwaars, 1999; Maredia et al., 1999; World Bank, 1998). As a result, large international seed companies concentrate on those countries with large commercial seed sectors, often focusing on high-value crops grown by larger farmers in more favourable areas, i.e. targeting those who are best able to pay for their seed. They tend to avoid self-pollinating crops - including many of the crops smallholder farmers grow and on which they depend for their food security - because these are the crops for which farmers save their own seeds, reducing opportunities for commercial seed production of these crops. In the past, the public sector - universities, governmental organizations and international organizations - were major sources of new varieties and quality seeds of food crops for the smallholder farming sector, especially with regards to self-pollinating crops. However, in recent years, many countries have encouraged privatization or commercialization of public-sector seed activities, while international organizations have faced budget constraints, leading to reduced investment in public-sector plant breeding and seed production enterprises. As a consequence, public-sector seed activities have tended to focus on a narrow range of crops grown by larger farmers, in this way, reducing supplies of seed of new varieties of subsistence crops to smallholder farmers even further (Bengtsson, 2007).

Nevertheless, there are a number of examples throughout the world where seeds of cultivars are supplied by successful small- to medium-scale seed enterprises or farmer organizations. Some of them may have succeeded in creating a vibrant seed business able to respond to the demand for quality seeds. Identifying these and determining the key factors leading to their success will contribute to efforts to replicate the innovations in similar areas or conditions.

This paper synthesizes the findings of case studies carried out in small-scale seed enterprises in Brazil, Côte d'Ivoire and India. This is followed by a review of literature concerning the development of such enterprises, with particular reference to developing countries, and compares the findings with those of the case studies. Finally, it draws out lessons that can be learned in an effort to support the development of small-scale seed enterprises in developing countries. The three studies cover a range of crops (soybean and maize in Brazil, rice in Côte d'Ivoire and sorghum, pearl millet and rice in India), markets (primarily smallholder subsistence farmers in Côte d'Ivoire and India, and commercial farms in Brazil) and the stages of development of the seed industry.





## 3 Case studies



### 3.1 BRAZIL

The study of seed enterprise development in Brazil focuses on soybean and maize.

There are marked differences in the stage of development of the seed sectors in the two crops. Soybean is a commercial crop grown by market-oriented farmers, with farm size ranging from 10-100 ha in the south to 500-5000 ha in central Brazil. In contrast, farmers growing non-hybrid maize are mainly small-scale subsistence-oriented producers. As a result, the nature of seed enterprises serving the two crops is quite different.

#### 3.1.1 Soybean

The soybean case study looked at a private seed production enterprise (Maua Seed Company) established in Parana State (southern Brazil) in 1975 by three agronomists formerly employed by a local agricultural cooperative.

At the time the company was formed, soybean cropping was a new venture in Parana State and most of the soybean 'seed' available was actually soybean grain imported from Rio Grande do Sul processed using adapted coffee processing equipment. The quality of the seed was poor, with high levels of admixture with other varieties and contamination with weed seed. Thus, there was a growing, unmet demand for quality soybean seed, assessed by the fledgling seed company through its contacts with a local farmers' cooperative and through a team of sales agents it had established.

The company set up operations in the Maua region of Parana State. This area has an average altitude of over 1000 m, giving it the cooler temperatures needed for producing quality soybean seed. The company constructed a soybean seed processing plant using the best technology available at the time. Technical advice was provided by seed specialists from the official Parana State Agriculture R&D Institution, IAPAR.

The capital to start the company was obtained from the National Development Bank of Brazil within a framework of Government financial support to agricultural activities. The financial support for investment and business operations was offered at that time at subsidized interest rates and less strict guarantee requirements for loan approval. In this case, the bank accepted as collateral the founders' technical knowledge and skills, as demonstrated by their prior work in the community, and an industrial project plan developed in conjunction with seed specialists from IAPAR. This was crucial to the early success of the company.

Seed production started through a collaborative project with eight large-scale soybean farmers in the region. Initially, the farmers planted a total of 4000 hectares with varieties obtained under license from Embrapa. Farmers were selected on their technical abilities as well as their interest in diversifying their enterprises. The seed company assisted the farmers in obtaining loans to start up their field activities, including development of production plans (seed and fertilizer rates, pest and disease control, field operations, etc) drawn up by agronomists from Parana State institutions. State government agricultural subsidy programmes were readily available at the time. Now, however, the seed company finances most seed production operations, including the cost of storing seed from harvest in May to planting in August-October.

Farmers are paid a premium for seed lots that meet required quality standards. The company operates its own quality control system, monitoring crops in the field and through processing and storage. Farmers are paid in cash.



Over the years, the number of farmers growing seed for the company has increased. Seed production has increased from 2800 tonnes in the 1970s to about 20 000 tonnes in 2007/08. The company also expanded its marketing to neighbouring regions and States by building linkages with other cooperatives and sales agents.

Since 1999, the company has also been closely involved in a consortium between private seed companies and Embrapa Soybean through which the seed companies partly fund Embrapa's soybean breeding programme in return for exclusive rights to commercialise the resultant cultivars. As a result, consortium members captured some 45% of the soybean seed market in southern Brazil between 2000 and 2005.

From the beginning, the company developed a technical assistance network in collaboration with the local agricultural cooperative, providing solutions to the main agricultural problems facing farmers in the area. By doing so, the company helped develop local farming and enhanced returns to agriculture. This, in turn, helped build demand for the company's seed as farmers gained in financial security and became more market oriented, as well as building the company's reputation as a trusted partner.

#### **3.1.1.1 Key success factors**

##### *Conducive policy environment*

Brazil has had seed legislation in place since 1965 that defines production, processing, storing and marketing regulations, minimum quality standards and inspection and quality control responsibilities. Plant breeders' rights have been in place for more than 10 years, providing an environment conducive to investment in plant breeding and seed enterprises.

The government also provided extensive financial support for the agricultural sector in the 1970s and 1980s, which supported the development of the seed industry and commercialisation of the farming sector. The company was able to obtain funds at government subsidized interest rates to develop the necessary infrastructure as well as to cover its operating costs for the first year. Such support is vital for new enterprises. Farmer seed-growers were also able to access subsidized credit under favourable terms through government support programmes. Credit has been more difficult to obtain in recent years with declining government support in this area and this will be a constraint to further development of the seed sector and a barrier to entry of new enterprises.

##### *Demand for seed*

There is a strong demand for high-quality soybean seed. Banks require farmers to purchase certified seed as part of the conditions of loans. Moreover, farmers recognise the importance

of using high-quality seed to establish good crops; soybean seed splits easily after harvesting if not handled carefully and correctly, markedly reducing germination. Given the strong market orientation of the soybean farmers in Brazil, farmers are willing to purchase seed rather than save their own seed and have the financial resources to do so. However, seed from the informal sector (self-saved seed or pirate seed) accounts for some 40% of the seed market and this is a constraint on commercial seed production.

#### *Availability of seed of improved cultivars*

The difference in the scale of farm operations for soybean has resulted in very different patterns of seed source in the two regions. In the south, where farms are smaller, the commercial seed market is dominated by seed enterprises multiplying varieties developed by EMBRAPA (45%) and cooperatives breeding and multiplying seed of their own varieties (40%), with multinational seed companies picking up the remainder of the market (15%). In the central region, where soybean farms are much larger, private seed companies meet 65% of the market, with EMBRAPA varieties meeting 20% and cooperatives 15% of the market.

The Maua company has also pursued an innovative approach in developing and commercializing new soybean cultivars, through a consortium involving private seed companies and Embrapa. This has helped ensure that cultivars developed meet farmers' needs and this has been reflected in a high market share being captured by the consortium's products.

#### *Technical expertise/linkages with R&D and extension services*

The Brazilian government has long had a very strong national agricultural research and development programme through the Brazilian Agricultural Research Corporation, Embrapa, through State agricultural bodies and through universities and higher education institutes. This has provided for extensive technical expertise in agriculture, strong extension services to support new agricultural ventures such as soybean cropping, and technical assistance to, for example, seed enterprises.

The company maintained close links with national and state agricultural institutes, particularly Embrapa Soybean and IAPAR, ensuring that it had access to state-of-the-art knowledge and advice.

#### *Marketing approach*

The company's approach to marketing, involving a combination of direct on-farm selling and partnerships with cooperatives and agricultural input retailers, helped build market chains for inputs and outputs. The company's sales force ensured extensive contact with farmers and cooperatives, giving the company strong insight into the needs of their client groups.

#### *Capacity building*

The company adopted a policy of continual capacity building for company staff and for partners, including staff of cooperatives and farmers. This has helped ensure that participants at all levels in the market chain are well-trained and knowledgeable, able to provide a high-quality service. Moreover, it has had spin-off effects, in increasing awareness of the value of high-quality seed among client farmers, increasing demand for its product.

#### *Focus on agricultural development*

The company holistic approach to agricultural development, aimed at helping farmers to improve their livelihoods, which gained strong support from the local communities and strong customer loyalty.



### 3.1.1.2 Constraints

#### *High costs of seed production, processing and storage*

Producing and commercializing quality soybean seeds in tropical conditions requires heavy investment in infrastructure and high levels of technology, particularly in terms of specialized harvesting, processing and handling equipment, and drying and storage. Recent declines in government subsidies for investment in agriculture will constrain further development of the seed sector and represent a barrier to entry for prospective new enterprises.

#### *Competition from agricultural cooperatives*

Agricultural cooperatives have access to government subsidies not available to private companies. Moreover, they have a captive market in the form of their members.

#### *Informal seed market*

The informal market, particularly farmer seed-saving, accounts for some 40% of the seed market. Farmer seed-saving limits the market for seed, with farmers commonly saving their own seed for several cropping cycles before returning to the market for fresh stocks of seed. The seed industry needs to do more in terms of persuading farmers of the benefits of using quality seed rather than farm-saved seed.

### 3.1.2 Maize

Maize farming in Brazil falls into two broad groups: large-scale farms growing crops from purchased hybrid seed, and smaller, more subsistence-oriented farms (10-30 hectares) growing old, open-pollinated varieties, landraces and populations derived from seed of hybrids, mostly obtained through the informal seed sector, including farm-saved seed. The hybrid seed market is dominated by four multinational companies (Monsanto, Pioneer, Syngenta and Novartis). Breeding and production of seed of open-pollinating varieties is presently limited to a few Federal and State public universities and research institutes that concentrate their focus on disease tolerance and work independently or in partnership with the private seed enterprises or farmer communities.

The maize seed case study examined a collaborative maize seed enterprise established in 1999. The partners involved in the enterprise are an NGO (Assessoria e Serviços aos Projetos de Agricultura Alternativa - AS-APTA), the State University of Londrina (UEL) and several farmer communities from central and southern Parana State. The NGO had been working to improve the standard of living of communities in the region for more than 15 years. The Biology Department of UEL had planned to establish a maize genebank to preserve traditional landraces and to initiate a maize breeding programme aimed at supplying smallholder farmers with affordable quality maize seed.

Following consultations with farmer communities in central-southern Parana State, the partners agreed to start a programme that had three main goals: 1) to preserve maize landrace varieties by assembling a genebank at UEL; 2) to begin a participatory breeding programme, as a means of providing the communities with quality maize seeds and improving the technical level of their crops; 3) to help foster the improvement of the community general education, agricultural practices and economic levels.

The programme started out working with farmers' organizations in 10 towns, representing a total of about 1500 farmers. By 2005/06 the programme had expanded to include some 4000 farmers from 22 towns. Each farmer organization elected two to four representatives to participate in 'forums' to plan activities, set targets and monitor implementation. The forums met every 6 months.

An initial work programme was developed in consultation with community leaders. The programme provided well-defined objectives and targets for each year, which included genetic gains from population breeding and multiplication and availability of seeds for sale or distribution.

Because the participating farmers lacked funds, forum activities were funded by the NGO, largely with support from foreign donors. UEL provided technical expertise to the programme and some investment in equipment for the breeding programme.

Farmers individually sought bank loans to fund their breeding and seed production activities. Funds were available through the government sponsored “National Program of Financial Support to Family Agriculture - Pronaf”. The NGO supported these applications by providing technical plans required by banks for loan approval.

Convincing the participating farmers to obtain bank loans at their own risk was a difficult step since several farmers had previously experienced crop failures and financial losses, mostly due to poor technical support from State official extension services.

Seed is produced of promising lines developed by the maize breeding programme. Seed is sold through local agricultural retailers and at local community fairs. It is sold in unmarked bags, as the seed does not meet legal requirements for selling on the formal market, which requires variety propriety documentation and production field registration and inspection by the regulating authorities. The legal procedures are still deemed too expensive for the farmers involved in the enterprise to comply with.

The programme obtained funding from Pronaf to develop basic seed drying facilities and low-cost short-term storage on farms to improve the farmers’ seed enterprises. It also has plans for future investments to further improve storage conditions and quality control of the produced maize seeds through the use of better receiving, drying, processing, classification and testing (including germination and vigour testing) by submission of a project of a industrial seed processing plant and quality control laboratory to governmental institutions for financing.

Community participation is a major feature of this programme, and a cornerstone of its achievements. The involvement of the communities in all aspects of the programme, from conceptualization through to planning and delivery of the work programme, raised the perception among community leaders that the technology available from the public institutions, UEL and IAPAR could help improve farmers’ cropping techniques and consequently their economic returns and living standards.

UEL staff have recently started a similar programme with family farmer communities located in northern Parana.

### **3.1.2.1 Key success factors**

#### ***Conducive policy environment***

As already discussed under the soybean case study, Brazil has long had seed legislation and plant breeders’ rights in place, providing an environment conducive to investment in plant breeding and seed enterprises.

#### ***Availability of credit***

The government has provided subsidized loans under favourable terms, which contributed to the success of the programme, allowing resource-poor farmers to purchase the inputs and equipment needed to engage in seed production. However, credit has been more difficult to obtain in recent years with declining government support in this area. This has hampered seed production, but has also limited demand for seed itself, making development of seed enterprise less financially viable.

#### ***Technical expertisellinkages with R&D and extension services***

The programme benefits from skilled, knowledgeable and dedicated staff of the NGO and the university, and from links with the State agricultural R&D institute (IAPAR).

#### ***Community participation***

Inclusion and real participation of the communities in the work was a necessary step to ensure the communities’ real interests were taken into consideration. It was also necessary

to overcome the communities' general distrust of governmental programmes, which had often failed in the past and caused financial losses and sometimes even rural exodus. The participatory approach has shown clear benefits to the uptake of improved technologies, as well as increasing general awareness among farmers of the value of the technology available from the participating institutes.

#### *Capacity building*

UEL, IAPAR and AS-APTA maintain a training programme on techniques for maize cropping and seed production including harvesting, drying and seed storage, which ensures that participating farmers are able to gain full benefit from the breeding programme.

#### *Focus on agricultural development*

As with the soybean seed enterprise, the maize programme focused on supporting broad-based agricultural development, not just seed production, with extensive farmer involvement and demonstration of new techniques and approaches.

### **3.1.2.2 Constraints**

#### *High cost of complying with legal requirements for seed marketing*

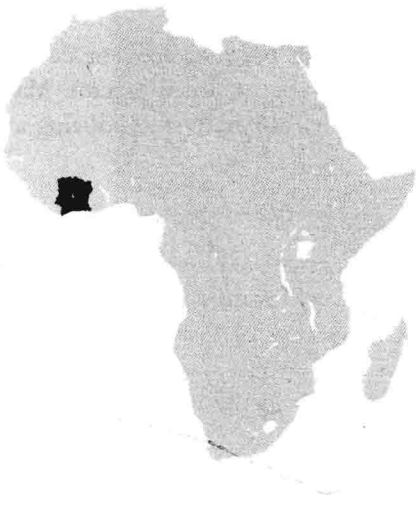
The resource-poor farmers involved in the programme cannot afford the cost of complying with seed certification regulations, both from their operational costs and the costs that would have to be passed on to their customers (other resource-poor farmers).

#### *Ongoing dependency on NGO and university support*

The programme is still dependent on support and intervention from the NGO (with donor funding) and the University, and hence is not self-sustaining. This reflects the low income from seed production activities under this model.

#### *Difficulty obtaining subsidized loans*

Credit has been more difficult to obtain in recent years with declining government support in this area. This is restricting further development of the seed enterprise and restricted demand for seed.



### 3.2 CÔTE D'IVOIRE

The case study in Côte d'Ivoire focused on the rice seed sector, and examined the operations of three farmer cooperatives involved in seed production and marketing.

Rice is the major subsistence crop in Côte d'Ivoire, but only about 10% of the crop is planted to improved cultivars. The main reasons cited for this are: lack of a seed policy; dominance of farm-saved seeds; lack of information about farmers' seed needs; lack of linkages between the different stakeholders in the seed sector; lack of seed production approaches adapted to the needs of smallholder farmers.

Farm sizes are small, averaging 0.8 hectares in rainfed systems and 0.3 hectares in irrigated areas. Yields are generally low because of the prevalence of traditional cropping systems, the preponderance of rainfed cropping and the low levels of use of both improved seed and other inputs.

Production of rice seed in Côte d'Ivoire started in the 1960s with multiplication and distribution of varieties bred by government institutes or introduced from other countries. During the 1970s the government established a seed certification laboratory, a foundation seed farm, introduced a seed multiplication agreement with farmers with a multiplication premium, and established three seed processing and storage centres. Seeds were distributed to farmers free of charge.

In 1985 the government established the Plants and Seeds Office to manage the seed production, processing and marketing. Seeds continued to be distributed free of charge.

A national decree on plant varieties Release and protection, and seed production and distribution was promulgated in 1992 and a national seed plan and technical regulations for certified seeds were developed. However, the national seed plan has yet to be approved or implemented, leaving a policy vacuum.

The government adopted a policy of privatization of seed production in 1989 and seeds were no longer distributed free of charge. The Commonwealth Development Corporation was in charge of managing a seed processing and storage unit until 1994, when it withdrew following several years of losses.

This 'history' is similar to that in other West African countries, including Ghana (Lyon and Afikorah-Danquah, 1998).

Seed production has since declined, as have average crop yields as farmers have reverted to saving their own seeds or buying uncertified seeds on local markets.

The National Rice Programme (PNR) produces first and second generation seed from parental material bred by the national agricultural research centre (CNRA) and the Africa Rice Center (WARDA). Seeds are certified by the National Laboratory for Agricultural Services Support (LANADA). The National Agency for Support to Rural Development (ANADER) ensures the dissemination of new technologies. Seed is produced commercially by a wide range of actors, including small businesses, various interest groups, associations and NGOs. Some international organizations have also initiated seed multiplication in rural areas through emergency programmes managed by NGOs. Seed is also produced at the village community level through Community Based Seed Systems (CBSS). These activities are now meant to be coordinated by the National Rice Producers' Association (ANARIZ-CI).

Under the CBSS approach, which supports informal farmer seed systems, the public sector plays a facilitation role. Key roles include producing and maintaining basic seed, certifying seed and providing information about seed and available varieties at the national level. Farmer organizations provide practical training for farmers, participate in variety testing, produce seed, provide information on varieties at the community level, monitor



and control seed quality, and disseminate seed. Farmer organizations have a lead role in developing seed enterprises and in stimulating demand for quality seed.

Cooperatives have been seen as a means of filling the gap between nascent demand for improved seed and the lack of seed provision by the public or private sector. Many development projects have supported development of farmer cooperatives producing and marketing rice seed and grain.

### **3.2.1 Seed production cooperatives in Côte d'Ivoire**

The study examined three cooperatives involved in producing rice seed: The Central Region Rice farmers Cooperative (CORICENTRE), The Food Crops Production and Marketing Cooperative of Daloa (COCOPROVIDA) and the Cooperative of Food Producers and Livestock Breeders (WALESE).

CORICENTRE arose from a development project aimed at increasing production and marketing of rice. The cooperative was established to coordinate activities by member farmers, linking production of quality-controlled seed to seed needs for rice production within the cooperative (but also selling seeds to the National Rice Programme and other farmers). The cooperative ensures members receive the seed and inputs they need to produce their crops and assists in marketing of the grain produced. The cooperative has provided extensive training in rice production and seed production for participating farmers and has coordinated participation in several seed production projects, including one supported by the European Union and FAO. Operating costs of the cooperative are meant to be covered by levies paid by members, but these are not always paid. The main strengths cited for the cooperative are the enthusiasm of the members, their experience in rice production, the availability of land, and local demand for seed.

COCOPROVIDA was set up to fight poverty by helping women in the Daloa region increase their self-reliance. About 2000 women from 58 villages are members of the cooperative. The main activities were cassava and rice production, but the cooperative later decided to produce seed of both irrigated and rainfed rice varieties. Seed for growing on was obtained from CNRA, WARDA and PNR. Seed of local varieties is also produced. In 2005/06 the cooperative sold seed to five main clients, including PNR, Caritas and FAO. Extension services and support, including training, are provided by an NGO, a voluntary agency, and several national and regional organizations that support small-scale agricultural development. The main strengths cited for the cooperative are the enthusiasm of the participating farmers, their experience in rice farming, and the availability of land to allocate to seed production.

The WALESE cooperative was established in 2004 with assistance from an NGO and currently has some 2500 members, mostly women. Two members have been trained in seed quality control but the cooperative does not have any quality control equipment. It is planned to start seed production in 2009.

#### **3.2.1.1 Key success factors**

The importance of sustained demand for seed is evident from the experience of both CORICENTRE and COCOPROVIDA cooperatives.

CORICENTRE is an integrated rice operation, in which seed production is closely linked to grain production. Rice produced is marketed as grain or milled to add to its value. The cooperative also organizes supplies of other inputs for grain production, including fertilizer and herbicides. Thus, the operation is producing seed to meet well-established and known seed demand, but also benefits from a broader operational base, being an end-to-end market chain for rice. It represents a potentially sustainable model for the stage of development of the seed sector in Côte d'Ivoire.

COCOPROVIDA was set up to meet demand for seed from the National Rice Programme, PNR, a parastatal organization. However, with declining government support for free distribution of seed, PNR is likely to purchase less seed in future. Other major clients are organizations running emergency food operations in the country, which again is not a