

# Finance and Management of Small-scale Seed Enterprises

S. Kugbei, M. Turner and P. Witthaut  
*Editors*



International Center for  
Agricultural Research in the Dry Areas

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# **Finance and Management of Small-scale Seed Enterprises**

**Proceedings of a workshop on  
Finance and Management of Small-scale Seed Enterprises  
26-30 October 1998  
Addis Ababa, Ethiopia**

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**Front cover:** A small-scale local seed shop in the Babjenine market, Aleppo, Syria.

**Back cover:** Top, a seed shop in Tamale, northern region of Ghana. Bottom, a shop where different agronomic products can be purchased, Mexico. Inset: Selling seed and grain at the Jumaa market in Aleppo, Syria.

**AGROVOC descriptors:** Grain legumes; potatoes; seed industry; seed production; small enterprises; small farms; seed balance; economic value; financial policies; marketing; profitability; contracts; development projects; Georgia; India; Turkey; Yemen; Egypt; Ethiopia; Ghana; Malawi; Sudan; Uganda; Zambia; developing countries; Middle East; North Africa.

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## Foreword

One of the key changes taking place in many countries is the greater participation of the private sector in seed production and supply, reflecting a general shift in economic policy. There is, therefore, a need to ensure that this change also promotes the growth of an indigenous seed sector, in which many different companies could participate to create a diversity of suppliers. The challenge is how to initiate this process and encourage new entrants to the seed business.

ICARDA maintains a strong Seed Unit which serves the needs of the seed programs in countries of the Central and West Asia and North Africa (CWANA) region, with the ultimate objective of improving the supply of quality seed of improved varieties to farmers. The Unit has a wide range of activities, including seed production, training, information management, research, and consultancy. The Unit also looks ahead to the future needs of the seed sector in a changing global environment.

A major obstacle to developing a strong indigenous seed sector is the lack of knowledge about organizing seed businesses, particularly at the local level. Producing and selling seed is complementary to other trading activities in the rural community, but it also involves some special risks that can deter entrepreneurs. Some entrepreneurs prefer only to sell seed, and not get involved in its production. However, local production can offer substantial cost savings and other benefits from closer contacts with farmers and understanding their real needs. There is, therefore, a need to look at the benefits from devolution of seed production to smaller enterprises that are in direct touch with farming communities.

Against this background, ICARDA organized a workshop in Addis Ababa in 1998 to bring together the varied experience in the finance and management of small-scale seed enterprises. This was probably the first meeting of its kind in the region on this subject. These proceedings contain the text of presentations made at the meeting. It is hoped that this volume will help promote further interest among national programs, donors and the commercial enterprises in seed production and distribution.



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This workshop provided a unique opportunity for seed specialists from Asia and Africa to meet and exchange views on how to establish and promote small-scale seed enterprises as alternative suppliers of seed in developing countries. The International Center for Agricultural Research in the Dry Areas (ICARDA) would like to thank the Ethiopian Seed Enterprise (ESE) for making all the logistical arrangements for the workshop and particular thanks to Mr Ato Getachew Detsa for his untiring efforts as a local organizer.

ICARDA is grateful to the Government of The Netherlands for sponsoring the entire workshop through their support to the DGIS Training Project in Seed Technology.

Special thanks go to all the presenters and participants for their free exchange of ideas and views, which created a warm, friendly, and stimulating atmosphere throughout the meeting.

Finally, we give our sincere thanks to Ms Constanza Mosquera, Ms Wafa Meskine, Nuha Sadek and Joyce Bendki in the Communication, Documentation and Information Services Unit of ICARDA for their assistance in preparing these proceedings.

## Welcome Address

*Ato Aberu Dagneu*  
*General Manager, Ethiopian Seed Enterprise, Ethiopia*

Dr Getenet Gebeyehu, General Manager of the National Seed Industry Agency and Chairman of the Board of Management of Ethiopia Seed Enterprise, Representatives of ICARDA and GTZ, Distinguished Guests, Participants, Ladies and Gentlemen. On behalf of ICARDA and the Ethiopian Seed Enterprise, the organizers of this workshop, it is a great pleasure for me to welcome you all, especially our foreign guests and colleagues, to Ethiopia and to this workshop.

I am gratified to learn that all workshop participants from abroad, with the exception of one coming from Georgia, have arrived safely in Ethiopia and without difficulty. We are lucky to host and have participants from 13 different countries, namely, Syria, Egypt, Malawi, Ghana, Uganda, Zambia, Sudan, Morocco, Yemen, India, Turkey, Kenya, and Ethiopia. With such a wide representation and diverse experience, I strongly believe it is possible to harvest a lot more from this workshop in five days than one would acquire from a five-month formal training course. It is, therefore, a good opportunity for you all to participate. I expect that your unreserved participation and share of experience will be essential in making it interesting and fruitful.

Distinguished Guests, Ladies and Gentlemen. I understand from the workshop program that you will have a field visit to observe our experience in developing a small-scale seed production scheme. During your visit, you will have a chance to see varieties of crops including *tef* grown in the field of small holder farmers. By the way, *tef* is a crop not only unique and indigenous to Ethiopia, but it is also our staple food. You will have a chance to enjoy the taste of *enjera*, a dish that is made of *tef*. During your short period of stay in Addis Ababa, you should find time to explore what the city can offer you. Addis Ababa is renowned for its pleasant climate, its huge open market or *Merkato*, its traditional music and dancing, its wide variety of delicious native dishes, and its typical Ethiopian souvenirs of all sorts.

I am sure these, coupled with the well-known Ethiopian hospitality, will make you feel comfortable and very much at home. As host and co-organizer, Ethiopian Seed Enterprise will do its best to make this workshop productive and successful.

Finally, I would like to take this unique opportunity to thank ICARDA for the financial support given to this workshop and to the Workshop Organizing Committee for their diligent contributions to make it a reality. I once more extend my warmest welcome to you all and wish you a pleasant stay in Ethiopia. I would now like to call upon Dr Getenet Gebeyehu to officially open this workshop on Finance and Management of Small-scale Seed Enterprises. Thank you for your attention.

## **Keynote Address**

### **The Role of Seed in Agriculture**

*G. Gebeyehu*

*General Manager, National Seed Industry Agency, Ethiopia*

Ladies and Gentlemen,

It is a great pleasure for me to address you at this opening session of the workshop on Finance and Management of Small-scale Seed Enterprises, and to speak about the role of seed in our agricultural system.

Seed is a basic input in agriculture, since crop productivity is directly related to the genetic potential of the seed planted, in addition to effective use of other recommended inputs and appropriate crop management practices. Seed production is a biological process, which involves multiplying small quantities of breeder seed into larger quantities for commercial distribution, following specified stages over successive cropping seasons. These are breeder seed, pre-basic seed, basic seed, and certified seed.

Since seed is living, it is subject to the natural phenomena of aging and death. Seed therefore needs careful handling, particularly during transportation and storage. Unlike products such as fertilizers, which are factory-manufactured in large quantities with in-built quality control arrangements, farmers under different farming conditions usually produce seed lots that need to be tested individually for quality before being offered for sale. Quality attributes tested include germination capacity, physical purity, variety purity, moisture content, and freedom from disease.

Ethiopia is blessed with a great diversity of indigenous crop species. For centuries, Ethiopian farmers have maintained this precious diversity through saving their own seed and exchanging material with neighboring farmers. These so called landraces have been going through the process of mutation and natural selection to generate new genetic materials over time that have become well adapted to specific agroecological conditions. These native varieties are normally noted for their resistance to disease, insect infestation, moisture stress, etc. Although the landraces are generally lower yielding compared with modern varieties bred in research stations, they continue to provide valuable genetic material for crop improvement research.

Variety improvement for cereals, pulses, and oilseed crops has a long history in Ethiopia that started when the Alemaya University of Agriculture (AUA) was established in the 1950's and the Institute of Agricultural Research (IAR) in the late 1960's. Varieties from these institutions were first introduced to farmers in 1967 under the Swedish-assisted Minimum Package Program at Chilalo Awaraja in Arsi Zone. The Chilalo Agricultural Development Unit (CADU) supplied farmers with a package of inputs and services, which included improved seed, fertilizer, pesticide, credit, and extension advice. The success of CADU encouraged similar minimum package programs in other regions by international

agencies including IDA, USAID, and FAO in collaboration with the Extension Service of the Ministry of Agriculture.

Production of improved seed on a commercial scale was institutionalized in 1978 with the establishment of the parastatal Ethiopian Seed Corporation, now Ethiopian Seed Enterprise (ESE), which is governed by a Board of Directors. The main objectives were to: (i) organize the production and marketing of improved seeds developed by the IAR and other agricultural research establishments, (ii) import reliable high yielding varieties, and (iii) organize seed cleaning and processing facilities at various locations. Until 1990, ESE was virtually the sole producer of seeds in the formal seed sector. It obtained breeder seed from the IAR and AUA, multiplied it into pre-basic and basic seed on its seed farms, and finally into certified. In July 1990, a Joint Venture Agreement was signed between the Ethiopian Seed Corporation and Pioneer Hi-bred International to procure, produce, process, condition, distribute, and sell seeds and other agricultural products domestically as well as in the export markets. Of the estimated total annual seed requirement of 7 million quintals, improved seed requirement is about 1.9 million quintals. This crop season, both ESE and Pioneer Hi-bred plan to distribute only 205,000 quintals of clean seed.

In terms of seed policy, there have recently been significant changes. For the first time in October 1992, the Transitional Government of Ethiopia announced a National Seed Industry Policy (NSIP). This was to help develop a modern seed industry in line with the national economic development policy, which promotes the development of private enterprises. The seed policy was introduced to encourage domestic private seed enterprises to participate actively in the production and distribution of improved seeds. The principal objectives of NSIP include: (i) to oversee and ensure seed industry development, (ii) to ensure that seed producers, the farming community, and exporters of agricultural produce benefit from the seed industry, (iii) to streamline variety evaluation, release, registration and maintenance activities through a new organizational set-up, (iv) to develop an effective system of producing and supplying high quality seeds of important crops to satisfy national seed needs, (v) to encourage the participation of farmers in germplasm conservation seed production, (vi) to create a functional and efficient organizational set up to facilitate cooperative linkage and coordination between the various participants in the seed industry; and (vii) to regulate seed quality standards, import and export, seed trade, quarantine and other seed related issues. To achieve these objectives, the national seed policy defines expected roles of the public and private sectors in seed industry development and removes distortions by allowing market forces to determine the price of seed. The policy also promotes active participation of farmers, strengthens the seed quality control system, lays down arrangements for variety testing and release, and promotes secondary seed multiplication of local and improved cultivars at village level.

The Government issued a proclamation (No. 56/1993 of 16 July 1993) establishing the National Seed Industry Agency (NSIA), under the umbrella of a National Seed Industry Council (now National Seed Industry Board), to implement the national seed policy and promote a broad-based seed industry that involves both the formal and informal sectors. The seed policy has been followed by a seed legislation proclamation (No. 16/1997), which aims

at regulating activities of the seed industry by protecting the interests of plant breeders, distributors and farmers. The private sector will be encouraged to invest in variety development, as well as in seed production and supply by providing technical guidance and financial support to private seed enterprises. The government will, however, continue its role in seed quality control to ensure that farmers receive good seed.

Under the guidance of NSIA, attempts are being made by the government to strengthen the technical, managerial, and institutional development of the public sector by supporting seed production in favorable areas through contractual arrangements with state farms, seed growers, and farmers. Support is also given to domestic private seed enterprises, which handle seed production, marketing, and distribution. In this way, the seed policy intends to create a suitable environment that encourages competition through price deregulation, subsidy elimination, regulation of quality control, truth in labeling procedures, and equal access to breeder, basic and certified seed. Special attention is being given to the participation of the private sector seed production of self-pollinated crops.

At present, the national seed policy is encouraging the participation of the informal seed sector in seed supply, since this sector provides over 80% of the national requirement with farm-saved seed. The NSIA through the Seed Systems Project is implementing the Farmer Based Seed Multiplication and Marketing Schemes (FBSMMS) in several regions of the country, which encourages variety diffusion within communities through farmer-to-farmer seed exchange. The scheme is implemented as a collaborative effort between the Regional States and NSIA, which provides technical assistance in the form of credit for purchasing inputs including seed, fertilizers and pesticides, as well as storage facilities and simple machinery and equipment for harvesting and seed cleaning. Training is also given in improved seed production techniques to farmers who participate in the Scheme. There are encouraging results obtained so far. Over 180,000 quintals of seed of various crops are expected to be produced by the Scheme this cropping season, with significant expansion expected in the coming years. NSIA encourages efforts made by a number of international and local NGOs, which are also involved in Small-scale seed production particularly in drought prone communities.

Finally, I would like to thank the organizers of this workshop. May we all try to change the lives of millions of hungry people in Africa.

Thank you.

## Opening Remarks

*Michael Turner*

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On behalf of the Director General of ICARDA and the Seed Unit, I would like to extend a very warm welcome to all the participants in this Workshop on Small Seed Enterprises. I thank you all for your interest, and especially those who have prepared papers and will make presentations during the week. I must also thank the Ethiopian Seed Enterprise for all their assistance with the arrangements here in Addis Ababa.

I regret very much that I am not able to attend personally, as this is a subject in which I have been interested and involved for some years. However, the Seed Unit is well represented here by three staff members,

- Dr Sam Kugbei, our Seed Economist who has organized the meeting,
- Dr Lahcen Grass who runs our training project, which is funding the meeting, and
- Mr Zewdie Bishaw, our Seed Systems Specialist who is interested in seed security and mechanisms of seed supply to small farmers.

As I am sure most of you know, ICARDA is one of 16 centers sponsored by the Consultative Group for International Agricultural Research, the CGIAR. ICARDA has a geographical mandate for the West Asia and North Africa (WANA) region, which is mostly characterized by a cool winter, in which rainfall occurs, followed by a hot dry summer. This region extends from Morocco to Pakistan and from Turkey to Ethiopia and the Arabian Peninsula. The remit has recently extended to include the countries of Central Asia and the Caucasus (CAC), which have a broadly similar agro-ecology. In addition, ICARDA has a global mandate for the improvement of barley, lentil, chickpea (kabuli types) and faba bean, and a regional mandate for wheat and some forage species.

The headquarters of ICARDA are near Aleppo in northern Syria, but much of its work is carried out through regional programs which facilitate the collaborative work with national agricultural research systems (NARS). There are now two main programs of research, Germplasm Improvement for the crops named above, and Natural Resource Management. This latter program, formed in 1997 through the amalgamation of previous work, addresses difficult problems of reconciling the sustainable use of natural resources with the increasing demands of production to supply a growing human and livestock population.

Among all the International Agricultural Research Centers, ICARDA is the one which has given most attention to seeds. This reflects a recognition from the early days of the Center that seeds play a key role in the diffusion of research outputs, particularly new varieties from breeding programs, but also forage and pasture seeds which play a part in the sustainable management of natural vegetation for feeding livestock. As a result of this interest, a Seed Unit was established at ICARDA in 1985 with funding from the Governments of Germany and The Netherlands. Besides some internal responsibilities, the Unit has

developed a substantial program of work to assist the development of seed activities in countries throughout the region. The main vehicles for this work are an information network and a training program, together with some consultancy work and research. Our partners in this development process are the national seed organizations in some 18 countries of the WANA region. In the last year, we have become actively involved with the CAC countries where seed industries are in a phase of rapid transition, following the shift to a more market-oriented economy.

The work of the Seed Unit was originally focused mostly on the technical aspects of seed production such as processing and quality control, but in recent years there has been an increasing interest in matters of policy and economics. This reflects the structural changes in many countries as national seed programs become less dependent on government funding and the private sector is expected to play a larger role. The prevailing view now from the international funding agencies and other donors is that the government should create a favorable 'policy environment' within which other parties can become the main producers and suppliers of seeds to farmers. This 'diversification' of the seed supply is intended to have benefits in terms of efficiency and competition, besides reducing the burden on the government budget.

The current fashion for privatization is often interpreted simply as selling off existing government facilities to the private sector, but in practice that is not an easy task. Parastatal companies and official seed organizations are usually large in terms of capital investment and staff, leading to high overhead costs and managerial complexity which are not attractive to the private sector. There has been very little success in this process of 'divestment' except by leasing facilities to other users. The multi-national seed companies are of course active in many countries, but usually only in the limited range of crops where hybrid varieties exist. There is little interest in self-pollinated cereals or legumes in which profit margins are low.

An alternative approach is to encourage the growth of new suppliers, who may satisfy local or crop specific seed demand at much lower cost. Such local enterprises would be consistent with the policy of 'rural business development', which is very much in favor, and they would be a more effective channel for locally adapted varieties suited to a particular area. However, there is a serious lack of information and experience to support these initiatives. Much of the work by non-governmental organizations (NGOs), though well intentioned, has relied on the injection of substantial external resources with little regard to financial or social sustainability.

Against this background, the context and importance of this workshop should be very clear. It provides an opportunity to advance the concept and especially the practicalities of small seed enterprises by sharing information and experience. I am sure it will be an interesting week and I wish you every success in your presentations and discussions. The Seed Unit has invested a lot of effort in preparing for this meeting and we hope that with your active participation, we may see a good return on that investment both in the discussions here and in a subsequent publication.

## **Session I**

### **Introductory Papers**

## Structure and Establishment of Small-scale Enterprises in Seed Industries of Developing Countries

*S. Kugbei and M. Turner*

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### Abstract

In developing countries, the majority of farmers still save their own seed using traditional practices, although modern varieties exist and large seed organizations produce and distribute certified seed. This is partly due to a lack of effective seed delivery systems that suit the needs of small farmers. Seed companies do not generally have a commercial interest in many of the crops grown by small farmers because they earn relatively small profit margins. There is therefore still a challenge within rural communities to identify cost-effective mechanisms to deliver seeds to small farmers. Although it is obvious that these have to be small enterprises that are located in the community and cater for local seed needs, it is not clear how they should be organized in a sustainable way. This paper provides a simple working definition of small-scale enterprises expressed in terms of ownership, management style, and method of operation. It gives examples of possible forms of small seed businesses, suggests how these could be set up and encouraged to grow, and describes essential organizational and financial management features.

### Introduction

Over the past three decades, there has been significant investment in large-scale national seed organizations and production farms in developing countries as mechanisms for multiplication and distribution of modern varieties. Many governments have encouraged this centralized approach partly because farmer sources and traditional varieties were regarded as incapable of providing production gains required to meet national food and seed requirements arising from rapid population increases. However, success in seed production and distribution by large parastatals is generally limited, and much of the seed provision is still made by small farmers who save their own seed and sometimes distribute it in farming communities using local means of exchange. Many countries are therefore seeking alternative ways of making seed available, particularly to the majority of farmers through the informal sector.

Privatizing public means of seed production is one approach that has been taken by many countries, but this does not solve problems small farmers face, since the new commercial companies are generally interested in improved varieties of high-valued crops, especially hybrids. On the contrary, a majority of small farmers usually rely on less profitable cereals and food legumes, which do not attract private sector investment. Indeed, the move to privatization of existing parastatals may mean that less seed is sold to small farmers. These farmers save their own seed using indigenous knowledge and traditional practices. Privatization policies should therefore take into account the needs of small farmers in terms of improved seed supply. The only effective way of meeting the needs of resource poor farmers is to produce and distribute better seed at low cost within farming communities. However, it has been difficult to identify the best way to do this. A solution may lie in

small-scale seed enterprises that are owned and run by the farmers themselves or by others in the rural business community. Such enterprises should have appropriate incentive structures that encourage village-level investment and commitment to seed production.

### **Definition of Small-scale Enterprises**

The functions of seed enterprises extend beyond farm-level multiplication (what growers do) to include post-harvest handling, cleaning, storage, and marketing. There are several definitions of small-scale enterprises depending on the industry and the country in which they are located. Similarly, criteria for defining enterprises also vary. The range within which an enterprise is classified as small and the way in which its size is measured are the subject of some debate (Harper 1984). Many studies use quantitative definitions, of which the most commonly used criteria include employee numbers, value of capital, sales turnover, and value added products. Employee numbers is frequently used to define small-scale enterprises, particularly those within the manufacturing sector (Sowa et al. 1992; Liedholm and Mead 1998). The Employment and Enterprise Development Project under Harvard Institute for International Development also analyzes the manufacturing sector by scale, defined by the number of employees (Young 1993).

Using employee numbers has some problems and is of limited application in seed production because of the seasonal nature of labor requirement, the prevalence of casual (temporary) employment, and the extensive use of unpaid labor including children in family enterprises. Valuation problems associated with the use of capital (cash, inventories or stock, and capital equipment) also render this measure of limited use. Both sales turnover and value added require measurement over time, which can be very difficult and are subject to seasonal variation. In addition, excluding the cost of purchased materials and supplies from actual sales value, further increases measurement problems in using the value-added approach.

Instead of a quantitative definition, this paper uses a qualitative description based on the management style and method of operation of the enterprise. It adopts a definition used by P. Neck: “*Small enterprises are those in which the management lies in the hands of one or two people who are also responsible for the major decisions*” (Neck 1977 quoted in Harper 1984 p. 5). This definition identifies a critical management feature of small-scale seed enterprises. It may be of greater importance than any quantitative measure. It is also similar to a description given to small-scale seed enterprises as those in which one person bears the responsibility of many functions, which are generally distributed among several persons in a large enterprise (Douglas 1980). This is an important characteristic that is evident in many small enterprises in other sectors (World Bank 1978; Carr 1981).

Small enterprises may be particularly suited to smallholder communities because seed selection and use are location-specific, with particular varieties often confined to specific agro-ecological niches. They have comparative advantages in serving geographically dispersed communities that are isolated by poor infrastructure. Reduced transport, distribution, and supervision costs are therefore major advantages over large seed companies.

### **Types of Small-scale Seed Enterprises**

By definition, small-scale seed enterprises are owned and managed by few people, with each person bearing responsibility for many functions. Investors, who are either already engaged

in farming operations or have close relationships with farmers, should come from within the community. Potential entrepreneurs, who can operate small-scale seed enterprises in developing countries, are diverse and include the following:

- Individuals and their families such as key farmers, merchants, traders, former extension officers, seed sector employees, and other interested persons.
- Small companies formed as a partnership among few businessmen or farmers.
- Farmers Cooperatives.
- Seed Producers' Associations formed from farmer groups.
- Community-based groups supported by non-governmental organizations (NGOs).

### **Seed Enterprise Establishment and Growth**

One of the difficult challenges facing small-scale enterprises is the search for a suitable organizational structure that is cost-effective in providing seed within farming communities. This involves identifying the right kind of people who can develop and operate seed enterprises and helping these enterprises to get established and thrive.

#### **Institutional Support**

It is difficult for small-scale seed enterprises to emerge by themselves. There has to be an institutional arrangement that takes the lead in initiating and coordinating initial efforts in developing them. This support could be at national, regional or local levels and could involve government institutions, the private sector or NGOs.

#### **Market Research**

An important step in enterprise development is to conduct a market research to assess the demand for particular varieties and seed at the community level, indigenous knowledge and practices used, and constraints to seed delivery. This could be done through a survey of farm households in the area.

#### **Identifying Investors or Entrepreneurs**

Since seed production and marketing require specialized knowledge, skills, and resources, it is important to identify individuals and groups who are prepared to invest in this sort of business and do it well. They should therefore have interest and experience in seed production and be concerned about selling good seed and maintaining reputation among farmers. Within the community, such entrepreneurs could be leading farmers, former extension agents, traders or merchants, and other businessmen such as grain dealers who carry out a speculative trade in seeds on a 'spot market'. This last category of dealers may be encouraged to undertake production as an adjunct to merchandising by contracting growers so that the seed they deal with has a clear identity in terms of origin and quality. The identification process should also include an analysis of advantages and disadvantages of alternative legal status of enterprises as defined by local legislation.

#### **Business Planning**

Before starting operations, an investor needs to draw up a business plan. The type of plan depends on the legal status of the enterprise, since it shows how the business borrows money, finances its operations, uses its profits, and manages and conducts its activities.

The plan should specify factors that affect the setting up of the enterprise, including the following:

- Initial capital requirement, especially loan facilities to purchase fixed capital items.
- Financing of working capital (savings and credit facilities).
- The investor's knowledge and experience in opportunities for trading in seeds.
- General level of economic activity.
- Reduced barriers to entry such as unfavorable licensing conditions and other government regulations, taxes, preferential access to inputs and subsidies, etc.
- Availability of information on seed demand.

### **Set-up Support**

Potential investors in small-scale enterprises may need incentives if they are to produce seed of less profitable crops that are not attractive to large seed companies. Support could take the following forms:

- Public sector research in less profitable crops.
- Access to basic or foundation seed of crops grown by small enterprises.
- Low or interest-free credit, grants, and temporary subsidies to get started.
- Tax-free holiday period.
- Training in seed production, quality testing procedures, and enterprise management.
- Arrangements to acquire basic equipment (e.g., simple seed cleaner), storage facilities, and materials (e.g., bags, fumigants and labels).

Support should be for a specified period of time until the enterprise succeeds in producing and marketing good seed, and demonstrates profitability.

### **Continued Growth**

Small enterprises are particularly vulnerable during the first few years of establishment since the entrepreneurs are exploring and learning how to run their new businesses.

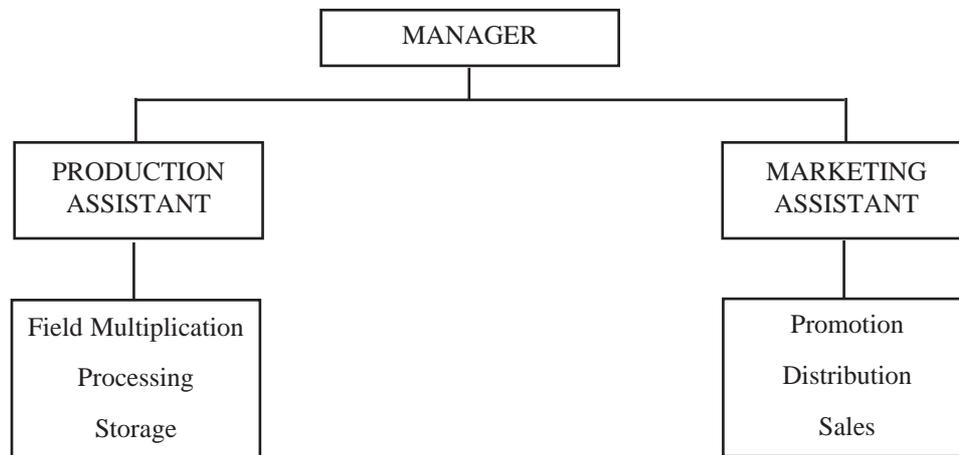
Whether the enterprise will survive and expand will depend on factors such as:

- Opportunities for diversification so that risks of business failure are spread over a wider portfolio of investment options.
- Proximity to growing seed markets and capacity to win new customers.
- Educational level and experience of entrepreneurs.
- Access to and ability to attract productive resources for reinvestment.
- Close links with other seed-related institutions such as variety research, source of basic seed, extension services, credit, quality control services, etc. This linkage with formal sector institutions should be regarded as a partnership and not opposition. In cases where crops have to be inspected or certified, a close connection with the seed certification agency is desirable and payment of fees properly worked out, if necessary.

Other factors critical in enterprise performance are the overall structure, financing and management of the enterprise.

## Organization and Financial Management of Seed Enterprises

To be successful, a seed enterprise must have the capacity to multiply, clean, store and market good seed effectively. This may require access to basic seed of new and existing varieties. These various activities must be coordinated and controlled by an effective management structure. A typical small-scale seed enterprise is illustrated in Figure 1, where only three key people supervise the entire operation of the enterprise with each person put in charge of a range of activities. This means that these essential staff must have good knowledge of both technical and economic issues involved in the production and marketing of seed.



**Figure 1. Suggested structure of a small-scale seed enterprise.**

There are three special management features of seed enterprises:

- Seed is a living material and has to be handled carefully so that its quality is maintained right through all processes from harvesting to the next planting time. This is important particularly in warm and humid climates where it is difficult to bring seed to a safe level of moisture content soon after harvest, and to keep it in store.
- As a biological process, seed multiplication is not characterized by significant economies of scale like in controlled processes such as conventional manufacturing because of several external factors which can cause sudden changes. These include variations in climatic conditions and disease/pest infestation.
- The seasonal nature of seed production limits flexibility in matching output with demand since it is difficult to influence unforeseen events during the seasons in which they occur (e.g., a sudden breakdown in resistance or occurrence of severe pest infestation). However, such effects could be partly mitigated by good planning.

These factors mean that many decisions should be made promptly and on the spot, so delegation of responsibility to relevant support staff is very crucial. Seed production is seasonal and therefore requires good financial planning. For example, funds have to be secured and made available to pay growers soon after they deliver raw seed if they are to remain committed to the terms of the contract agreement.

Where demand is uncertain, it is financially risky for small enterprises to deal in seeds which can lose viability quickly and cannot be used otherwise (e.g., vegetable and forage seed). However, vegetable seeds in sealed packets are durable and could be a useful additional business for local agents. Cereal seed can be sold as grain if no chemical treatment has been applied. It is advisable therefore to treat seed on demand and leave all remaining stock untreated so that this is sold as grain if necessary.

Financial management is particularly difficult in times of acute inflation since input loans and seed prices become difficult to determine. In such situations it is sometimes better to recover loans in kind and keep working capital in foreign exchange if possible.

### Conclusion

On the whole, successful small-scale enterprises are those that:

- are formed by a combination of new ideas with attractive attributes of existing local systems of seed production,
- have a lasting impact, by showing a capacity to survive in the long-term,
- are not continuously dependent on external support,
- have close links with relevant formal sector seed activities so that the farmers benefit from investments in variety research, associated technologies and quality control services,
- serve as dependable sources of good seed or that contribute to higher productivity and prosperity in the community

Setting up small seed enterprises and encouraging them to grow and survive in the future should be part of privatization efforts in developing countries. Measures should take account of the country's economic development, and fit within the culture, traditions, and institutional arrangements in farming communities.

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## Legal Considerations in Establishing Small-scale Seed Enterprises

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### Abstract

An entrepreneur setting up a new seed enterprise does not only take into account financial, economic, and marketing factors, but also an appropriate legal status for the business. In most countries, there are different types of legal structure for enterprises and these are generally defined in the company law. The manner, in which a seed enterprise manages and conducts its affairs, borrows money, the type of financial information it generates, and the people who receive such information are to a great extent related to the legal structure of the business. Advantages and disadvantages of alternative organizational forms and attempts to provide general guidelines on factors that are relevant in the choice of an appropriate legal basis for seed enterprises are discussed here.

### Introduction

The first step in setting up a seed business is to carry out market research into the location and needs of the farming community, crops and varieties required, the quality of seed to be produced, and the range of prices the farmers will be willing to pay. These will form the basic elements for the next step, which involves preparing a business plan. But before doing so, it is necessary to look at some of the legalities that may be involved in setting up the business.

Setting up a seed enterprise within an appropriate legal framework is important in protecting the owner's capital and initial investment costs. There are two fundamental factors that influence the choice of a suitable organizational structure for a small-scale seed enterprise. First, the amount of money (capital) needed to start the business, to acquire basic machinery or equipment, and to finance working capital. Second, the risk involved in the business and the extent to which the possibility of financial failure should be spread. An investor therefore needs the essential elements of alternative legal forms in deciding on an appropriate structure for the seed business.

### Types of Legal Forms

Legal factors become important when private persons seek to form business associations with the objective of making profit. In establishing a seed business, various ownership structures are possible depending on how many people actually own and run the business.

#### **One-person Business**

This involves a person on his/her own trading seeds with the objective of making profit. This is probably the most common form when a business starts. It is normally an easy way to start a business and gives the owner complete control.

### *Advantages*

- The owner is totally responsible for the business, although there may be need to employ staff to do some of the work or to manage the business. These workers will be employees and the owner bears final responsibility.
- The owner can trade under his/her own name or a business name.
- The business name does not have to be registered, but if so, the owner's name should appear on letterheads and other relevant documents.
- Financial information about the business does not have to be made public.
- The owner of the business takes all the profit generated.
- There are relatively few legal requirements to fulfill although this depends on the laws of the country pertaining to issues such as payment of tax and declaration of profit.

### *Disadvantages*

- The owner is personally responsible for all the debts owing to the business.
- When starting the business, the owner will provide all the finance from his/her own savings. In some cases, there may not be sufficient capital to start the business and borrowing from other people might be difficult. Banks and other financial institutions may need detailed plans of the proposed business before lending money.
- The owner provides all the management expertise, unless the business can afford to hire staff.
- The owner suffers all financial losses and if the business runs into financial problems such as owing money, then the owner will be personally responsible for paying the debts.

## **Partnership**

A partnership can be defined as two or more people carrying on a business with the objective of making profit. Partnership is based on contract and is therefore only suitable for a relatively small number of persons who know and trust each other. There is usually a limit to the number of partners engaged in the business but this depends on the legislation of a given country. Partners are all owners of the business, and jointly share in decisions and the running of the business. They may operate under a business name, which does not have to be registered, and may have their names on the firm's stationery.

A Partnership Act usually specifies that:

- Proper books of account are kept.
- Capital is distinguished from profits and losses.
- A record of profit, shares, and withdrawals is kept.
- Partners are bound to render true accounts and full information of all things affecting the partnership to any partner or his legal representative.

### *Advantages*

- It is possible through a partnership to raise more capital to start a business and to share the pressure of running and controlling the business.
- Financial information about the business does not have to be made public.
- All partners will expect a share of any profit the business earns. A solicitor normally draws up a legal agreement indicating the relative proportions in which partners will

share any profit, loss, and other matters relating to the business. If partners invest different amounts of capital, they can choose either to apportion the profits in the same ratio as the amount invested or to allow time, say six months, for partners to equalize their investments so that their profits could be equally shared. In either case, voting rights normally remain equal as well as personal drawings.

#### *Disadvantages*

- Partners are individually liable for debts of the business and if one partner disappears, the remaining partner(s) is/are personally liable for all the debts of the business.
- Individual members do not have sole control and other partners may overrule their decisions.
- Partners take a share of losses made.

#### **Limited Liability Company**

A limited liability company is a legal entity in its own right, which is quite distinct from its owners. The financial responsibility of the owners is limited to the amount they have invested or agreed to invest in the company.

In forming a limited liability company, certain documents (e.g., articles of association, memorandum of association) and the name of the business (no two companies can have exactly the same name) must be registered with the Registrar of Companies. At periodic intervals, the company must make certain financial information available to its shareholders and deposit certain information with the Registrar. As any person may consult the files of the Registrar, data submitted by the company become public documents.

The most common forms of business organization are companies limited by shares. Companies whose shares can be offered to the public are known as public limited companies and must have 'plc' written after their names depending on the country. Similarly, private limited companies whose shares may not be offered to the public because founders and owners often hold the total shares must have 'limited' written after their names. A public company can choose to offer its shares to the public through the stock exchange, which a private company cannot do.

The legal reporting requirements surrounding limited companies are complex and are contained in the Company's Act. There are variations depending on the type of company and its size but the main general provisions are:

- Accounting records must be kept to show and explain the company's transactions.
- At the end of each financial year, final accounts must be prepared. They comprise the profit and loss account, the balance sheet, and the auditor's and director's reports. These final accounts are given to each shareholder, debenture holder, and any other person entitled to attend the Annual General Meeting. The accounts should be also lodged with the Registrar of Companies. In this way they become public documents and for a small fee anyone can obtain a copy of them.
- There are certain national and international accounting standards which are guidelines issued by the professional accounting body in many countries. Although these standards may not have the force of law, they constitute recommendations on how certain accounting matters should be dealt with by limited companies.

*Advantages*

- Setting up a seed enterprise as a limited liability company might provide access to larger sums of money even from investors who do not wish to work directly in the business.
- Directors, company secretaries, accountants, and solicitors could professionally manage the company.
- The company is responsible for debts incurred in trading, and where it is unable to pay its debts, then the company can be sued in its own name.
- The owners of this company (shareholders) are responsible for the amount of money they have invested and/or agreed to invest in the company, but their liability is limited only to that amount.
- Its shareholders and directors may change but the company will continue to exist until wound up.

*Disadvantages*

- A number of legal burdens are placed on limited companies particularly for losses made in trading.
- If the company is unable to pay its debts then it may go into liquidation and have to stop trading.

**Co-operative**

A co-operative could be regarded as a specialized form of limited company. This section, however, refers to 'workers' co-operatives. Co-operatives are run like any other small business with managers or supervisors and guided by a cooperative law in many countries. The major differences are that everyone who works in it owns the business and any decisions are made democratically. In many cases, most laws and regulations apply as for a limited company.

**Guidelines for Starting a Small Seed Business**

Various organizational structures for seed enterprises and reporting requirements have been discussed in the previous section. In effect, the decision to choose the right form of organizational structure depends primarily on the capital available and the management capabilities of the owner(s).

Establishing and running a seed business can be divided into three distinct phases: before starting, starting and keep going. There are key things that should be done during each phase, as shown below.

<b>BEFORE STARTING</b>	<b>KEEPING GOING</b>
<ul style="list-style-type: none"> <li>• Doing the market research</li> <li>• Making it legal</li> <li>• Preparing the business plan</li> <li>• Raising the finance</li> </ul>	<ul style="list-style-type: none"> <li>• Controlling the finances</li> <li>• Coping with taxation</li> <li>• Using a computer</li> <li>• Learning from failures</li> <li>• Getting more business advice</li> </ul>
<b>STARTING</b>	
<ul style="list-style-type: none"> <li>• Designing letterheads, etc.</li> <li>• Employing staff</li> <li>• Doing basic officework</li> <li>• Marketing and sales</li> </ul>	

## Managing Risk in Small-scale Seed Enterprises

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### Abstract

Small-scale seed enterprises are subject to varying forms of financial and physical risks depending on the environment within which they operate. This paper describes sources of risks and uses examples to illustrate effects on the performance of small seed businesses. Difficulties involved in attempts to quantify risks are emphasized. A practical alternative of identifying risks and noting their effects in which entrepreneurs have to select specific management strategies for countering them is suggested. In doing so, it is useful to also test the sensitivity of the business to changes in key variables, since this can enable the manager to choose the point at which to intervene and to formulate an appropriate plan of action to minimize the negative effects of such changes.

### Introduction

In economic analysis, risk and uncertainty are not exactly the same. While uncertainty refers to the state of not knowing what the exact outcome would be, risk is that part of uncertainty that can be measured and therefore could be included in the planning process. For example, the likelihood of drought is an uncertain event, but an estimated fall in earnings due to 20% yield loss from drought is regarded as a risk.

For enterprises, a single figure of performance such as rate of return, net present value, annual cash flow or profit margin can be misleading. Actual and expected results often differ because estimates and predictions of outcomes are subject to varying degrees of uncertainty. Therefore, it is necessary to indicate a degree of possible variation in the results of an enterprise when conducting exercises such as investment appraisal and benefit-cost analysis.

Risk in seed production is diverse and relates to a wide range of different activities including field multiplication, quality assurance, seed purchasing, processing, storage, distribution, and marketing. Each activity is associated with different types of risks and therefore requires specific management strategies to mitigate those risks.

### Types of Risks in Seed Production

There are two broad types of risks that enterprises face in seed production, namely, financial and physical risks.

#### Financial Risks

These arise from financial claims made on the seed business and include the following:

##### *Debt and Equity*

The ratio of debt to equity (financial leverage) is an important indicator of financial viability. It is risky for an enterprise with low equity to take more loans because the higher the

financial leverage is, the greater the risks for the enterprise to meet financial obligations to lenders are.

#### *Interest and Exchange Rates*

Changes in interest or exchange rate could have serious implications on cash flow projections made. In such cases the enterprise has to carry out proper financial planning as a risk management strategy to minimize mitigating effects on cash flow or revenue.

#### *Asset Protection*

Financial planning should also ensure protection of assets by taking into account possible hazards that could result in a major loss or damage to capital items such as buildings, machinery, draught power, irrigation channels, etc.

#### *Terms of Credit/Loan Repayment*

Variations in loan terms can also affect cash flow projections and should form part of the financial planning strategy.

#### *Inflation*

Enterprises operating in conditions of inflationary spiral find it hard to conduct business transactions in nominal currency since the monetary values are always changing and sometimes by wide margins. Estimating future price levels or repayment terms for input loans become difficult. One option, if permitted by government policy, is to maintain cash deposits in a more stable currency such as the US dollar. Alternatively, arrangements could be made for input loans and services to be repaid in kind. For instance, fertilizer and transport charges could be converted into equivalent physical quantities of seed and recovered from the grower at harvest time.

### **Physical Risks**

Physical risks are wider in scope than financial risks. They are inherent in operating enterprises and are generally out of control of the management of the business. They include the following:

#### *Environmental Risk*

There is a range of possible impacts of the physical environment on seed enterprises. Examples of environmental risk include climate, weather, and outbreak of pests and diseases. All these factors affect crop yield and therefore influence performance although situations such as drought and floods may be within partial control of the enterprise. Effective planning could help minimize disease risk by selecting resistant varieties and identifying suitable location of farms.

In some countries, harvesting under dry conditions is crucial for seed quality since sun drying is the only means of bringing seed to safe moisture content for storage. This may mean adjusting planting time so harvesting does not take place during the rainy period. This can be a risky decision to make since changing planting time could minimize yield potential, while not providing a firm guarantee of dry weather at harvest time.

Seed enterprises may face risks if crops registered for certification are rejected. This has several cost implications amongst which are reduce earnings for growers who may find it difficult to repay input loans, increased cost of production per unit output, and reduced

capacity of the enterprise to match actual with target production. A severe shortage may have other effects such as sub-optimal utilization of processing capacity, storage, and transport facilities.

There is also the risk of storage loss, especially in climates characterized by high temperature and relative humidity, which provide suitable conditions for pest infestation. The risk of carryover stock not maintaining an acceptable level of viability the following season because of pest damage becomes an important factor in production planning.

#### *Market Risk*

This results from variation in prices for inputs as well as outputs. A sudden increase in input prices could influence production costs significantly and result in higher seed prices, which may not be affordable by some farmers. On the product side, increased output during a good year may depress prices in the grain market. If the agreed procurement price for contract seed becomes much higher than the grain price, there is a possibility that some growers will opt to sell grain as seed with the intention of obtaining higher prices. Similarly, during a bad year, shortage may result in a grain price that may be higher than the procurement price of raw seed from contract growers. In this case, "seed leakage" could occur as growers may refrain from selling their production back to the seed enterprises and instead may choose to sell directly to the grain market for a higher price (Singh et al. 1995).

#### *Human Risk*

Besides variation in prices, there is a risk associated with unpredictable behavior of other people such as traders, competitors, buying and commission agents, international agencies, and government officials, who make decisions on pricing, etc. The likely dishonesty of growers, who may not abide by the terms of the contract agreement because of profit motives, has been discussed.

Human risk also relates to staff dedicated to delicate tasks such as sampling, quality assessment, lot labeling, cleaning processing machines, and adjusting processing equipment to clean seed or apply chemical treatment. Mislabeling a winter for a spring variety could lead to total loss, this may be difficult to ascertain.

Management decisions and actions are also subject to risk. A decision to treat a certain proportion of seed with chemical can be risky if this seed remains unsold and can no longer be used as grain. Similarly, deciding to keep seed in long-term storage could lead to losses due to a decline in quality or lack of demand.

#### *Lack of Information*

Decision-making that is based on lack of complete information or on inaccurate information is risky to the business. For a seed enterprise to function well, information on key elements including crops varieties farmers want, the quantity of seed needed, the cost of producing and distributing the seed, and the price farmers are willing to pay, must be available. Some of this information may be available elsewhere and could be used readily, while others need to be collected. However, since acquiring information involves cost, enterprises should compare the cost of seeking new information with its usefulness and value. Enterprises must decide on the type of additional information, why it is needed, and how to acquire and use it. In practice, a small business may have to rely on experience to carry out its transactions.



tribution. The probability distribution of these variables could be objectively derived from historical data available in records of seed enterprises.

At the start of a growing season, farmers do not know exactly what yields or selling prices they will receive, although they may have a reasonable idea of forthcoming possibilities. In this respect they face risky prospects in both yield and prices. In addition, costs of production (expenditure on inputs and overhead costs) are subjected to risk too, because of possible variation in the prices of inputs and other related cost items. Consequently, profit is also risky since it represents the difference between revenue (selling price received) and production cost, both of which are risky variables.

Theoretically, risk is measured as the product of probability and the corresponding monetary value of the variable in question. For instance, if an enterprise estimates a 90% probability of making a \$2000 profit, this will also imply a 10% chance of earning no profit at all. The expected profit will then be given as  $\$2000 \times 0.9 = \$1800$ .

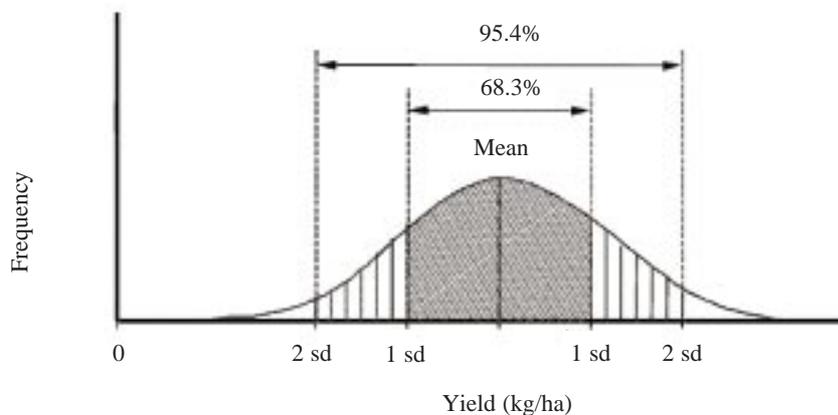
In the case of seed yield, there is a distribution of individual yield values about a mean expressed in kg/ha. This means that although there is an expected yield value (mean value), the actual yield obtained by the farmer fluctuates from year to year around this expected value. This deviation or dispersion of yield values around the mean is expressed as the standard deviation, which is interpreted as risk (Pannell 1996). In statistical analysis, if the distribution of yield is normal, then 68.3% of yield values are assumed to fall within  $\pm 1$  standard deviation on either side of the mean yield, and 95.4% within  $\pm 2$  standard deviations (Figure 2). The range of possible values for yield is measured on the horizontal axis and the probability of each yield value arising is measured on the vertical axis. The area under the curve equals one, indicating that the total probability of all possible yields values occurring is 100%.

In many practical situations, probability distributions tend to be skewed and are seldom normal (Dixon et al. 1989). For these, different statistical methods are used to measure the dispersion of values. In general, the greater the dispersion of values around the mean is, the riskier it will be for the enterprise (Figure 3). Enterprise A and B have identical symmetry with the same mean value of yield. Enterprise A is riskier since the degree of dispersion of yield around the mean is higher and there is a probability that low profits could arise although high yield are also possible. On the other hand, enterprise B is less risky, with smaller dispersion of yield around the mean and less likelihood to get low yields.

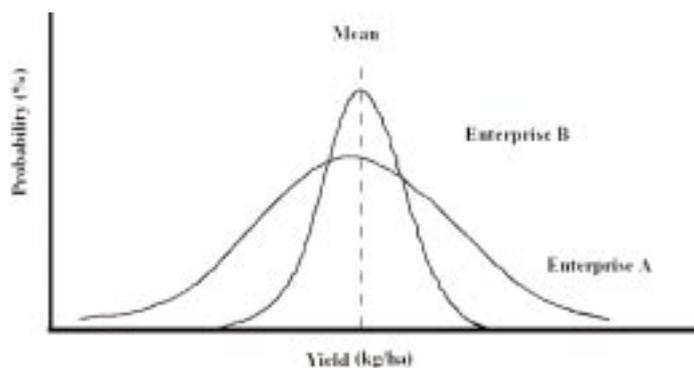
Because of the complexity involved in dealing with a large number of variables which are subject to chance variation, the use of computer software is usually necessary in risk analysis. Although it is useful to understand the principles used, it may not be relevant or possible for small enterprises to engage in details of risk analysis. An important point to note is that despite mathematical robustness, it is impossible to quantify exactly the risks an enterprise is subjected to. In practice, it is therefore sufficient to just record the kinds of risks different enterprises face and to use this as a basis for choice in enterprise design. Of course, this choice and the perception of risk are often subjective and are strongly influenced by the experience and preferences of the owner.

### **Attitude towards Risk**

Small farmers or enterprises are generally assumed to be risk averse. This means that where there are alternatives, with similar expected return, farmers would usually prefer the ones



**Figure 2. Normal distribution of yield values.**



**Figure 3. Probability distribution of yields for two alternative enterprises.**

associated with less risk. Consider the yield potential and associated probability for a local and improved variety as shown in Table 1.

Although the local variety has less yield potential, the probability of complete failure and getting zero yield is less (20%) compared to that of the improved variety (80%). Theoretically, a farmer, who is indifferent and would therefore equally desire either of the two varieties because they have the same expected yield of 400 kg/ha, is considered risk neutral. A farmer who is risk averse, however, will choose the local variety with less risk of failure, and would judge the two varieties as equivalent, only if the improved variety had a higher yield potential beyond 2000 kg/ha. A farmer who is a risk taker will prefer the improved variety with higher yield potential.

**Table 1. Estimating expected yield for local and improved varieties.**

Type of variety	Yield potential (kg/ha)	Probability (%)	Expected yield (kg/ha)
Local	500	80	$500 \times 0.8 = 400$
Improved	2000	20	$2000 \times 0.2 = 400$

This attitude to risk influences the adoption of new technologies especially by small farmers or businesses operating in harsh environments. They usually form different perceptions about the risk involved in new options and carefully weigh possible effects on their operations before deciding which options to choose.

### **Risk Management Strategies**

Risk management involves formulating actions for countering business and financial risks in an enterprise. The management strategy adopted depends on the circumstances of the business. Types of managerial responses to risk in a large-scale commercial enterprise may not be appropriate in a small-scale business. However, in farming, risk management involves ways of coping with key effects such as unexpected changes in weather (= yield), changes in prices for inputs and outputs, or changes in the behavior of market intermediaries. Considering the examples of yield and price risks, the following management options could be considered:

#### **Responding to Price Risk**

##### *Use of Forward or Buy-back Contracts*

Although enterprises may face price risks in acquiring inputs, there is usually a greater risk associated with the final selling price of the seed they produce. Here, market choices become important if enterprises seek to take advantage of competitive price offers. Growers usually enter into forward contracts with seed enterprises to guarantee them a market or a certainty of higher or stable price.

##### *Diversifying Income Sources*

Enterprise diversification is the act of holding combinations of investments. It is a risk-reducing strategy and can be part of planning (Barry et al. 1983; Bain 1992). The idea behind diversification is that different combinations of investments may reduce an investor's risk more than having only a single investment. It ensures possible reduction in total variability of returns by combining different income generating activities without unduly sacrificing expected returns.

Success in minimizing risk through diversification is determined by the correlation among investments (Barry 1984). Generally, higher-risk investments carry higher expected returns, and vice versa. Consequently, there should be a trade-off between extent of risk and the magnitude of expected returns. This trade-off forms the basis of risk management strategies.

It is then important for enterprises to incorporate into their investment portfolio those activities whose returns are not perfectly correlated, that is, to include activities having negative covariance, in which a high profit potential in one activity is associated with a low profit potential in another.

For seed enterprises, examples of diversification include combining production on seed farms with contract growing, seed with grain production, mixing improved varieties with traditional ones, or engaging in other activities such as milling or selling of agro-chemicals and tools.

Therefore, two aims of diversification are to minimize risk and to smooth cashflow to the enterprise by allowing different activities to generate returns during different periods within the farming year to reduce the possibility of loss. However, there can be no gain in

risk reduction from diversification between investments, which are subjected to the same risks since their returns will be perfectly (positively) correlated. This will be the case, for instance, where in the same area most crops experience similar weather patterns, use similar resources, and experience similar market forces. A combination of rainfed and irrigated farming could be an effective diversification strategy.

### **Responding to Yield or Production Risk**

#### *Technical Efficiency*

Technical efficiency involves efforts to minimize those effects that are often associated with yield loss such as delays in sowing and harvesting, resulting from machinery breakdown, etc. Maintaining machinery and equipment in good condition could improve this situation. Another factor which influences yield is to follow technical advice and recommendations on correct seed rate, weeding practices, pest/disease control, etc.

#### *Diversification*

Diversification in investment options can also play an important role in minimizing yield risks. Farmers may decide to use some specific combination of crops/varieties or adjust the use of particular inputs depending on yield prospects in a particular season.

#### *Flexibility*

There should be enough flexibility in seed production that can enable the farmer to cope with risk. For instance, the farmer may wish to do the following:

- respond quickly as new information becomes available,
- adopt technology, crops or varieties with higher prices, and withdraw from those with relatively lower prices,
- reduce fixed costs by substituting wage labor for mechanization, and
- use general-purpose inputs as opposed to specific alternatives of higher cost.

### **Sensitivity Analysis**

In making investment decisions using methods such as benefit/cost analysis, a practical way of describing risk is by means of sensitivity analysis, in which the values of certain risky variables are changed and the effects of these noted.

Sensitivity analysis is a technique for testing the sensitivity of results obtained in analyzing enterprises to changes in some key variables. It is useful to assess how profit generated by an enterprise is affected by specified changes in some key variables in the sensitivity analysis.

The likelihood of occurrence of these proposed changes in key variables is then examined to determine whether the resulting changes in profit will influence the decision to proceed with the investment. In this context, sensitivity analysis is a “what-if” technique which attempts to answer a question such as: “*What will the net income of an enterprise be if for some reason the volume of seed produced changes from the amount that was originally predicted?*”

Sensitivity analysis can be carried out in simple informal ways or in more formal ways. A major advantage of this analysis is that it provides an immediate financial measure of the consequences of possible prediction errors.

There are two elements of sensitivity analysis:

### Identifying Key Variables

There are two characteristics that a variable must possess for it to be regarded as a key variable:

- It should be an important or major element of cost or return/benefit
- There should be uncertainty about its true value (i.e., it should be variable)

Defining key variables helps to focus on those factors that have the most pronounced effect on benefits and costs and eases the entrepreneur's mind regarding predictions that have little impact on decisions. By dealing with key variables, sensitivity analysis offers a simple means of analyzing the effects of risk on enterprise design and analysis.

The following examples are effects of some key variables often used in analyzing the performance of seed enterprises:

#### *Sales Price(s) of Main Output (e.g., Certified Seed)*

It is important to examine the activities of the enterprise to assess what will happen if assumptions about the final sale price of seed prove wrong. This may happen in the case of a crop where the market price for grain is a strong basis for deciding on the seed price. For instance, in a particularly bad year, the price of grain may rise to such a level that an enterprise may find it difficult to pay its seed growers the agreed premium, which is a specified percentage above the market price for grain.

#### *Purchase Price(s) of Capital Items and Main Inputs (e.g., Foundation Seed, Fertilizer)*

Seed enterprises need to acquire certain capital items or facilities in the early years before any benefit can be realized. Cost overrun (i.e., costs rising significantly more than predicted values) at this stage should then be avoided as much as possible. Otherwise, the enterprise may become unattractive. There could also be overruns in production costs if prices for inputs (e.g., fertilizer) and supplies (e.g., fuel) rise significantly in later years. If during sensitivity analysis an enterprise is shown to be very sensitive to cost overrun, it becomes crucial for the entrepreneur to obtain firm estimates of costs before proceeding with the investment.

#### *Volume of Demand from Users of Certified Seed*

It is generally difficult to make firm predictions of seed use in situations where a large majority of seed-using farmers can produce and save their own seed. Similarly, in markets dominated by few large users (such as development projects), any cancellations or drop in seed orders could result in far less volume of seed demanded. Enterprises existing in such situations should be tested for sensitivity to a fall in the quantity of seed sold.

#### *Yield*

Estimates based on reported yield potential of newly released improved varieties may be subject to error if yields at farm level fall short of these figures. Testing the sensitivity of the enterprise to lower yields could serve as useful guide in decision-making where such a situation is suspected.

#### *Discount Rate*

Where discounting is used, the choice of discount rate used should best be based on the opportunity cost of capital. Where wide fluctuations in market rates of interest are possible

(e.g., changes in inflation effects) it is important to test the sensitivity of the enterprise to such possible changes.

#### *Delay in Operations*

Timeliness in operations is vital to the success of seed enterprises. Uptake of seed by farmers may be severely curtailed if seed is not available in time for planting. Delays in ordering and receiving equipment and inputs such as fertilizer may adversely affect the performance of the seed crop and render other estimates of limited use. Therefore, carrying out a sensitivity analysis to assess the effects of delay on a proposed seed enterprise is an important element in planning and decision-making.

#### **Repeating Analysis for High and Low Values of Key Variables**

Having identified key variables, the next step is to repeat the analysis with lower and upper limits of these variables (e.g., varying the key variable by  $\pm 10\%$ ) and recording the effects. It may be necessary to note the effects on the level of profit for an enterprise under the following alternative scenarios:

- Using 12, 14, or 16% discount rates.
- A 50% increase in the purchase price of basic seed.
- Hiring a new farm manager with an annual salary of \$10,000.

This step enables the entrepreneur to select suitable points at which to operate, and to formulate appropriate plans of action to minimize the negative effects of changes in key variables.

### **Conclusion**

This paper has highlighted the importance of risk identification and management in the design and operation of small-scale seed enterprises. The ideas presented are based on basic principles and have not made reference to experiences of particular enterprises in existence. This approach was basically aimed at attempting to draw seed-related implications from well-known concepts on general risk analysis. Hence, it is hoped that this material serves as reference and guidance to those who manage or intend to establish small seed businesses in somewhat unpredictable financial and physical environments.

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## **Assessing Costs and Margins within the Seed Production-Distribution Chain**

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### **Abstract**

In a commercial enterprise, it is essential to understand costs as the basis of pricing. Cost analysis involves following the progress of seed from the production field until it reaches the farmer who buys it for sowing. The main objective of this paper is to identify the processes involved and to analyze factors that influence the level and nature of costs at the different stages. This is critical particularly for enterprises which deal in less profitable crops. Such enterprises should minimize their production costs as much as possible so that they are able to offer seed at prices that farmers can afford and are willing to pay, while earning reasonable profits. This paper attempts to define different cost elements and margins within the seed production-distribution chain; it explains the procedure for calculating them using examples based on actual transactions, and emphasizes the need for controlling overhead cost, since this is usually a significant component in seed prices.

### **Introduction**

A margin is the difference between the value of an equivalent unit quantity of seed at one stage and another in the production-distribution chain. This means that the total margin is the difference between the price received by a contract grower and the final retail price paid by the end user. Defined in this way, the margin of an enterprise can be regarded as equivalent to the costs incurred for processing, storage, and marketing services that are applied to the seed. The prices paid for the seed should normally cover both the costs incurred in providing these services and any net profits that are earned.

In many cases, the seed goes through market intermediaries before it finally reaches the farmer who buys it for planting. These intermediaries buy seed expecting to sell it at future prices, which will cover costs and leave some profit. The desire by all intermediaries to make a profit increases the total cost of marketing the seed. Since the main objective of an efficient supply system is to make seed affordable to farmers, it can then be regarded as the one that moves seed from the producers to the final users at the lowest cost. This system is consistent with the provision of services that the users desire and are prepared to pay for. These services include cleaning, treatment, packaging, transport, storage, and marketing.

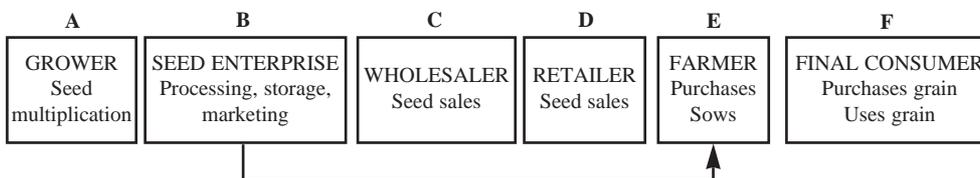
Growers, processors, wholesalers, and retailers all need to have a precise idea of the costs they incur and how these costs influence the expected selling price of seed and the profit they make at that point. There are important financial management issues to take care of if some of the cost items need to be financed by loans from external sources. Timing such loans and terms of payment, including interest, may have important financial implications on the business.

### **Estimating Selling Price of Seed**

As the seed flows from the multiplication field through the seed enterprise to the end user, its form changes, and so does the value at the various stages of transaction. A typical seed

production-distribution-use chain is represented in Figure 1. Seed obtained from the grower is processed and stored by the seed enterprise before it reaches the wholesaler, who in turn passes it on to the retailer who finally sells it to the farmer who uses it for planting. The seed transaction ends here, although farmers may retain seed from subsequent harvests and exchange this among themselves as well as sell grain to final consumers.

The value of the seed changes since intermediaries at every stage incur costs and expect to earn some margin. Therefore, the cost of the seed builds up as it passes along the chain. Some enterprises may sell direct to seed users, with no intermediary in between. In this case the difference between the cost price and the selling price represents the actual margin the enterprises earn per unit of seed sold.



**Figure 1. Seed production-distribution-use chain.**

An enterprise should prepare a cost sheet when calculating the price for certified seed. These estimates will include all direct and indirect expenditure to determine the true cost. The cost of seed per unit is then determined by dividing the total cost by the volume of seed produced. Table 1 is a simple cost sheet which summarizes estimates of costs and returns from the sale of certified seed of wheat by the Ethiopian Seed Enterprise during the 1996/97 season (ESE 1996). The fixed and variable overheads mentioned in Table 1 comprise costs of several items, including the following:

#### *Fixed Overhead Costs*

- Depreciation
- Property taxes
- Insurance
- Property maintenance
- Bank charges
- Salaries
- Fees
- Administrative and general expenses (advertisement and promotion, posts and telecommunication, license and registration, computer services, uniform and clothing, office supplies, etc.)

#### *Variable Overhead Costs*

- Interest on working capital
- Wages of casual labor
- Utilities
- Machinery repairs

The break-even or cost price covers all costs of the enterprise but does not include any profit margin. Once profit is added, the price of the seed increases. The cost price is basically

**Table 1. Marketing cost of certified wheat seed in Ethiopia.**

Description	Amount in Ethiopian birr (EB)†/100kg	Cost price (%)
<b>Seed Acquisition Cost</b>		
1. Procurement cost	157.50	79.8%
2. Packing materials cost	7.65	
3. Transportation cost	8.39	
4. Unloading and moving cost	1.34	
5. <i>Sub-total cost of unclean seed (1+2+3+4)</i>	<i>174.88</i>	<i>88.7%</i>
6. Cost recovery of sales of by-products (rejects)	5.20	
7. Cost recovery from sales of used bags	4.00	
8. Sub-total cost recovered from unclean seed procured (6+7)	9.20	
9. <i>Net acquisition cost of seed (5-8)</i>	<i>165.68</i>	<i>84%</i>
<b>Variable Cost (Processing)</b>		
10. Packing materials cost of clean seed	7.57	
11. Seed tag cost of clean seed	0.04	
12. Moving and loading cost of clean seed	1.07	
13. <i>Sub-total of packing, tags, moving and loading cost (10+11+12)</i>	<i>8.68</i>	<i>4.4%</i>
14. <i>Cost of seed, packing material, tags, moving and loading (9+13)</i>	<i>174.36</i>	
<b>Overhead Cost</b>		
15. Fixed overhead cost	20.70	10.5%
16. Variable overhead cost	3.17	1.6%
17. <i>Sub-total overhead cost (15+16)</i>	<i>23.87</i>	<i>12.1%</i>
18. Cost recovery from cleaning services	0.97	
19. <i>Net overhead cost (17-18)</i>	<i>22.90</i>	<i>11.6%</i>
20. <i>Break-even or cost price of seed (14+19)</i>	<i>197.26</i>	<i>100%</i>

† EB = Ethiopian birr (US\$1 = 0.146 EB; 1998 official rate).

Source: Ethiopian Seed Enterprise, Addis Ababa.

the sum of the net acquisition cost of unclean seed, the variable cost of cleaning the seed and the net overhead cost.

Market intermediaries incur costs that relate mainly to storage, transport, wages of sales staff, and administrative overheads. For agents, a sale commission is a fee that should cover any costs plus a reasonable profit.

### Margins Earned

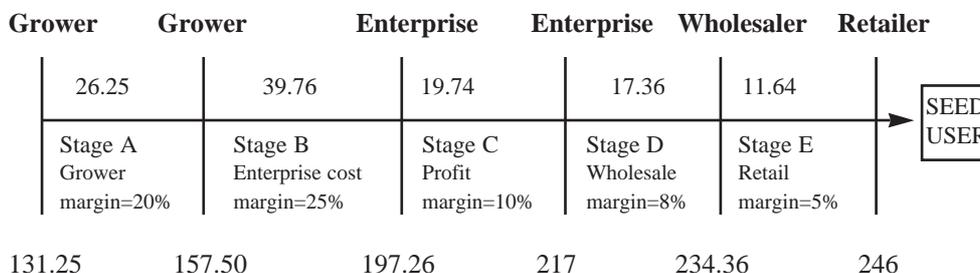
Actual margins earned in a production-distribution chain using the ESE seed procurement price of EB157.50 (including a contract premium), the break-even price of EB197.26 (Table 1), and assuming the growers get a 20% margin, ESE profit margin of 10%, wholesale margin of 8%, and retail margin of 5% are shown in Table 2.

**Table 2. Selling prices of seed at various stages of marketing (Ethiopian birr<sup>†</sup>/100 kg).**

Seed grower's cost	131.25	Wholesale margin	17.36
ESE procurement price	157.50	Wholesale margin	8%
Seed grower's margin	26.25	Wholesale selling price	234.36
Seed grower's margin	20%		
ESE cost price	197.26	Retail margin	11.64
ESE cost margin	39.76	Retail margin	5%
ESE cost margin	25%	Retail selling price	246
ESE profit margin	19.74		
ESE profit margin	10%		
Selling price ex-ESE	217		

† See Table 1

Margins earned at each marketing stage, expressed as a percentage of the costs incurred by the intermediary at that stage are shown in Table 2. That is, five percent retail margin = (retail price-wholesale price)/(wholesale price). The margins earned at different stages from the grower to the final user of seed can be better visualized, as illustrated in Figure 2 using estimates presented in Table 2.



**Figure 2. Margins at different stages of marketing from grower to seed user (Ethiopian birr).**

The procurement price of the unclean seed should cover the on-farm seed multiplication costs including those costs relating to activities such as roguing/field inspection, plus a margin that is high enough to serve as an incentive to the grower. This is normally offered in the form of premium, which in the case of cereal seed, and is usually related to the market price for grain.

Margins are sometimes presented as a percentage of the retail price, thus representing the share of the retail price going to the intermediary concerned. For example, the growers' share is represented as (grower margin)/(retail price) = 100 (26.25/246) = 10.7%. The difference in the price per unit (quintal) of certified seed between the contract farm and the retail stage is the overall margin per unit (*unit margin or price spread* = EB114.75), often expressed as a percentage of the retail price (*percentage margin* = 47%). Provided the total

volume of certified seed sold is known, this total quantity multiplied by the unit margin will give the appropriate aggregate margin for certified seed.

A temporary rise in the enterprise percentage margin does not necessarily imply that the growers are being exploited and are obtaining a smaller share of the retail price in a given period. Such a rise may be due, for instance, to an investment (necessitated by additional functions or changing pattern of business) which may lead later to higher benefits for the grower. However, changes in percentage margin over a long period of time at least require an explanation.

The crucial stage is normally represented by the margin at stage B (Figure 1), as this accounts for all overheads of the seed enterprise. Enterprises should be more efficient by making the margin, at this stage, as low as possible so as to create reasonable returns for the grower and intermediaries, while making seed cheap enough so that the end users can afford to pay for it. The seed supply system cannot function effectively if unnecessary overhead costs of an enterprise are either passed on to the grower in terms of lower buying price for raw seed or to the user in terms of increased retail price of certified seed.

### **Gross Margin**

The gross margin or gross profit of an enterprise represents the value of the enterprise's output less its variable costs. Determining causes of variation in gross margins is a useful measure of financial control (Hosken 1985). Current cost level could be compared with budgeted estimates for the same period or with costs incurred in previous time periods. This practice makes it possible for managers to investigate variances in gross margins and to take corrective action. Calculating gross margin by crop or variety provides another means of control such as information on relative profitability that could be useful in production planning. For example, the decision to reduce or increase particular crops or varieties in the production plan may depend on the size of relative gross margins.

Changes in sales price of seed and in sales volume and prices of inputs are the most common causes of differences between budgeted and actual gross margins. Once such changes are properly analyzed, it is possible to bring actual operations in line with budgeted expectations. The size of the gross margin of an enterprise is very important. In particular, it must be large enough to cover all fixed costs and thereafter generate profit.

Again, estimates given in Tables 1 and 2 could be used to calculate the gross margin as it is shown in Table 3.

The net margin of 15% actually takes into account all revenue that is earned by the enterprise including the sale of seed and used bags as well as earnings from cleaning services. The margin falls to 10% (Table 1) if only seed sale revenue is considered. Also as expected, the acquisition cost of unclean seed accounts for a high proportion of total variable cost. This has implications for financial management of enterprises as there is a need to secure enough capital to pay seed growers on time, despite the large negative cash flow involved.

Another important information in Table 3 pertains to the influence of fixed overhead costs, which in this case drive the margin down from 29 to 15%. An advantage of small-scale seed enterprises is normally the relatively low investment in fixed assets, which makes gross margins a good measure of profitability as these tend to be almost equivalent to the net margins.

**Table 3. Gross margin calculation.**

Item	Amount in EB <sup>†</sup> / 100 kg seed	Percentage (%)
<i>Revenue</i>		
Sale of seed	217.00	
Cost recovery from sale of by-products	5.20	
Cost recovery from sale of used bags	4.00	
Cost recovery from cleaning services	0.97	
Total revenue	227.17	
<i>Variable cost</i>		
Acquisition cost of unclean seed	165.68	93.7
Packaging cost for clean seed	7.61	4.0
Moving and loading cost of clean seed	1.07	0.6
Variable overhead cost	2.20	1.7
Total variable cost	176.56	100
Gross Margin	50.61	29
Fixed overhead cost	20.70	
Total cost	197.26	
Net Margin	29.91	15

† See Table 1

### **Sensitivity Analysis of Gross Margins**

Sensitivity analysis is a technique for testing the sensitivity of enterprises to changes in key variables. Assessing how benefit generated by an enterprise is affected by specified changes in key variables such as seed price. The likelihood of a price change is then examined to determine whether the resulting changes in benefit will influence the decision by an enterprise to proceed with the investment. In this context, sensitivity analysis is a “what-if” technique which attempts to answer a question such as: “*What will the net margin of an enterprise be if for some reason the price of seed changes from that which was originally predicted?*” Since most common sources of change in gross margins are due to changes in the price of inputs and outputs, it is possible to substitute alternative prices, one at a time, and to re-calculate the gross margin. For instance, taking information from Table 4 as a reference part, it is possible to carry out a sensitivity analysis for two scenarios: Scenario 1 where revenue increases by 10% and Scenario 2 where cost increases by 10%.

#### **Effect if Scenario 1:**

A 10% increase in overall revenue, assuming cost of inputs remain constant, results in a 9% drop in variable costs/revenue, a rise of 45% in gross margin, and a 76% rise in net margin.

#### **Effect if Scenario 2:**

A 10% increase in overall cost of inputs, assuming the level of revenue remains constant, results in a 9% rise in variable cost/revenue, a 35% drop in both gross margin, and a 59% drop in net margins.

These results show that the enterprise is equally sensitive in terms of changes in gross and net margins for a 10% rise in both total revenue and total cost. However, it can be seen that even with a 10% rise in total cost, the enterprise is still profitable although the margins drop significantly.

**Table 4. Sensitivity of gross margin to revenue and cost increases.**

ITEM	Reference	Scenario 1		Scenario 2	
	EB <sup>†</sup> /100 kg	EB/100 kg	Ref. (%)	EB/100 kg	Ref. (%)
<u>Revenue</u>					
Seed sales	217.00	238.70	10	217.00	
Sales of by-products	5.20	5.72	10	5.20	
Sales of used bags	4.00	4.40	10	4.00	
Payment for cleaning services	0.97	1.07		0.97	
Total revenue	227.17	249.89		227.17	
<u>Variable cost</u>					
Cost of unclean seed	165.68	165.68		182.25	10
Packaging cost	7.61	7.61		8.37	10
Moving cost	1.07	1.07		1.18	10
Variable overhead cost	2.20	2.20		2.42	10
Total variable cost	176.56	176.56		194.22	10
Variable cost/Revenue	77.8%	70.7%	-9	85%	+9
Gross Margin (EB/100kg)	50.61	73.33	+45	32.95	-35
Fixed overhead cost	20.70	20.70		20.70	
Net Margin (EB/100kg)	29.71	52.63	+76	12.25	-59

† See Table 1

## Conclusion

In competitive situations, the price structure is not open and discretionary. In fact, it is normally a challenge to keep each cost step as low as possible. Successful seed enterprises should first be able to assess effective demand for the seed they produce, and then operate efficiently so as to offer prices that can generate attractive margins for growers, dealers, etc., while making seed available at prices the users can afford and are willing to pay. In particular, it is important for seed enterprises to have a proper understanding of how and why margins change. To discover the timing of such changes at different stages can be vital to a seed enterprise, as this includes purchase of contract seed, processing, storage, and of distribution, which altogether influence the overall length of time the seed takes to reach the final users.

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## **Using Profit and Loss Account and Balance Sheet as Management Tools in Assessing Financial Viability in Small-scale Seed Enterprises**

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### **Abstract**

This paper first examines the profit and loss account or income statement as a source of vital financial information for owners and managers of seed enterprises. It indicates whether an enterprise is selling its seed and services for more or less than it costs to produce and distribute that seed. In doing so, the enterprise deducts the costs that relate to sales made in a given period from the income derived from those sales. Major items that constitute the cost and revenue structures of typical small-scale seed enterprises are described. A simplified step-by-step method on how to assemble a profit and loss statement is also presented. The analysis shows that it does not necessarily follow that an enterprise, which makes profit during a specific period (as shown in the income statement), is financially viable by the end of that period (as shown in the balance sheet). The working principles of the balance sheet are defined and explained with particular reference to its use in seed enterprises. The essence of the balance sheet as a statement that provides key information on financial viability is demonstrated with examples from seed enterprises. The paper further introduces a stepwise sequence in preparing balance sheets by incorporating relevant business information such as transactions shown in profit and loss accounts, for both actual and budgeted operations. In this way, the balance sheet is an effective tool for planning, monitoring, and controlling of business performance. The materials and examples presented in this paper are intended to serve as simple guidelines and reference material, especially for non-accountants who may be interested or involved in preparing financial statements for small-scale seed enterprises.

## **Profit and Loss Account**

### **Introduction**

A profit and loss account measures performance over a specified period by showing what profit or loss has been made at the end of that period. It is also called the income statement and is a financial report that summarizes revenues and expenses of an enterprise during an accounting period. Net income, or profit, is what remains after expenses incurred in seed production have been deducted from revenue earned on seed sales and related services. In other words:

$$\text{Net income or profit} = (\text{Revenue} - \text{Expenses})$$

The net income (profit) after tax is the return to the owners of the enterprise and is available either for distribution or for reinvestment in the enterprise. The profit and loss account serves as a “bridge” between successive balance sheets. The net income from the profit and loss statement (after paying dividend to shareholders) is transferred to the balance sheet as retained earnings and thus increases the owner’s equity.

## Elements and Structure of Profit and Loss Statements

When looking at a profit and loss account, it is important to remember three basic elements:

### (i) It is historical

It contains information on what has happened, not what is happening now.

### (ii) It does not include capital expenditure

The only capital expenditure included in the profit and loss account is the depreciation charge. Consequently a business can be shown to be profitable but could run out of cash because of a high capital expenditure program.

### (iii) It does not show whether the cash has been received from customers or paid to suppliers, just that the sales has been made.

The profit and loss statement comprises the following main components:

- *Revenue*  
Revenue in most seed enterprises comes from sales of seed and by-products. Seed sales figures normally represent net of sale discounts, returned seed, and sales taxes.
- *Non-operating income*  
This includes income obtained in the form of subsidies, and may be incorporated elsewhere other than in the income statement, or may be shown as revenue (as in the case of export incentive payments).
- *Cash operating expenses*  
This includes all cash expenditure incurred in seed production. Important among these are expenditures for labor, procurement of raw seed, seed dressing and packaging. Subtracting these direct costs from the revenue gives the gross income or gross profit.
- *Selling, general, and administrative expenses*  
These include a number of overhead items such as general administration, and training.
- *Non-cash operating expenses*  
The main item in this category is depreciation, which is an allocation of a proportion of the original cost of a fixed asset in each accounting period so that the value of the asset is gradually used up or written off during the course of its useful life. What remains after deducting non-cash-operating expense is the operating income (or operating profit), also called the profit before interest and taxes. It is the net benefit or cash flow of the enterprise which is derived from operations.
- *Income (profit) before income taxes.*  
Deducting the non-operating expense such as income taxes gives the final entry of net income.
- *Non-operating expenses*  
Interest received is regarded as a “negative expense”. Sales taxes are indirect taxes which are deducted before obtaining the sales revenue. In effect, the enterprise is simply acting on behalf of the government when it collects a sales tax, and since this amount of tax does not enter the income statement. Another indirect tax could be value-added tax.
- *Net income (profit) after taxes*  
This is the return to the owners of the enterprise and is available either for distribution to them or for reinvestment in the enterprise.

- *Profit*

Profit is not an easy concept. It usually has little to do with cash, except in very simple circumstances. For example, if a trader bought certified seed yesterday for US\$ 200.00, paying cash for it, and then sells it today for US\$ 300.00, also for cash, then he has US\$ 100.00 more cash today than he had yesterday. In this case he would have made a profit of US\$ 100.00. However, in case the trader did not pay cash yesterday, but bought the seed on credit, and sells it today, not for cash, but to someone on credit who will pay the trader next month. In this case no cash would have changed hands, but in accounting terms, the trader would still have made a profit of US\$ 100.00 although his cash level now is US\$ 200.00 less.

The position, regardless of cash changing hands or not, is as follows:

the sale is	US\$ 300.00
the cost of sale is	US\$ 200.00
and the profit is	US\$ 100.00

Profit can then be described as simply sales minus the cost of sales.

### Constructing a Profit and Loss Account

Strictly speaking, the full name for the profit and loss account is the Trading and Profit and Loss Account. The following is a simplified example of this account:

		Amount (US\$)
<i>Trading Account</i>	Sales of Certified Seed	10,000.00
	Less Cost of Seeds Sold	4,000.00
	= <i>Gross Profit</i>	6,000.00
<i>Profit and Loss Account</i>	Less Expenses	5,000.00
	= <i>Net Profit</i>	1,000.00

The following example is used to illustrate principles and accounting conventions used in constructing a profit and loss account.

*'Quality Seed Company' sells certified seed to farmers, through wholesalers and retailers. The company buys raw seed from its growers at US\$ 700/tonne and sells processed seed to wholesalers at US\$ 1,000.00/tonne.*

- At the start of January 1996, the company had 25 tonnes seed in stock.*
- During January, the company bought 60 tonnes from its growers.*
- On 25 January, the company paid its growers for the 70 tonnes which were bought in the previous month of December.*
- During January, the company sold 75 tonnes to various wholesalers.*
- During January, the company received payment for 45 tonnes which were sold in December.*
- On 25 February, the company paid its suppliers for the 60 tonnes which were bought during January.*

g. During February, the company received payment for 55 of the 75 tonnes which were sold in January.

To calculate how much profit or loss 'Quality Seed Company' has made during the month of January anything to do with cash payment or cash receipt is irrelevant. This means that (c), (e), (f) and (g) are irrelevant although this information is useful in managing the business and for producing cash flow statements and balance sheets. This leaves (a), (b) and (d) as relevant.

The seed position can be expressed as follows:

	<u>Amount (tonnes)</u>
Item (a): Stock as at 1 January	25
Item (b): Add purchases during January	60
Balance	85
Item (d): Less sales during January	75
Stock as at 31 January	10

A simple trading account will be represented as follows:

**Trading Account (US\$) for Quality Seed Company for the month ending 31 January 1996.**

Sales of seed 75 tonnes @ US\$ 1,000	75,000
Less cost of seeds sold 75 tonnes @ US\$ 750	52,500
<i>Gross Profit</i>	<i>22,500</i>

This account in detail as follows:

Sale of seed	75 tonnes @ US\$ 1,000	75,000	75,000
Less cost of sales:			
Opening stock	25 tonnes @ US\$ 700	17,500	
Add purchases	60 tonnes @ US\$ 700	42,000	
Available for sale	85 tonnes @ US\$ 700	59,500	
Less closing stock	10 tonnes @ US\$ 700	7,000	
Cost of sale	75 tonnes @ US\$ 700	52,500	52,500
<i>Gross Profit</i>			<i>22,500</i>

Important points to consider in preparing the trading statement include:

- Always give the account a title, which includes the name of the business.
- Always specify the period to which the account relates.

In seed sales, profit is realized as soon as the good is sold (i.e., when the seed passes to a customer who is invoiced for it, regardless of when that customer is likely to pay).

- Cost of sales is the cost of the quantity of seed sold.

According to the trading account above, the company made a gross or trading profit of US\$ 22,500. But that is not the end of the story. In operating the business, the company will incur

costs or expenses other than buying seed from its growers. These costs will include the following:

- Rent of premises
- Business rates
- Electricity
- Gas
- Telephone
- Stationery
- Cleaning costs
- Insurance
- Accountancy and legal fees
- Delivery van expenses
- Depreciation of delivery van
- Depreciation of equipment
- Bad debts and provisions for bad debts
- Interest on loans and/or bank overdraft
- Salaries of sales and technical staff

All these expenses reduce the company's gross profit to a net profit, out of which it will have to pay tax and draw the living expenses for the owners of the company. The following is an example of a combined trading and profit and loss account:

### **Quality Seed Company**

#### **Trading and Profit and Loss Accounts (US\$) for the month ending 31 January 1996**

<b>Trading account</b>	<b>Amount (US\$)</b>	<b>Balance (US\$)</b>
Seed sale: 75 tonnes @ US\$ 1,000	75,000	75,000
Less cost of sales:		
Opening stock: 25 tonnes @ US\$ 700	17,500	
Add purchases: 60 tonnes @ US\$ 700	42,000	
Total stock: 85 tonnes @ US\$ 700	59,500	
Less closing Stock: 10 tonnes @ US\$ 700	7,000	52,500
Gross profit		22,500
Profit and loss account		
Less expenses:		
Rent of premises	1,000	
Rates	500	
Electricity	150	
Gas	50	
Telephone	300	
Stationery	1,000	
Cleaning	1,100	
Insurance	600	
Accountancy and legal fees	500	
Delivery van expenses	150	
Depreciation of van	90	
Depreciation of equipment	120	
Bad debts and bad debt provision	125	
Interest on overdraft	170	
Staff salaries	1,250	
Total expenses	7,105	
<i>Net profit</i>		<i>15,395</i>

The following Table is an example of a detailed profit and loss statement for an entire year for a seed enterprise:

**Quality Seed Company Ltd.**

<b>Profit and Loss Statement for the Year Ending 31 December 1997</b>		<b>US\$</b>
1	<b>Revenue</b>	
2	Sale of certified seed	227,378.00
3	Sale of rejected seeds	9,194.00
4	Total revenue	236,572.00
5	<b>Cash operating expenses</b>	
6	Purchase of raw seed	72,296.00
7	Multiplication bonus	11,173.00
8	Transport and packaging	5,412.00
9	Processing variable cost	15,133.00
10	Processing fixed cost	10,714.00
11	Total cost of goods sold	114,728.00
12	Gross income (profit) (4-11)	121,844.00
13	Selling, general, and administrative expenses	
14	General administration	7,843.00
15	Training	267.00
16	Research	627.00
17	Management fee	5,100.00
18	Total selling general, and administrative expenses	13,837.00
19	Funds from operations (operating income before depreciation (12-18)	108,007.00
20	Noncash operating expenses	
21	Depreciation	
22	Seed processing plant	10,000.00
23	Buildings	14,172.00
24	Machinery and equipment	7,000.00
25	Others	8,628.00
26	Total non-cash operating expenses	39,800.00
27	Total operating expenses (11+18+26)	168,365.00
28	Operating income or profit (4-27)	68,207.00
29	Non-operating income and expenses	
30	Interest received	-4,245.00
31	Interest paid	19,738.00
32	Duties and indirect taxes	
33	Subsidies	Nil
34	Total non-operating expenses (30+31)	15,493.00
35	Income (profit) before income taxes (28-34)	52,714.00
36	Income taxes (40%)	21,086.00
37	Net Income (profit) after taxes	31,628.00

## **Balance Sheet**

### **Introduction**

A balance sheet shows what a company has (assets) and what it owes (liabilities) on a certain day. It is a snapshot at the business and good measure of financial viability. By assessing what a company has and what it owes, it is possible to tell whether the business can pay its debts when they are due. An enterprise looks at what it owns and takes off what it owes to get what it is worth.

The following are three important features of a balance sheet:

- It is a statement of the financial position of a business at a given point in time.
- It shows financial relationships in detail as expressed by accounting equations.
- It details the assets owned by the business and its capital and liabilities.

### *Structure of Balance Sheets*

Balance sheets can be presented in horizontal and vertical formats. Here the horizontal format is used where assets are presented on the left-hand side, with capital and liabilities on the right-hand side such that:

$$\text{Assets} = (\text{Liabilities} + \text{Owner's Equity})$$

### **Assets**

Assets are owned by the enterprise and have a measurable value. There are two principal kinds of assets:

- Current assets consist of cash, bank deposits, accounts receivable, and inventories intended for quick sale.
- Fixed assets include durable goods of relatively longer life and are used by the enterprise in seed production. Property, machinery, equipment, and land are the most common forms of fixed assets. For buildings, machinery and equipment, the current value is expressed as the original cost less accumulated depreciation. By convention land is not depreciated.

Fixed assets can be further classified into:

- Tangible assets, which include land, buildings, plant, machinery, vehicles, etc.
- Intangible assets, for items such as brand-names or patents which are of value to the company but are more difficult to define physically.
- Investments that the company intends to keep for more than a year.

Any seed enterprise requires certain basic resources to operate, which may include the following:

- Premises which the business owns and from which it operates; equipment (laboratory), processing plant, and machinery and motor vehicles required for seed production and trading.
- Desks, telephones, computers, furniture, and equipment required for business administration, seed distribution and marketing.
- Stock of raw materials (raw seed, seed treatment chemicals, packaging material, etc.) required for transformation into certified seed for final sale.

- Stock of certified seed required by wholesalers or retailers.
- Cash needed to buy any of the above items.

### ***Liabilities***

Liabilities are claims that creditors hold against the assets of the enterprise. In other words, liabilities are debts outstanding to the enterprise. There are three principal kinds:

- Current liabilities, which comprise debts falling due within a year, such as accounts payable, short-term loans and the current portion of long-term loans and suppliers' credits that must be paid within the coming accounting period. Taxes payable, but not yet paid, are also current liability.
- Long-term liabilities are debts that become payable after one year from the date of the balance sheet.
- Owners' equity consists of claims against the assets of the enterprise by its owners. In other words, what is left after all other liabilities have been deducted from total assets. Owner's equity generally takes the form of share capital contributed by the owners of the enterprise, retained earnings and reserves.

The balance sheet deducts the assets from the liabilities to show what the company is worth to the owners or the "net worth" of the company.

### **The Accounting Equation**

To start a new business, the owner(s) need(s) money to acquire assets. It is usually the owner(s) of the business who could be the main source of such money. Money supplied by the owner is known as the initial or business capital, and the business will owe this capital to the owner. Capital is therefore a liability to the business (i.e., capital for which the business is liable to the owner who supplied it). If no person, other than the owner, supplies funds to the business, then:

$$\text{Assets} = \text{Capital}$$

However, in addition to the owner, other people may lend money to the business. For example, a bank may approve a loan or agree to an overdraft, or suppliers may deliver raw material on credit for repayment at some agreed date in the future. Until payment is made, these suppliers are known as creditors and these sources of funds are known generally as liabilities.

At any point in time, all the assets owned by the business will exactly equal the amount of the capital supplied by the owner(s) plus all the other outstanding liabilities. This relationship is known as the accounting equation and can be expressed thus:

$$\text{Assets} = (\text{Capital} + \text{Liabilities})$$

This accounting equation always holds true such that if any two of the three items in the accounting equation are known, the third item can be calculated.

A business cannot increase its total assets without increasing either its capital or liabilities. An individual asset (e.g., stock) can increase in value but only if capital or liability also increases, or if another asset decreases by a similar amount. This principle is known as the dual nature of transactions.

**Setting up the Balance Sheet**

The following example demonstrates a sequence of stages in setting up a simple balance sheet.

**Stage 1**

*Mr Smith starts a seed business known as Quality Seed Company on 1 January 1996 with an initial capital of US\$ 10,000.*

The balance sheet on that day will be shown as follows:

**Quality Seed Company  
Balance Sheet as at 1 January 1996**

Cash	10,000	Capital	10,000
------	--------	---------	--------

**Stage 2**

*On 2 January 1996, the company uses its cash to buy fixtures for US\$ 5,500 and stock of goods for US\$ 3,500.*

**Quality Seed Company  
Balance Sheet as at 2 January 1996**

Note that the assets have been classified into:

- Fixed assets, e.g., those resources which the business intends to keep in the long-term.
- Current assets, e.g., stock and cash, which are items that are part of the trading cycle, and which will be used up in the day-to-day activities.

<i>Fixed Assets</i>		<i>Capital</i>		<i>10,000</i>
Fixtures	5,500			
<i>Current Assets</i>				
Stocks	3,500			
Cash	1,000	4,500		
<i>Total</i>		<i>10,000</i>		<i>10,000</i>

**Stage 3**

*On 3 January, the business buys a further US\$ 1,000 of stock, but does not pay the supplier, and therefore incurs the liability of having a trade creditor.*

**Quality Seed Company**  
**Balance Sheet as at 3 January 1996**

<i>Fixed Assets</i>			<i>Capital</i>	10,000
Fixtures		5,500		
<i>Current Assets</i>			<i>Current Liabilities</i>	
Stocks	4,500		Creditors	1,000
Cash	1,000	5,500		
<i>Total</i>		<i>11,000</i>		<i>11,000</i>

**Stage 4**

On 4 January, the business sells for US\$ 3,000 in cash stock, which it purchased for US\$ 2,500.

**Quality Seed Company**

<i>Fixed Assets</i>			<i>Capital</i>	10,000
Fixtures		5,500	Profit	500
<i>Current Assets</i>			<i>Current Liabilities</i>	
Stock	2,000		Creditors	1,000
Cash	4,000	6,000		
<i>Total</i>		<i>11,500</i>		<i>11,500</i>

**Balance Sheet as at 3 January 1996**

Note that the profit of US\$ 500 earned on the stock (sales less cost of sales) belongs to the owner of the business, and the amount of profit is shown as an addition to his capital. In other words, the business now has a new liability of profit, which it belongs to the owner.

**Step 5**

On 5 January, the business purchases equipment of US\$ 1,000 for cash, and a further US\$ 4,500 of stock on credit.

<i>Fixed Assets</i>			<i>Capital</i>	10,000
Fixtures	5,500		Profit	500
Equipment	1,000	6,500		
<i>Current Assets</i>			<i>Current Liabilities</i>	
Stock	6,500		Creditors	5,500
Cash	3,000	9,500		
<i>Total</i>		<i>16,000</i>		<i>16,000</i>

**Quality Seed Company**  
**Balance Sheet as at 5 January 1996**

**Step 6**

*On 6 January:*

- *the owner of the business withdraws US\$ 200 cash for his own use, and*
- *the business sells US\$ 3,000 worth of stock for US\$ 4,000 to customers on credit (i.e., these customers are expected to pay the amount they owe in one month's time). Until they pay, they are known as debtors to the business.*

**Quality Seed Company**  
**Balance Sheet as at 6 January 1996**

This example illustrates key steps involved in formulating a simple balance sheet. The actual balance sheet for a seed enterprise may be more complex as illustrated by the following example.

<i>Fixed Assets</i>		<i>Capital</i>	<i>10,000</i>
Fixtures	5,500	Old Profit	500
Equipment	1,000	New Profit	1,000
	6,500		1,500
<i>Current Assets</i>			<i>11,500</i>
Stock	3,500	Drawing	200
Debtors	4,000		
Cash	2,800		
	10,300		11,300
		Current Liabilities	
		<i>Creditors</i>	<i>5,500</i>
<i>Total</i>	<i>16,800</i>		<i>16,800</i>

### Conclusion

It has been shown that the profit and loss account provides vital information on whether businesses make a profit or a loss at the end of a specified period. It specifies the amount and sources of such profit/loss. To maintain an up-to-date management information system, it may be necessary for a seed enterprise to prepare separate profit and loss accounts per crop and for all crops combined, and on a quarterly basis. Similarly, the balance sheet has been demonstrated as a management tool, which keeps owners and managers informed about how much their business is worth financially. However, the need for enterprises to prepare these documents at the end of a financial year and details that are included depend on the size of the business (in general measured by turnover) and the tax law of the country concerned. Otherwise, enterprises should keep their bookkeeping system as simple as possible according to the needs of the business.

**Balance Sheet**  
**Quality Seed Company as at 31 December 1997**

<b>ASSETS</b>		<b>LIABILITIES AND EQUITY</b>	
<i>Fixed assets</i>		<i>Current liabilities</i>	
Building, processing plant, equipment at cost	469,736	Accounts payable	-
Less accumulated depreciation	-207,498	<i>Short-term loans</i>	-
Construction in progress		<i>Long-term loans (current portion)</i>	
<i>Net fixed assets</i>	262,238	Commercial Bank	9,409
<i>Current assets</i>		East African Development Bank	10,956
Cash and bank balance	17,241	<i>Suppliers' credits</i>	13,431
Accounts receivable contract growers	47,202	Taxes payable	-
Inventories		<i>Total current liabilities</i>	33,796
Raw seed	20,000	<i>Long-term liabilities</i>	
Certified seed	7,000	<i>Long-term loans</i>	
Packaging materials	5,546	European Investment Bank	98,435
<i>Total current assets</i>	96,989	East African Development Bank	60,470
		<i>Suppliers' credit</i>	
		Plant Production Company	13,381
		<i>Total long-term liabilities</i>	172,286
		<i>Total liabilities</i>	206,082
		<i>Equity</i>	
		Share capital	196,500
		Retained earnings	-43,355
		<i>Total equity</i>	153,145
<i>Total assets</i>	359,227	<i>Total liabilities and equity</i>	359,227

Source: Economic Analysis of Agricultural Projects, J. Price Gittinger, 1982, Page 192, (modified by author).

## **Developing a Financial Plan for a Small-scale Seed Enterprise**

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### **Abstract**

A key step in starting a new enterprise is preparing a business plan. At the “heart” of the business plan is a financial plan, which gives a reasonable forecast of expected cash flow. A basic rule in making such a forecast is to be somehow pessimistic. In particular, overheads should not be underestimated, as these always tend to become larger than expected. Monthly forecasts of sales figures should reflect the reality that it takes time for new businesses to become established, especially in the seed industry since production is seasonal and small private enterprises may face competition from bigger organizations such as parastatals. The guiding principle is for enterprises to carry out sound financial planning. This depends largely on the availability of relevant information, particularly that relating to existing and potential markets for seed produced and distributed by the enterprise.

### **Introduction**

Accounting and financial management are closely linked and are often interchanged. In commercial business, it is important to distinguish these as separate subject areas. Whilst accounting is concerned with processing and interpretation of financial information, financial management relates directly to the routine management of financial aspects of enterprises.

Financial planning establishes guidelines for the business and should include:

- A definition of financial goals,
- an analysis of differences between these goals and actual financial status, and
- actions needed to achieve specified financial goals.

Financial planning formulates the method by which financial goals are to be achieved. It has two dimensions: a time frame and a level of aggregation.

### **Setting up a Financial Plan for a Seed Enterprise**

A financial plan is a statement of what is to be done in a future time period. Long run financial planning is normally taken to cover a two-year to three-year time frame. Financial plans are usually drawn up from capital budget analysis as a basis. In effect, investment proposals (investment in inventory, machinery, labor, etc.) of each operational unit are added up and treated as a “big” project. This process is called aggregation.

Financial plans always have alternative sets of assumptions as their inputs. The financial planning process should involve each operational unit, but for the business as a whole there could be three alternative business plans for, say, the next three years as follows:

**(i) Worst Case**

This plan would require making the worst possible assumptions about the business as a whole as well as the crops to be processed, and the state of competition by the private and state controlled sector.

**(ii) Normal Case**

This plan would require making “most likely” assumptions about the business as well as its competitors.

**(iii) Best Case**

This plan would require making the most optimistic assumptions. It could reflect new products (seeds, varieties) which the business would offer.

## **Common Elements of Financial Planning**

### **Sales Forecast**

All financial plans require a sales forecast. Perfect sales forecasts are not possible because sales depend on the uncertain future state of the seed industry (market share of private business).

### **Pro-forma Statement**

The financial plan will have a forecast balance sheet, an income statement (also per crop), and a sources and uses statement. These are called pro-forma statements or pro-formas.

### **Asset Requirement**

The plan will describe projected capital spending. In addition, it will discuss the proposed uses of net working capital (current assets - current liabilities).

### **Financial Requirement**

The plan will include a section on the financing arrangements that are necessary. This part of the plan should discuss profit policy and debt policy. The amount of financing from retained earnings (depend on the next year’s sales, the payout ratio and the profit margin) and debt will be set by profit policy and debt policy.

### **Economic Assumptions**

The plan will have to state the economic environment in which the business expects to survive over the period of the plan. Among the economic assumptions that will have to be made is the level of interest rates.

### **Sensitivity Analysis**

To complete the financial plan, inputs must be altered to examine how the plan changes under different scenario assumptions. This is called a sensitivity analysis because it shows how sensitive the financial output is to change in the input assumptions.

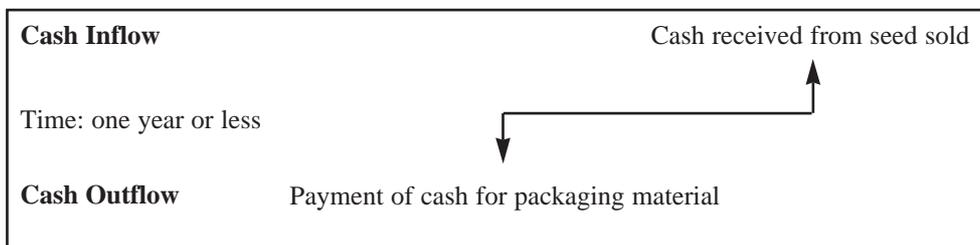
### Items Included in the Financial Plan

The core problem of financial planning is maintaining the liquidity of the business. Financial planning by a seed enterprise is done per crop and it includes following major items:

- Cost of raw seed
- Cost of jute bags
- Cost of transportation
- Cost of seed processing
- Cost of packaging
- Cost of seed treatment
- Interest for finance
- Cost of storage (also fumigation)
- Cost of distribution and sales (commission, discounts)
- Other fees payable
- Royalties (if applicable)
- Cost of seed certification
- Reserve for undistributed seed
- Reserve for rejected raw seed

### Short-term Finance and Planning

Short-term finance is an analysis of decisions that affect current assets and current liabilities and will frequently have an impact on the business within a year. The term net working capital is associated with short-term financial decision making. Net working capital is the difference between current assets and current liabilities. However, making net working capital decisions relies on cash flow and net present value. The most important difference between long-term and short-term finance is the timing of cash flows. Short-term financial decisions involve cash inflows and outflows within a year or less. A short-term financial decision is involved when the seed enterprise orders packaging materials, pays in cash, and anticipates selling certified seed for cash within one year as illustrated in Figure 1.



**Figure 1. Short-term financial decisions of a seed enterprise.**

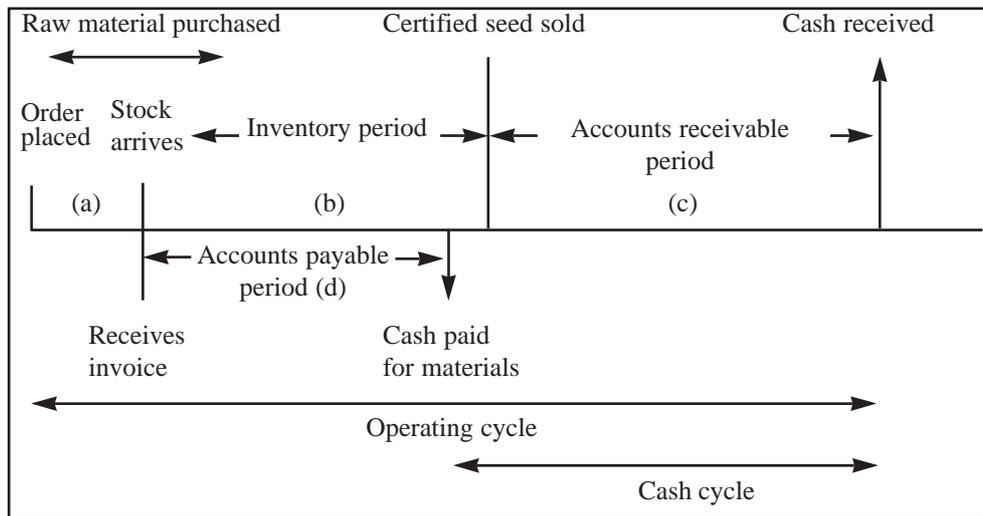
To further assess the short-term financial needs of an enterprise, the following factors should be taken into account:

- Keep a reasonable level of cash on hand or in a bank to pay current bills.
- Monitor the amount of raw materials (bags, seed dressing chemicals, etc.) that are ordered.
- Monitor the volume of credit that should be extended to customers.

## The Operating Cycle and the Cash Cycle

The cash flow line consists of an operating cycle and a cash cycle (Figure 2). The need for decisions on short-term financing depends on the gap between cash inflows and cash outflows. This gap is related to the operating cycles and accounts payable period. This gap can be filled by borrowing or by holding a liquidity reserve, and can be narrowed by adjusting the inventory, receivable, and payable periods.

The operating cycle is the time period between the placement of an order and the receipt of cash. The cash cycle is the time period from when cash is paid out to when cash is received.



**Figure 2. Operating and cash cycles of a seed enterprise.**

The length of the operating cycle (Figure 2) is equal to the length of the inventory turnover (b) and accounts receivable turnover (c) periods plus the time between when an order is placed and when the stock arrives (a).

The inventory turnover period is the length of time required to order, to produce, and to sell a product. The accounts receivable turnover period is the length of time required to collect cash receipts. The accounts payable deferral period (d) is the length of time the seed enterprise is able to delay payment on such items as wages and raw materials.

$$\text{Cash cycle} = (\text{Operating cycle}) - (\text{Accounts payable period})$$

The working capital cycle and cash cycle can be calculated from the inventory turnover ratio, the accounts receivable turnover ratio, and accounts payable deferral period. For example, an operating cycle of 167.6 days could be categorized as follows:

$$\begin{aligned} \text{Operating cycle} &= \text{Inventory turnover} + \text{accounts receivable turnover} \\ &= 110.6 \text{ days} + 57 \text{ days} = 167.6 \text{ days} \\ \text{Cash cycle} &= \text{Operating cycles} - \text{Days in payables} \\ &= 167.6 \text{ days} - 38.8 \text{ days} = 128.8 \text{ days} \end{aligned}$$

## **Major Factors Influencing Short-term Financial Policy**

The policy that an enterprise will adopt for short-term finance will depend on two key factors:

### **Investment in Current Assets**

This is usually measured using the enterprise's level of total operating revenues as a basis. A flexible short-term financial policy would maintain a high ratio of current assets to sales. A restrictive short-term financial policy would entail a low ratio of current assets to sales.

### **Financing Current Assets**

This is measured as the proportion of short-term debt and long-term debt used to finance current assets. A restrictive short-term financial policy means a high proportion of short-term debt relative to long-term financing, and a flexible policy means less short-term debt and more long-term debt.

Flexible short-term financial policies involve:

- Keeping large balances of cash.
- Making large investments in inventory (= seed stocks).
- Granting liberal credit terms (high-level accounts receivable).

Restrictive short-term policies involve:

- Keeping low cash balances.
- Making small investments in inventory.
- Allowing no credit sales and no accounts receivable.

Determining the optimum investment level for an enterprise in short-term assets requires identifying different costs of alternative short-term financing policies. The objective is to trade off the costs of restrictive policies against those of the flexible ones to arrive at the best compromise. However, sales are stimulated by the use of a credit policy that provides liberal financing to wholesales, retailers and farmers.

In an "ideal" case, short-term assets can always be financed with short-term debt, and long-term assets can be financed with long-term debt and equity, such that net working capital is always zero. But, short-term interest rates are normally lower than long-term interest rates. This means that it is generally more costly to rely on long-term borrowing as compared to short-term borrowing.

However, a seed enterprise buys raw seed after harvest, stores and processes it, selling it during the year. It has high inventories of raw seed after the harvest and ends up with low inventories just before the next sowing season. Bank loans with maturity of less than one year are used to finance the purchase of raw seed and storage costs. These loans are paid off from proceeds of the sale of certified seed.

## **Financial Plan**

In practice, every seed enterprise has to determine its requirement of capital during the financial year. The volume of capital depends on the time, e.g., on the duration of sowing season for the particular crop. The capital requirement is calculated by accumulated cash inflow (sales of certified seed and other sales) and cash outflow. The capital requirement is calculated by crop and per year. A schedule of the campaign for major crops in Egypt, as a basis for financial planning, is shown in Table 1.

**Table 1. Schedule of campaign in Egypt.**

<b>Crop (seed)</b>	<b>Contract period</b>	<b>Sowing period (sales period)</b>	<b>Harvest period purchase of raw seed</b>	<b>Processing period</b>
<i>Wheat</i>	Sept-Oct	01.11-15.12	May/June	July/August/ September
<i>Faba bean</i>	Sept-Oct	01.10-15.12	April/May	July/August
<i>Cotton</i>	Dec-Jan	01.02-31.03	Sept/Oct	Dec/Jan/ Feb/March
<i>Rice</i>	Mar-April	15.04-30.05	Oct/Nov	Nov/Dec/ Feb/March

Therefore, a financial plan should be established per crop and an aggregated plan for the financial year. The following Tables present financial plans for the major crops (wheat seed, rice seed, cotton seed, faba bean seed) and an aggregated plan for the whole financial season.

The Tables are prepared in such a way that the first column includes the balances brought forward from the previous year after having prepared the final accounts per crop as well as for the financial year. The following columns represent the time period for purchasing raw seed up to the time for selling certified seed.

Financial plans should be prepared on all operational levels and then aggregated.

Examples of how to prepare a Financial Plan and their main components are:

- Cash Inflow
- Total Cash Inflow
- Cash Outflow
- Total Cash Outflow
- Net Cash Flow (Total Cash Outflow—Total Cash Inflow) which then gives us
- Cumulative Finance Surplus/Deficit and, in case of deficit, the Finance Requirement

The Financial Plan compares planned and actual figures of every month so that a regular control of cash inflows and outflows is provided. Shortcomings are foreseen in time so that corrective measures can be implemented immediately.

The Financial Plan should be prepared by crop, variety, and sales area and on a half-yearly as well as yearly basis.

## **Conclusion**

Preparing a financial plan for a seed enterprise is also about risk, which must be quantified wherever possible. Potential risk could come from a number of sources—a new competitor, changes in legislation, difficulties in obtaining raw seed, packaging material, etc. A more common risk is that the expected turnover is not achieved.

A useful exercise is to do a second cash flow forecast assuming 20% (or 50%) less sales with all the overheads (i.e., wages, rent, rates, light, phone, etc.) remaining the same. In a situation where it is almost impossible to forecast sales, a break-even cash flow could be done. The whole cash flow is completed but leaving the sales line until the very end and then calculating the sales which are needed to break-even. In practical terms, this means ensur-

ing the bottom line of the cash flow remains positive. One of the most common errors people make when completing their first cash flow forecast is to over-estimate the monthly sales forecast.

### **CENTRAL ADMINISTRATION FOR SEED PRODUCTION, EGYPT EXPLANATORY NOTES TO TABLES ON FINANCIAL PLANNING**

#### **CASH INFLOW:**

1. **Sales of certified seed** - includes all certified seed sold during the period, also considering the different sales prices to agricultural cooperatives, military, marginal areas, etc.
2. **Sales of rejected seed** - includes the sales of rejects I, II, III.
3. **Other sales** - sales of second hand jute bags and other items.
4. **Short-term credit** to finance seed purchase and processing.
5. **Other sales** include all seed which are not mentioned in the previous sales.

#### **CASH OUTFLOWS**

1. **Raw seed** - purchase of raw seed, including multiplication and purity bonus and other cost paid to the farmer or supplier to deliver raw seed to the seed center.
2. **Materials** - all materials used for processing and selling certified seed (rejected seed).
3. **Seed certification** - cost of seed certification (charges by the Central Administration for Seed Certification paid by CASP).
4. **CASP bonus and incentives** - bonus and incentives paid by CASP to its employees.
5. **CASP casual labor** - pay to all casual labor (daily paid labor) working for CASP on all levels.
6. **Contract labor** - money paid to subcontractors for loading and unloading seed.
7. **Transportation** - cost of transportation to deliver raw seed to the various CASP seed centers and other seed centers as well as to other locations.
8. **Cost of cotton delinting** - cost of cotton delinting.
9. **Cost of processing** - cost of processing paid to EAO, ARC and others.
10. **Commission** - sales commission paid to third parties for selling seed.
11. **Sales incentives** - incentives paid to CASP staff for selling seed.
12. **Services** - contributions paid to Agricultural Syndicate, National Seed Council, Research, etc.
13. **Royalties** - money paid for breeder rights to ARC and others.
14. **Utilities** - cost of electricity and water.
15. **Traveling allowances** - paid to CASP staff in general.
16. **Telecommunication** - telephone, postage, fax, to be paid for.
17. **Maintenance and repairs** - cost of maintenance and repairs for seed processing plants, buildings, motor vehicles, computers and software etc.
18. **Spare parts** - cost of spare parts for seed processing plants, buildings, motor vehicles, computers etc.
19. **Redemption short-term credit** - repayment of loan without interest
20. **Interest short-term credit** - payment of interest for short-term credit.
21. **Taxes and rates** - all taxes and rates (maybe not applicable),

**Quality Seed Company  
Cash Flow Budget**

Description	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Total
<b>Cash in</b>													
1. Sales (incl.VAT)													
2. Bank or other loans													
3. Owner's Capital													
4. Other sales													
5. Total													
<b>Cash out (incl. VAT)</b>													
6. Raw Seed													
7. Inventory													
8. Advertising & Promotion													
9. Bank Charges/Interest													
10. Business Insurance													
11. Drawings/salaries													
12. Electric/Gas/Heat													
13. Fee (Accountant, Lawyer)													
14. Lease/Loan Payments													
15. Motor-Fuel													
16. Other expenses													
17. Postage													
18. Rent and Rates													
19. Repairs and Maintenance													
20. Staff Wages													
21. Staff Income Tax/ Insurance													
22. Stationary/Printing													
23. Sundries													
24. Telephone/Fax													
25. Travelling													
26. VAT													
27. Other Expenses													
<b>28. Capital Expenditure</b>													
<b>29. Total</b>													
<b>30. Net Cash Flow</b>													
31. Opening Balances													
<b>32. Closing Balance</b>													

**Quality Seed Company**  
**Financial Plan**  
**From 1 July 1998 - 31 December 1998**

**Cash Inflow**

Financial year:	1998/99
Campaign	
Crop:	
Location:	

Description	Balance B/F		July		August		September		October		November		December		Total	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
CASH INFLOW																
Sales C-Seed of present month																
Sales C-Seed of last month																
Sales Rej. Seed of present month																
Sales Rej. of last month																
Other sales of present month																
Other sales of last month																
Short-term credit																
Others																
<b>TOTAL CASH FLOW</b>																

## Cash Outflow

CASH OUTFLOW	Balance B/F		July		August		September		October		November		December		Total	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Raw Seed																
Materials																
Wages and Salaries																
Cost of Seed Certification																
Bonus & Incentives																
Casual Labor																
Contract labor																
Transportation																
Cost of Cotton Delinting																
Cost of Seed Processing third party																
Commission																
Sales Incentives																
Services (syndicate, etc.)																
Royalties																
Utilities																
Travelling Allowances																
Telecommunication																
Maintenance and Repairs																
Spare parts																
Redemption short-term credit																
Interest short-term credit																
Taxes and Rates																
Other																
<b>TOTAL CASH OUTFLOW</b>																
<b>NET CASHFLOW</b>																
<b>CUMULATIVE FINANCE SURPLUS/DEFICIT REQUIREMENT</b>																

## **Session II**

# **Experiences of Existing Small-scale Seed Enterprises**

## **Restructuring Government Seed Centers into Private Small-scale Enterprises in Egypt**

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### **Abstract**

Since the early 1990s, the Government of Egypt has been making considerable progress in privatization as part of the country's structural reform program with the World Bank and the International Monetary Fund (IMF). Strengthening legislation and privatizing public means of seed production are parts of this process, for which an action plan has recently been developed that is aimed at commercializing activities of the state-owned Central Administration for Seed Production (CASP), with special reference to self-pollinating crops like wheat, rice, and faba bean. It is proposed to restructure CASP by gradually reforming its constituent seed centers into independent profitable entities that will ultimately operate as private seed enterprises. Following the successful introduction of a new management system in two pilot seed centers, efforts are being made to extend this to as many other centers as possible. This paper discusses the performance of the pilot centers and demonstrates prospects of converting government seed centers into private enterprises that can produce and distribute seed within local communities.

### **Introduction**

The Egyptian seed industry had its beginning in 1922 when a seed production and distribution unit for cotton was established within the Ministry of Agriculture. The activities of this unit were later expanded to include seed production of other crops. This unit was upgraded into a Branch in 1942, into a Section in 1957, into a Directorate in 1960, and into the Central Administration for Seed (CAS) with an Under-Secretary in 1980. In 1995, CAS was divided into the Central Administration for Seed Production (CASP) and the Central Administration for Seed Certification (CASC) to separate the production and regulatory functions.

This process of change has been accompanied by a gradual revision of seed legislation. Activities in the seed industry are at present governed by Law No. 53 of 1966, which is an all-inclusive agricultural act that is not confined to seeds alone. According to this Act, the Ministry of Agriculture is given the statutory responsibility for establishing, operating, and controlling seed activities nationwide. Important modifications to the Law have been proposed recently to take account of new developments such as market liberalization and the introduction of plant variety protection. A new seed law is currently under preparation and negotiation in the parliament and may become effective within a year.

Privatization has been regarded as the most effective means of introducing efficiency into the seed sector of Egypt, which until the early 1990s was almost entirely under public ownership and management. Privatization of the seed sector therefore requires a redefinition of the roles the public and private sectors should play. Various steps have been taken in this direction and at present private seed companies account for total market shares of about 30%

for self-pollinated crops (GTZ/CASP 1997). The main public seed organization is CASP. It operates several seed centers and agricultural offices in the governorates. The final objective of the privatization process is to combine activities of the seed centers and associated governorate offices and transform them into regional autonomous and profitable seed producing entities with commercial legal status. It is expected that these entities will become financially viable within a period of between five and seven years, after which they will be merged with private companies, offered for sale on the capital market, and/or leased to interested investors.

### **Composition of Seed Sector**

The main organizations involved in the seed industry of Egypt are the following:

#### **Agricultural Research Center (ARC)**

With 17 research institutes and support organizations, ARC has the primary responsibility for crop improvement research, as well as cultivar development and testing throughout the country. The Center produces and markets both basic and certified seed. The total number of personnel in the ARC is estimated to be 28000 of which about 2500 hold PhD degrees.

#### **Central Administration for Seed Production (CASP)**

This is responsible for all governmental seed production activities, which include seed multiplication, processing, storage, transport, and marketing. Privatization of all governmental seed production activities is planned to take place within the next five to seven years.

#### **Central Administration for Seed Testing and Certification (CASC)**

As a governmental agency, CASC is responsible for quality control and seed law enforcement and certification. With further liberalization and privatization, CASC will be expected to perform sovereign tasks in certification of seed, seedlings, plants, tubers, etc., as a quality guarantee for the farmers.

#### **Other Public Organizations**

Other public sector organizations involved in the sector include the Egyptian Agricultural Authority (EAO), which handles about 25% of the vegetable seed imported annually into Egypt, and the Principal Bank for Development and Agricultural Credit (PBDAC), which provides storage, distribution, and credit facilities relating to certified seed production.

#### **Private Seed Companies**

As regards private seed companies,

- There are eight registered seed production companies, which specialize in hybrids of maize and sunflower. Some of these have recently included small-scale seed production of self-pollinating crops such as rice and wheat.
- There are 53 companies engaged in the import of mainly vegetable seed.
- There are 148 companies engaged in seed export.

### **Privatizing the Crop Production Sub-Sector**

For several years under the leadership of Presidents Nasser and Sadat, a socialistic system was introduced in Egypt, which nationalized private businesses in agriculture. Government

departments and ministries controlled input supply and marketing of all agricultural products. For instance, the Ministry of Agriculture regulated crop areas and supplied farmers with subsidized inputs such as fertilizer, agro-chemicals, and seed.

With the start of gradual liberalization in the late 1980s, grain production became more attractive and domestic prices rose to the level of the world market. Subsidies were gradually reduced on fertilizer and other agro-chemicals, and the government fertilizer distribution system was transferred to the private sector. Farmers replaced long-straw wheat varieties with dwarf ones. Consequently, on-farm yield and total cultivated area increased nationwide.

Since 1994, the production of cotton has been gradually liberalized although this is a strategic crop. This has resulted in increased yields and reduced area under cotton, thus releasing more land for growing other cash crops. Rice production, in particular, has increased although this crop requires substantial irrigation.

### **Privatizing Seed Sector**

Between 1992 and 1997, considerable progress has been made in liberalizing the seed market and encouraging the involvement of the private sector in the national seed supply system. The following key steps have been taken in privatizing governmental seed production in Egypt:

#### **Separating Seed Production from Certification**

The Central Administration for Seed (CAS), established in 1980, has recently been divided into two autonomous entities: CASP for seed production and CASC for seed certification. Since 1 July 1997, both administrative units are operating separate budgets and personnel.

#### **Market-oriented Approach**

With the assistance of the Improvement and Decentralization of Governmental Seed Production and Marketing Project (IDGSPM), CASP has established a marketing department with branches in all governorates and districts. Staff members have received specialized training in marketing, extension and economics. A logo, which is printed on all bags, tags, labels, letters, and publications as a means of promotion, has also been developed. This logo will become a trademark for quality seed produced by CASP.

Periodic surveys are conducted as part of market research efforts to obtain data on seed related issues such as:

- The opinion of farmers regarding certified seed
- Annual demand for certified seed
- Varieties preferred
- Sources where farmers obtain seed
- Distance to nearest sales point
- Means of payment for seed (cash, credit, etc.)

As a result of these surveys, it has been possible to determine varieties and quantity of seed desired by farmers, the preferred packaging units, location of sales points, etc. Follow-up approaches in market promotion will focus on regional field days, farmers meetings, advertisement, distribution of crop-specific leaflets, etc.

### **Management Accounting System**

A new management accounting system at two pilot seed centers has been introduced and tested by CASP. This system has proved to be efficient and has been therefore recommended for other seed centers and governorate offices.

### **Removal of Subsidies and Price Distortion**

Direct subsidies on seed have been eliminated and indirect subsidies are being gradually phased out. The practice of centrally administered seed pricing was stopped in 1996 when CASP, for the first time, increased its seed prices substantially to about twice the grain price as in the private sector. This avoids the problem of unfair competition.

### **Privatization Committee**

A committee was established in 1997 to outline policy measures and strategies in privatizing public seed institutions.

### **Seed Legislation and Plant Variety Protection**

Enactment of the new seed law, which replaces Law 53 of 1966 is under discussion and will be essential for developing a modern seed industry in Egypt. The new law will facilitate international seed trade and offer more protection of farmers' interests. In addition, the introduction of a plant variety protection law will enhance private plant breeding, improve access and use of hybrids and other improved varieties including transgenic plants.

### **Seed Association (under consideration)**

The IDGSPM project intends to support the establishment of a 'Seed Association' that has a strong private sector participation, and which can give political weight to the privatization process.

## **Establishing Semi-independent Seed Centers**

Within the past 15 years, the development of seed centers has gone through three distinct stages:

### **Seed Processing Stations**

Tasks and responsibilities of these stations were limited to the receipt of raw seed, processing, and distribution strictly according to plans and targets set by CAS.

### **Seed Centers**

With the establishment of seed centers, more responsibilities were shifted to these centers. The seed centers started to contract farmers for seed multiplication. An internal quality control system was introduced as a quality assurance of the product. The seed centers were made responsible for roguing of farmer's fields, for processing, storage, transport, marketing, and sale of seed. The center management became more aware of the essence of utilizing processing facilities to optimum capacity. Seed centers began operating on a commercial basis with employees receiving incentives depending on revenue that is generated.

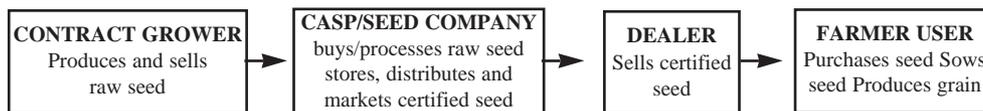
### Regional Business Entity (RBE)

The Central Administration for Seed Production is a large administrative organization with an extensive labor force and is therefore not attractive to potential private investors. According to Hazem Hassan (1997), CASP total manpower in 1997 comprised 3080 employees, which included staff at headquarters, governorates, and districts. This figure seems excessive and unsuitable for commercial consideration, especially when most of the staff were listed as employees at headquarters. A recent approach is to breakup CASP into smaller units at regional level, to decentralize decision making, production planning, and financial management to the regional entities, which should operate as autonomous units or branches with reduced labor force. It is argued that the pilot centers should be fully integrated and linked to the governorate structures if they are to cater for location-specific seed needs. At present, such inter-relationships seem loose, making the seed centers appear as isolated units.

It is believed that this approach will also encourage competition by breaking up the monopoly of CASP and creating several separate units, which will later become enterprises in their own right. The regional business entities will be formed by a combination of one or more seed centers and associated regional agricultural offices for the purpose of planning, production, processing, storage, and marketing of seed. It is expected that out of the entire 24 governorates and 14 seed centers, between four and six profitable RBEs will be initially established. Each will serve as a private seed company and will be equipped with an analytical accounting system that supports commercial seed production and marketing. Each entity will buy basic seed from ARC, make their own contracts, and supervise the multiplication fields. Furthermore, this method permits piecemeal privatization and allows different methods of privatization to be applied to the different entities. These methods will include management contracts, employee buy-outs, etc. It is hoped that after some years, the RSEs will be leased or sold to the private sector as the final step in the privatization process.

### Comparing Performance of CASP with Private Seed Companies

According to Schütz et al. (1997), cost effectiveness can be assessed by analyzing the process of price formation as raw seed is transferred from contract growers to CASP or private seed companies (for processing, storage, and marketing), onto market intermediaries, until certified seed finally reaches farmers. The seed production-distribution-use chain in Egypt is illustrated in Figure 1.



**Figure 1. Seed production-distribution-use chain in Egypt.**

To have an idea on the marketing efficiency and degree of competitiveness, margins earned at different points in the chain involving CASP are compared with those of two private sector companies: HYTEC and the Egyptian Agricultural Company (EAC). Both deal with the same self-pollinating crops (wheat and rice) and use similar marketing channels. Data from these private companies are tentative, as it is difficult to obtain a detailed breakdown of costs and returns (Schütz et al. 1997).

**Table 1. CASP 1996/97 cost structure of certified seed in EP<sup>†</sup>.**

<b>Description</b>	<b>Wheat</b>	<b>Rice</b>	<b>Faba bean</b>	<b>Cotton</b>
Raw seed cost	760.00	880.00	1,451.61	727.08
Raw seed cost (rejects)	84.33	120.00	161.29	242.36
Transportation to Seed Center	37.00	56.63	35.84	77.78
Storage cost (receiving)	33.33	41.67	32.26	25.00
Jute bags	44.44	61.67	57.35	0.00
Seal and thread	3.33	8.33	3.23	16.67
<b>Subtotal</b>	<b>962.43</b>	<b>1168.30</b>	<b>1741.58</b>	<b>1088.89</b>
<i>Processing (variable cost)</i>				
Seed cleaning	29.67	37.50	28.71	55.56
Seed dressing	0.00	0.00	0.00	38.33
Delinting	0.00	0.00	0.00	52.50
Fumigation	8.00	0.00	6.45	0.00
Plastic bags and twine	22.50	33.33	28.45	52.50
Interest	66.74	69.17	119.03	33.33
Bank charges	4.94	0.00	17.63	0.00
Seed certification	16.67	33.33	14.84	83.33
Royalties	33.33	41.67	32.26	100.00
<b>Subtotal</b>	<b>181.85</b>	<b>215.00</b>	<b>247.37</b>	<b>415.55</b>
<b>Total operational cost</b>	<b>1144.28</b>	<b>1383.30</b>	<b>1988.95</b>	<b>1504.44</b>
<i>Distribution cost</i>				
Commission on sales	53.33	41.67	32.26	76.67
Fumigation/insecticide	6.67	0.00	0.00	0.00
<b>Subtotal</b>	<b>60.00</b>	<b>41.67</b>	<b>32.26</b>	<b>76.67</b>
<b>Total production cost</b>	<b>1204.28</b>	<b>1424.97</b>	<b>2021.21</b>	<b>1581.11</b>
<i>Miscellaneous expenses</i>				
CAS services	33.33	41.67	32.26	66.67
CAS incentives	33.33	41.67	32.26	33.33
National Seed Council	13.33	8.33	6.45	66.67
Grain and Legume Council	3.33	4.17	3.23	0.00
Agricultural Syndicate	20.00	15.00	20.00	10.00
<b>Subtotal</b>	<b>103.32</b>	<b>110.84</b>	<b>94.20</b>	<b>176.67</b>
Reserve	23.33	41.67	0.00	0.00
Reserve for undistributed seed	33.33	41.67	52.90	0.00
Loss of bags	13.33	8.33	0.00	16.67
<b>Total cost</b>	<b>1377.59</b>	<b>1627.48</b>	<b>2168.31</b>	<b>1774.45</b>
Less value of rejects	59.26	85.80	71.68	108.33
<b>Net total cost</b>	<b>1318.33</b>	<b>1541.68</b>	<b>2096.63</b>	<b>1666.12</b>
<b>Cost or break-even price</b>	<b>1318.33</b>	<b>1541.68</b>	<b>2096.63</b>	<b>1666.12</b>

<sup>†</sup> EP = Egyptian pound (USUS\$ 1 = 3.41 EP; 1998 official rate).

Source: CASP Financial Records.

Results of the analysis presented in Table 2 reveal, particularly in the case of rice, that because the two private companies have much lower unit cost margins, they are in a better position than CASP to offer higher margins to the growers and dealers, while earning an acceptable level of profit. In general, despite a two-fold increase in retail price over the grain price, costs of preparing and handling seed accounts for much of this difference. In other words, the relatively high overhead costs (high cost margin) of CASP are passed on to growers and dealers in the form of reduced margins. This conclusion is in line with findings by Nasr and Grenzebach (1996) who stated that raw seed buying price is regarded by many growers as insufficient to cover additional costs associated with seed production and to compensate for the extra time needed to deliver seed to storage centers.

The analysis of marketing margins shows that margins, at every marketing stage for self-pollinating crops, are low (in this case, less than 20%) compared to those of hybrids and other high-value crops, for which the seed:grain price ratio averages up to 10:1 (e.g., for double-cross maize hybrids) in many developing countries. Two approaches are usually used to compensate for such low margins associated with self-pollinating crops:

- Crop diversification in which there is a mix of self-pollinating and other more profitable crops. This approach is used by both HYTEC and EAC and offers the opportunity for reducing overall production cost through an effective utilization of fixed assets/capacity and manpower in all-the-year round activities as much as possible.
- Expansion of aggregate margin (unit margin  $\times$  total seed output) through an increase in total volume of certified seed sold. However, at present the capacity for the private companies to increase output is limited since the public sector organizations already produce large volumes of seed of these crops and compete unfairly with private efforts.

**Table 2. Unit margins earned (EP<sup>†</sup>/tonne) in the seed production-distribution chain.**

Description	Wheat		Rice		
	CASP	EAC	CASP	HYTEC	EAC
<b>Seed grower</b>					
Grain price	633.00	680.00	850.00	867.50	867.15
Raw seed buying price	741.00	696.67	880.00	1020.00	934.63
Grower's unit margin	108.00(17%)	16.67(2.5%)	30.00 (3.5%)	152.50(17.6%)	67.48(7.8%)
Margin of retail price (%)	8.2%	1.3%	2%	8.5%	4.1%
<b>Seed organization</b>					
Cost price	1269.20	1153.33	1496.67	1304.33	1303.81
Unit cost margin (%)	528.20(71%)	456.6 (65%)	616.67(70%)	284.33(27.9%)	369.19(39.5%)
Margin of retail price (%)	40%	34.3%	40%	15.8%	22.4%
Wholesale price	1269.20	1270.00	1496.67	1565.17	1499.40
Profit or net margin (%)	0	116.67(10%)	0	260.84(20%)	195.59(15%)
Profit of retail price (%)	0	8.8%	0	14.5%	11.9%
<b>Seed dealer</b>					
Seed retail price	1320.00	1333.33	1541.67	1800.00	1649.34
Retail margin (%)	50.80(4%)	63.33(5%)	45.00(3%)	234.83(15%)	149.94 (10%)
Margin of retail price (%)	3.8%	4.8%	3%	13%	9%

<sup>†</sup> See Table 1.

Expressing unit margin as a percentage of the retail price represents the share of the retail price that goes to the intermediary concerned. Although the payments to contract growers account for about half of the final retail price, the actual margin earned by the growers is small when expressed as a proportion of the retail price (less than 10% in all cases), and when compared to the margin of 40% that accounts for CASP costs for both wheat and rice. Corresponding cost margins for the private sector companies are much lower. CASP barely breaks even and earns no net margin or profit. Results also show that the narrower the difference between the cost and net margins, the better the financial position will be, as in the case of rice seed produced by HYTEC (15.8% - 14.5%). It is crucial that the overhead costs incurred do not far exceed the net margin. Otherwise the enterprise would operate at a loss.

On the basis of these results, one can conclude that under competitive market conditions, CASP would not be able to offer much incentive to its growers to deliver raw seed or to its dealers to sell certified seed. This would then have an adverse effect on the market share of CASP. The following measures could help improve the competitive position of CASP in a privatized seed industry:

- Reducing the current estimated cost margin of 70% per unit of certified seed of self-pollinating crops (compared to about 40% existing in the private sector). This could be achieved partly through economies of scale in production, improved management, and efficient utilization of unused capacities especially in processing and storage. Excess capacity beyond this should be made available for use by the private sector at reasonable cost.
- Creating the right balance between self-pollinating crops and other activities of higher value to ensure optimum use of manpower and other resources.
- Improving the seed distribution system, since nearly all CASP seed goes through government distribution channels including the national extension service. In the future, marketing activities will have to be strengthened through vigorous promotional efforts and sale of seed through CASP's own outlets as well as through private dealers. Establishing a marketing division for this purpose is therefore desirable. The private companies have proved successful in self-pollinating crops partly because they keep in frequent contact with growers and dealers by providing them a product mix comprising seed, fertilizer, credit, extension and other inputs. Such a strategy could also benefit CASP.

At present, there are no guidelines regarding the role of different actors in the seed production-distribution chain. Some private sector companies are concerned that too many merchants, who lack basic technical knowledge and experience, are trading in seeds. These merchants are generally not concerned about the adverse effects of dealing in inappropriate or poor quality seed. To regulate and protect the seed market from abuse, it is important to formulate guidelines which specify the minimum levels of organization required for individuals to participate as growers, enterprises, or dealers, but not impose rigid barriers to entry.

#### **Performance at Seed Center Level**

Unlike cost pricing carried out at the CASP level, Schütz et al. (1997) also shows that a similar procedure at Shirbeen Pilot Seed Center includes fixed costs relating to staff expenditure and depreciation (Table 3). This brings the unit cost prices of the major seed crops, to more or less the same levels as those calculated at the CASP organizational level. It is, however, doubtful whether the difference in cost structure between CASP and the pilot seed cen-

ters is accounted for by staff and depreciation costs alone, since it is possible that improved management practices introduced at the pilot centers have made a positive contribution.

As part of the process of decentralizing seed production, the GTZ project supports CASP in setting up autonomous seed centers at regional level. Two such centers, Shirbeen and Kafr Saqr, are already in operation out of a target of five centers in the short term. These centers are meant to serve the seed needs of specific regions in which they are located, by carrying out demand forecasts to determine varieties and amount of seed needed within each locality. Each center controls its pattern of expenditure, prepares cost sheets and other financial statements using a computerized analytical bookkeeping system.

The centers make direct contracts with growers for seed multiplication, deliver foundation seed to them and follow up field activities. At harvest time, growers are provided empty bags to deliver raw seed, which is tested on receipt by staff of the internal quality control laboratory. Growers receive immediate payment depending on the test result, and seed is then processed and officially certified by CASC before it is marketed.

Comparing Shirbeen Pilot Seed Center with Gemaiza (a non-pilot seed center), Taryal (1997) observes no significant differences in total unit production costs for wheat, rice, and cotton. The same study, however, identifies some cost advantages of Shirbeen over Gemaiza although results of cost analysis do not clearly reflect these observations. As explanation for these narrow differences in unit costs, much of the cost of raw seed differs little between the two centers. This cost item constitutes a rather high proportion of total unit costs (between 70 and 80%), and therefore tends to outweigh any contrasting effects of other cost factors.

Strengths of Shirbeen Pilot Seed Center include the following:

- A better organized grower scheme in which the center makes direct contracts with farmers in terms of supervision and payment for raw seed. This has the combined benefit of boosting the delivery of high quality raw seed and reducing transport costs, since seed is delivered directly to centers without interim storage.
- An internal quality control system and a separate bank account to facilitate payment for raw seed.
- A higher degree of capacity utilization and efficiency in processing, which has resulted in reduced quantity of rejected seed.
- A re-organized management system based on decentralized decision-making, productive use of labor, and utilization of commercial management tools such as analytical accounting.

An advantage in analyzing differences in cost margins is that this method isolates the cost effect of raw seed and concentrates on those factors which actually constitute overhead costs at both centers. As shown in Table 4, this method seems to provide a more reliable indication of higher efficiency at Shirbeen Pilot Seed Center.

A great difference in performance cannot be expected between these two types of seed centers now, since adjustment measures have only been introduced recently at Shirbeen and will require more time to demonstrate high efficiency. With the expectation of greater benefits in the future, the present differences can only indicate the sort of gains that could be realized from restructuring and decentralizing, and further support the need for upgrading other centers to the level of pilot centers as part of the privatization process.

**Table 3. Cost prices in EP<sup>†</sup> at Shirbeen Pilot Seed Center.**

<b>Description</b>	<b>Wheat</b>	<b>Rice</b>	<b>Faba bean</b>	<b>Cotton</b>
Raw seed cost	741.67	880.00	1,451.61	710.42
Raw seed cost (rejects)	93.35	80.70	73.19	76.31
Transportation to SC	37.53	54.59	33.88	64.60
Storage cost (intake)	37.53	45.49	33.88	27.69
Jute bags	45.03	54.59	54.22	0.00
Seal and thread	3.75	9.10	3.23	16.67
<b>Subtotal</b>	<b>958.86</b>	<b>1124.47</b>	<b>1650.01</b>	<b>895.69</b>
Processing (variable cost)				
Seed cleaning	11.49	10.67	8.26	10.67
Seed dressing	0.00	0.00	0.00	38.33
Delinting	0.00	0.00	0.00	88.59
Fumigation	0.00	0.00	6.45	0.00
Plastic bags and twine	22.50	33.33	23.55	30.42
Other expenses	0.60	0.75	0.58	0.75
Interest	67.02	52.58	113.96	71.80
Bank charges	9.93	11.68	16.88	10.64
Seed certification	16.67	33.33	14.84	83.33
Royalties	33.33	41.67	32.26	100.00
<b>Subtotal</b>	<b>161.54</b>	<b>184.01</b>	<b>216.78</b>	<b>434.53</b>
Fixed cost				
Depreciation	17.27	21.58	16.71	21.58
Wages and salaries (bonus)	2.33	2.92	2.26	2.92
Interest on fixed assets	26.13	32.67	25.29	32.67
<b>Subtotal</b>	<b>45.73</b>	<b>57.17</b>	<b>44.26</b>	<b>57.17</b>
Total operational cost	1166.13	1365.65	1911.05	1387.39
Distribution cost				
Storage (1.14% per 30 days)	13.12	15.36	21.5	15.61
Commission on sales	53.33	41.67	32.26	10.00
Fumigation/insecticide	6.67	0.00	0.00	0.00
Sub total	73.12	57.03	53.76	25.61
Total production cost	1239.25	1422.68	1964.81	1413.00
Miscellaneous expenses				
CAS services	33.33	41.67	32.26	66.67
CAS incentives	33.33	41.67	32.26	33.33
National Seed Council	3.33	8.33	6.45	66.67
Grain and Legume Council	13.33	4.17	3.23	66.67
Agricultural Syndicate	20.00	15.00	20.00	10.00
<b>Subtotal</b>	<b>103.32</b>	<b>110.84</b>	<b>94.20</b>	<b>243.34</b>
Reserve	23.33	41.67	0.00	0.00
Reserve for undistributed seed	33.33	41.67	52.90	0.00
Loss of bags	13.33	8.33	0.00	16.67
Total cost	1412.56	1625.19	2111.91	1673.01
Less value of rejects	50.35	57.31	32.53	34.91
Net total cost	1362.21	1567.88	2079.38	1638.10
<b>Cost price</b>	<b>1362.21</b>	<b>1567.88</b>	<b>2079.38</b>	<b>1638.10</b>

<sup>†</sup> See Table 1.

Source: CASP Financial Records.

**Table 4. Comparison of unit cost margins in two seed centers in 1995/96.**

Cost margin in EP†/tonne	Wheat	Rice	Cotton
Shirbeen Pilot Seed Center	462.67	514.17	918.33
Gemaiza Seed Center	497.33	574.17	938.33
Difference over Gemaiza Seed Center (%)	-7.5	-11.7	-2.2

† See Table 1.

Source: Adapted from Nasr and Grenzebach (1996).

### Conclusion

It is essential for enterprises dealing in seed of self-pollinating crops to operate at low overhead costs so growers and dealers will get enough incentive from it, while earning a reasonable amount of profit. This feature makes such crops more suitable for small-scale seed enterprises, which invest less in capital assets, and incur lower transport and staff costs.

Although the price of seed may not be a high proportion of total production cost, demand for seed of self-pollinating crops is relatively elastic at prices above the cost price because of the possibility of farmers to use retained seed as a substitute. This means that as the gap between the price of certified, and retained seed increases, so does the tendency for farmers to use own-saved seed. In such market situations, seed enterprises must endeavor to provide the farmer with seed of consistently better quality than farm-saved seed.

Seed operations managed or carried out by CASP have been shown to generate positive gross margins (when depreciation and staff costs are excluded). This makes CASP crop units attractive for privatization as they show a promise of emerging as viable entities under an appropriate restructuring program. So are the operations of the pilot seed centers. However, there is a problem because the seed centers are located on state land and have assets which belong to the government and therefore cannot be sold directly to individuals. Some of the centers are also very expensive and cannot generate returns in the short term even if they were sold. Therefore, in many cases, the only alternative is to undertake long-term lease agreements at reasonable charges.

The approach to privatization has to fit within the political framework of the seed sector. There are several pre-conditions that should be fulfilled as a means of encouraging private sector participation including a revision of seed legislation that permits plant variety protection, and withdrawal of ARC from production and distribution of certified seed.

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## **Producing Quality Seed Potato by a Farmers' Cooperative in Georgia**

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### **Abstract**

In the post-Soviet Republic of Georgia, the transition from a planned economy to a free-market system has adversely affected agriculture and the livelihood of its farmers. There has been a sharp decline in farm productivity, partly as a result of limited availability of essential inputs such as seed and credit, in addition to poor awareness about appropriate farming techniques. An international non-governmental organization, Cooperative for Assistance Relief Everywhere (CARE) implements the Small Farmer Support Project (SFSP) in Georgia, which seeks to improve farmers' access to quality seed amongst several interrelated activities conducted in the target areas. The Project is undertaking a pilot initiative, which is aimed at stimulating local seed production capacity through providing support for the establishment of private farmer-run small potato seed enterprises. This paper describes a season's experience of SFSP support to Marienfield, a newly formed cooperative that is undertaking local seed production as an enterprise. It first gives a brief history about seed potato production in the former Soviet Union; it then explains the rationale for establishing and developing a management structure for the Marienfield Cooperative, and finally it reviews progress made so far and future prospects for developing small enterprises in potato seed production.

### **Introduction**

The livelihood of the rural inhabitants of Georgia has been adversely affected by the change from centrally planned Soviet economy to post-independence free market system. The Georgian agricultural sector in the Soviet times was based on government controlled collective farms that produced cash crops such as fruits, tea, and vine products for export to other Soviet Republics, while essential food commodities including wheat and other grains were imported from different parts of the Soviet Union. This system enabled farmers to work as employees on the collective farms and they depended on the salaries earned as the main source of household income. Although every farming household was at the same time allocated a small portion of land for personal use, the income derived from this source was insignificant compared to that earned when working on the state farms. The collapse of the collective farming system therefore means Georgian farmers have virtually no opportunity to acquire off-farm income.

In recent years, farm profits have fallen as crop yields have dropped and production costs have risen. As a result of reduced demand, farm-gate prices have also slumped. A lack of effective marketing system in the country exacerbates the decline in crop sales. The Small Farmers Support Project is operating in the remote mountainous areas of South and West Georgia where rural communities are experiencing severe constraints to agricultural productivity. In this area, yields in particular are low. Several factors account for this including a continuous use of low quality farm-saved seed, limited availability of credit and other

essential inputs, a lack of knowledge on appropriate crop husbandry techniques, and post-harvest losses resulting from poor storage.

To assist farmers in the target districts on how to address these problems, SFSP is promoting complementary measures of intervention including improved crop husbandry practices and quality seed, since lack of good seed is believed to be one of the major constraints to crop production in the project area. In this regard, the project focuses on potato since this is the main crop cultivated in the highlands of South and West Georgia. Several activities that are aimed at improving farmers' access and use of high quality potato seed are supported by SFSP. These include on-farm demonstrations, variety trials, and, more recently, the establishment of a pilot seed producers' cooperative, which is intended as a model for private farmer-run small-scale potato seed enterprises.

### **On-Farm Demonstrations**

During the Soviet times, seed potato was imported mainly from Russia, Belorussia and Ukraine for use on state farms. Since independence in 1991, the collective and Soviet farm system has gradually collapsed and trade links have not been established with other former Soviet states and nearby European countries. None of the former state farms have the capacity to initiate effective production of seed potatoes and no indigenous enterprises have emerged to meet the domestic demand. At present, the private sector does not have the technical or financial capacity to enter the seed business.

Against this background, SFSP has embarked on supplying farmers with basic seed of imported high-yielding varieties that are suited to the various agro-ecological conditions in the project area. In the spring of 1997, the project imported 80 metric tonnes of elite potato seed of three European varieties. This seed was distributed amongst 250 selected farmers for on-farm demonstrations as a means of creating greater awareness in the village communities about the benefits of using healthy seed material. These farmers used improved husbandry practices recommended by SFSP and were able to obtain up to a two-fold increase in yield compared with adjacent plots that were sown with farm-saved seed and cultivated using traditional methods. Results of these demonstrations have generated considerable interest and increased awareness among the general farming population of the need to use healthy seed material and to adopt modern farming practices although these results are limited to one season only.

### **Variety Performance Trials**

The on-farm demonstration scheme is linked to the potato trial program of the government of Georgia, since SFSP provides imported varieties for further testing by the program. This is a valuable assistance, which helps to create a wide pool of varieties for testing and for eventual use by farmers. The project also covers some of the operational costs of the national trials program.

### **Establishment of a Potato Seed Cooperative**

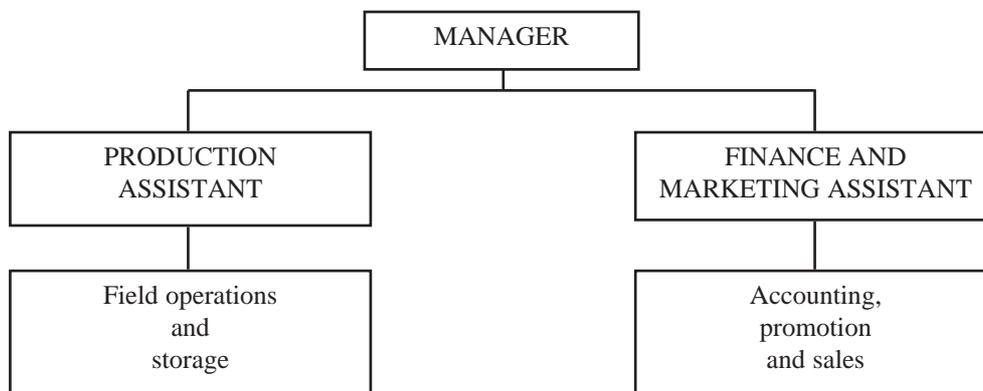
Having created awareness about the merits of modern potato varieties, the project considered exploring the potential for local seed production as a means of ensuring that benefits from demonstrations and trials were sustained beyond the project phase. The first step in this

direction was to create a pilot producers' cooperative (Marienfield Cooperative) in the spring of 1998, which in the beginning comprised five small farming households.

The project assisted in establishing an organizational structure, in drafting rules and regulations, in formulating a business plan, and in getting the cooperative registered formally. Additional support was provided in the forms of start-up inputs on credit (seed, minitubers, plantlets, fertilizers, and pesticides). Members of the cooperative on their part contributed land and basic machinery. All field operations such as land preparation, planting, fertilizer application, and pest/weed control were carried out by the farmers and members of their families.

### **Organizational Structure**

The organizational structure of Marienfield Cooperative was discussed and adopted by the members at the time of establishing the enterprise. A manager who is responsible for coordinating the overall planning and implementation of all activities, as well as for maintaining relationships between the cooperative and the technical advisory team of SFSP and government institutions (e.g., tax inspection and seed quality commission) was elected. A Production Assistant was elected and put in charge of all field operations and storage of the produce. Another person was elected as the Finance and Marketing Assistant and made responsible for accounting, promotion, and sales. The organizational structure is simple as shown in Figure 1.



**Figure 1. Organizational structure of Marienfield Potato Seed Cooperative.**

During the first year of operation, the SFS Project Officer (an expert in technical and economic aspects of seed production and marketing) worked closely with the new officials and helped in coordinating and monitoring all activities of the cooperative.

### **Rules and Regulations**

Rules and regulations adopted by the cooperative are based on recommendations arising from several years' experience of Agricultural Cooperative Development International (ACDI) in building farmers' cooperatives (Fledderjohn 1990). The rules pertain to various aspects of the relationships between members of cooperatives. The most important rules are as follows:

- All members of the cooperative should contribute a portion of land with similar yield potential.
- All members should make equal contribution to the registration capital of GEL<sup>1</sup> 2000 (equivalent to approximately US\$1500). Contributions can be made either in cash or in productive asset.
- All strategic decisions for the cooperative are made on a democratic basis only.
- The workload should be shared equally among all members of the cooperative.
- Profits earned should be shared according to the investment made by cooperative members.
- Any member can leave the cooperative and withdraw funds invested into the enterprise.
- New farmers can join the cooperative if they contribute financial capital and land, and are accepted by all members of the cooperative.

### **Seed Production Methods**

The cooperative has adopted two methods of seed production:

- (i) Purchase of micro-tubers and plantlets obtained by meristem culture from two local scientific institutes. These materials will undergo a further three-year propagation cycle before sufficient seed is generated for sale to farmers.
- (ii) Purchase of early generation material from international seed companies and propagating this for another year before distributing to farmers. After the first season, some seed could be retained for one more year of propagation to generate new material for distribution to farmers.

Both methods have been used in the first year for technical and financial reasons, and for reducing the potential risk of failure from relying on only one method of propagation. The first is considered more cost-effective since it is relatively cheap and locally produced meristem material is used. This method, however, is more complicated and requires an active involvement of technical experts. In addition, the process of developing material until it is available for sale takes time and revenue is earned for the first time by the end of the third year. But the rate of return is high with revenue about 400% higher than the investment made into the production process.

The second method is faster since seed can be sold after the first year of propagation. The method is also technically easier to implement, but it is less cost-effective. Revenue earned is between 35 and 40% above the level of investment because of the high cost of transport for imported seed, which accounts for approximately 60% of the total seed price.

Since the cooperative has to honor its repayment obligations to SFSP in full by autumn 1999, the second method (fast production/fast return method) has been adopted together with the first one. The cooperative will assess progress and decide on which combination of methods are best suited to its operational capacity and the prevailing market demand for seed potatoes.

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<sup>1</sup> GEL = Georgian lari (USUS\$ 1 = 1.35 GEL; 1998 official rate).

**Input Supply**

The project provided most of the inputs required for the first year of seed production according to a credit-in kind agreement with the cooperative. The project imported a total of 7.8 metric tonnes super elite seed of seven European varieties from Germany and gave these to the cooperative. In addition, 700 microtubers and 3,140 plantlets were procured from two local scientific institutes and also supplied to the cooperative. The total cost of inputs including seed, other planting material, fertilizers and pesticides procured by the project for the cooperative during the first season amounted to GEL 12,373.

**Credit Repayment**

Pre-harvest inspection of potato fields indicate an expected overall yield in this first year of approximately 60 tonnes from 7.8 tonnes of seed planted, giving a multiplication factor of 7.7. Out of the total output of 60 tonnes, about 15 tonnes will be retained by the cooperative for planting in the next season, and a further 15 tonnes will be sold as seed to other farmers in the community. The remaining 30 tonnes will be marketed as table potatoes.

The cooperative expects the following sales revenue based on the current farm-gate premium price for quality seed and the average price of table potato in the project area.

Sale of 15 tonnes seed potato @ GEL 550/tonnes	=	GEL 8250
Sale of 30 tonnes table potato @ GEL 250/tonnes	=	GEL 7500
Total sales		GEL 15750

Based on a formal agreement with the project, the cooperative will pay back the sum of GEL 6,805 (i.e., 50% of the total credit plus interest for 10 months at the rate of 5% per annum) in December 1998. The remaining revenue of GEL 8,945 will be mainly reinvested in the next production cycle and for the purchase of new stock of mini-tubers and plantlets. It is expected that, by the end of the second production season, the cooperative will be able to produce at least twice the quantity of seed and table potatoes produced in the first year and consequently double its revenue. According to these projected returns, the cooperative will be able to complete its credit repayment in the autumn of 1999. By the end of the third production season, the cooperative will start to sell seed propagated from micro-tubers and plantlets obtained in the spring of 1998.

**Problems Encountered**

Although the Cooperative produced enough potatoes for planting the following season, and for partial repayment of outstanding credit, the overall yield was lower than originally expected. Three factors account for this low yield, all of which are consequences of the rapid start-up of the program and the quick transfer of technical information from the experts to the farmers. First, there was inappropriate treatment in the greenhouse, which resulted in about 30% loss of plantlets. Second, the cooperative members applied one of the selected herbicides later than recommended, hence partially damaging the crop. Third, there was inadequate fertilization of relatively poor soils, because the initial fertility status was not properly assessed by the technical staff.

On the whole, the important lessons learnt from these experiences are allowing sufficient time for training farmers in technical issues, and implementing activities on time.

## **Conclusion**

The experience from one season of implementation demonstrate that adequate start-up support, proper training, technical advice, and appropriate business organization can enable small farmers to produce and effectively market high-quality seed potato. It will take at least two years to properly evaluate how actual yields obtained by Marienfield Cooperative match those estimated in the business plan. However, experience from this first year of production shows the profit potential of this type of business. These positive results have been achieved despite severe unfavorable climatic conditions during the summer of 1998 and some technical mistakes that contributed partly to reduced output. After full repayment in late 1999, the cooperative would still have generated sufficient financial reserve to continue the business without the assistance of CARE—Georgia, especially with the increasing demand for potato seed within and outside the project area.

Potato seed production, however, involves relatively high initial investment costs that can be prohibitive for small farmers, even when they are organized into groups. The only likely farmers who may have sufficient resources to embark independently on potato seed business are those large farmers operating in fertile lowland areas. But the highland areas of up to 1,400 meters above sea level are the only locations where vector control can be successfully implemented in producing virus-free potato. Small farmers make up the vast majority of the population in these mountainous areas and therefore seem to be the only possible potato seed producers in Georgia. As it has been shown, these farmers can only succeed as entrepreneurs if they have access to credit and technical assistance, and are given adequate start-up support. Non-governmental organizations (NGOs) seem to be the only institutions which are in position to assist rural farming communities in Georgia, since banks are not operating effectively enough to grant agricultural credit, particularly to small scale farmers, and a national extension service is lacking. If the success story continues into the near future, CARE-Georgia's SFSP or similar organizations would need to replicate the pilot seed production initiative in neighboring districts in the project area and possibly beyond.

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## **Small-scale Seed Production and Marketing in Malawi: The Case of a Smallholder Seed Development Project**

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### **Abstract**

The formal seed sector in Malawi concentrates mainly on hybrid varieties including maize, which are accessible to only about 25% of the farmers. The rest are small-scale farmers in rural areas who use traditional varieties for several reasons, including a lack of money to buy hybrid seed each year and the better food qualities of local varieties. These varieties are generally of longer duration and therefore are less suited to recurrent drought. Small farmers also rely on self-pollinating crops, which do not attract the interest of commercial seed companies. Although several high-yielding, disease-tolerant and shorter-duration varieties have been released, these are not widely used by farmers partly because there has been no appropriate institutional arrangement to produce and distribute seed of these crops. The government Smallholder Seed Multiplication Scheme (SSMS) was implemented for several years but achieved limited results mainly because of distribution difficulties. The ActionAid-Malawi Smallholder Seed Development Project (MSSDP) was established in 1995 and uses two production strategies. First, the not-so-poor farmers are encouraged to produce certified seed and operate independently, but they still face marketing problems for which new approaches such as the use of stockists are being investigated. Second, the poorer farmers are organized into community groups to produce and distribute seed on a communal basis using group revolving funds. In this case too, finding an effective mechanism to market the seed produced is also a continuing problem. This paper discusses the current status and future prospects of the MSSDP in meeting seed needs of small-scale farmers in Malawi on a more sustainable basis.

### **Introduction**

There are many factors which account for the growing food insecurity in Malawi including depletion in soil fertility and use of low-yielding traditional varieties. The vast majority of farmers in Malawi are smallholders who grow mostly self-pollinating crops such as groundnut, bean, pigeon pea, cowpea, and open-pollinated maize. These crops are not attractive to the formal seed sector because of their low productivity and weak profit potential, since farmers can save their own seed and do not usually see the need for frequent replenishment with seed from external sources. Household food security can be enhanced significantly if smallholders have better access to quality seed of high yielding and disease tolerant varieties of the crops they cultivate. This is an important challenge in many developing countries since it has been difficult to strengthen seed supply systems at the local level where smallholders themselves can establish and manage seed production and distribution enterprises within farming communities.

Prior to the 1991/92 drought, farming systems in Malawi were dominated by several traditional varieties of open- and self-pollinated crops, which had attractive food attributes and

were adapted to longer rainy seasons. Most of the farmers lost their seed stock during this drought. Worse still, many of these varieties are no longer well adapted to the current pattern of shorter rainy seasons and recurring drought, which has further contributed to reduced productivity. Commercial approaches to improving the situation have been ineffective because these have involved attempts to sell expensive seed of less appropriate varieties to farmers who have been used to saving their own seed. For some crops (e.g., groundnut and beans), production costs are high, and this combined with low multiplication factors makes seed from the formal sector expensive for small farmers.

Variety development and production of breeder seed are responsibilities of the Department of Agricultural Research, other international and regional research institutes. The Crops Department of the Ministry of Agriculture multiplies breeder seed into basic seed. Further multiplication of basic into certified seed is by commercial seed producers. Government policy and donor interventions have been biased towards hybrid maize seed, which is affordable by only 25% of the 2.8 million farm families (MOA 1998). This excludes most of the smallholders who have continued to use seed of traditional varieties. Earlier attempts by the Ministry of Agriculture through the Smallholder Seed Multiplication Scheme (SSMS) to initiate small-scale seed production and distribution for self-pollinated crops such as groundnut and beans produced limited results. The parastatal Agricultural Development and Marketing Corporation (ADMARC), which was responsible for purchasing seed produced by farmers did not offer enough incentive because of a rigid price control policy. As a result, several other intermediaries who could offer more attractive prices to producers became involved, but only to divert seed to the food market.

The new seed policy of Malawi has removed the dominance of the parastatal National Seed Company of Malawi (NSCM), making the way for entry of private sector companies. The policy also makes a provision for the informal sector seed production of minor crops by government agencies and NGOs. Consequently, in 1995, ActionAid began implementing the Malawi Smallholder Seed Development Project (MSSDP) with the primary objective of enhancing crop productivity through better seed delivery systems within poor farming communities, as a means of improving household food security for smallholder farmers. A Project Manager, supported by three specialist staff in extension and training, seed contracting, documentation and research, manages the project. Field activities are coordinated by two seed officers who are assisted by four monitoring and coordinating supervisors in close collaboration with extension staff of the Ministry of Agriculture. The project is funded by DFID (UK) and is implemented in collaboration with the Ministry of Agriculture. The project has made significant progress and has recently been complemented by an EU funded Smallholder Certified Seed Entrepreneur Development Project, which is implemented by the Group 2 Task Force Committee of the Ministry of Agriculture. The goal of Group 2 is to help establish a sustainable seed production system for open-pollinated maize, and legumes such as groundnut, bean, and pigeon pea in other Agricultural Development Divisions (ADDs) not covered by MSSDP.

### **Smallholder Seed Supply Initiatives**

The Malawi Smallholder Seed Development Project uses two strategies to improve seed delivery to small farmers.

### Seed Producer Enterprises

Some not-so-poor smallholders are encouraged to form small-scale enterprises, which can invest in seed production and distribution. The enterprise buys basic seed from the Ministry of Agriculture and multiplies it into certified seed under the guidance and supervision of the Seed Services Unit of the Department of Agricultural Research and Technology Services (DARTS). Marketing of certified seed produced by enterprises has been a problem because of a lack of an effective distribution system that could channel seed to areas of potential demand. Seed is sold mostly through government departments, NGOs, and middlemen. Efforts are being made to improve the flow of seed through a network of stockists or shop-keepers, who are in close proximity to farmers and supply them related inputs and other services. It is expected that certified seed produced by these enterprises will be passed on to community seed groups for further multiplication.

### Seed Producer Groups

Members of the community-based seed producing groups are smallholders who are willing to undertake improved seed production as a means of enhancing household food security. The target group constitutes a total of 5,405 direct beneficiaries who have been organized into 235 seed producer groups (MSSDP 1998). Group members are selected through a participatory rural appraisal exercise in needs assessment and targeting of poor households. Focusing on the poorest households has meant that far more group participants selected are women (Table 1), who also perceive greater advantages in belonging to groups than men do. About 70% of group members are women and over 80% of the seed groups are composed entirely of women (MSSDP 1998). Female groups are better organized and their seed revolving grants have higher repayment rates than those from male groups. Women get higher yields, generate better savings, and sustain more cohesive groups.

Group members total an average of 20 persons, with a management committee comprising a chairperson, a secretary, a treasurer, a production coordinator, a marketing coordinator, and six other members. Committee members are elected but not paid formally. The groups are governed by a simple constitution of guidelines developed by the members.

**Table 1. Crop preference and group participation by gender.**

Crop	Area planted		Number of farmers	
			Female	Male
	Hectares	Percentage	Number	Number
Groundnut	173	52.1	2892	1297
Bean	71	21.4	382	117
Soybean	38	11.5	208	155
Pigeon pea	12	3.6	126	49
Cowpea	10	3.0	36	7
Sorghum	9	2.7	43	-
Pearl millet	2	0.6	50	-
Maize (open-pollinated)	17	5.1	109	45
Total	332	100	3846	1670

### ***Seed Multiplication***

In the first season, a grant of certified seed is given to the group, which is used for multiplication on a group garden. After harvest, some of the seed is shared among the members as compensation mainly for their labor input. This seed is supposed to be used mainly for establishing small private seed plots or shared with relatives and neighbors. A greater part of the seed is retained for group planting the following season.

In the second season, seed is multiplied again on the group garden and field days are organized to demonstrate quality attributes of the crops and varieties to farmers in the community. The decision by farmers to adopt improved seed depends to a great extent on awareness about the characteristics of varieties and how these meet their desired needs. The first step has been to promote new varieties by conducting demonstrations and organizing field days. Farmers from surrounding areas are invited to examine and discuss crop performance in terms of growth habit, adaptation to environmental conditions, duration to maturity, seed size, color, straw quality, etc. Food attributes such as suitability for particular local dishes, cooking time, and taste are also demonstrated, since these are quite important factors for many of the crops grown. Several communities have a great interest in improved groundnut and bean varieties. This is reflected in a high incidence of theft to materials in demonstration plots soon after field days in some areas.

### ***Distribution and Marketing***

After harvest, seed producer groups process and package seed for storage. The groups try as much as possible not to sell seed soon after harvest because seed and grain fetch nearly the same prices at this time. The groups prefer to store their seed until the planting season when demand and prices are at their highest levels. The price offered for improved seed during the planting season varies by area, but generally rises to twice the grain price at harvest time.

The seed is advertised at market places, churches, and funeral gatherings to create demand. The groups can easily sell seed directly to farmers if there is a high demand within the community. However, if markets within the vicinity of the producer groups become saturated, there may be a need to channel excess seed to more distant locations with the help of intermediaries such as traders and shopkeepers.

The quantity of seed produced by 235 groups during 1998, the quantity of seed distributed, the total cost, and revenue earned are shown in Table 2. This information is tentative as there may be inaccurate reporting on actual production and selling prices in some cases. It should also be noted that the gross margin includes other costs besides that of seed.

### ***Sustainability***

The project had a humble beginning with two tonnes certified seed of different crops and varieties, which were given out to the groups in the first year. This produced 24 tonnes of seed the following year, and 175 tonnes of seed in the third year. The revenue from seed sales is deposited in the group bank account. Some money is shared among the members and part used to procure new seed of the same or other crops/varieties in demand within the community. The groups are expected to multiply seed for three consecutive seasons, after which a new stock of certified seed is introduced to repeat the process. In general, the groups view this venture more as an income-generating activity, which is somehow different from the original food security goal of the project. Many groups prefer seed production of groundnut, which is regarded a high-value cash crop rather than maize, the main staple food crop. The additional cash earned from groundnut seed sales can be used to satisfy multiple needs including paying school fees and purchase of food or additional seed. In addition,

**Table 2. Cost and benefit of seed produced and distributed by groups in 1996-98.**

Crop	Quantity of improved seed issued (1) kg	Mean price of seed issued (2) MK/kg	Value of seed issued (3) MK	Quantity of seed sold by the groups (4) kg	Mean village price of seed (5) MK/kg	Revenue received from seed sold (6) MK	Gross margin on sale (7) MK	Percent gross margin on sale (8) (7) as % of (3)
Groundnut	15446	19	293474	133,454	9	1,201,086	907,612	309
Beans	3890	36	140040	20,509	5	102,545	-37,495	-27
Soybean	2190	24	52560	14,732	8	117,856	65,296	124
Pigeon pea	80	10	800	1,501	5	7,505	6,705	838
Cowpea	62	12	744	485	5	2,425	1,681	226
Sorghum	24	18	432	1,371	3	4,113	3,681	852
Pearl millet	16	12	192	206	3	618	426	222
Maize (open-pollinated)	333	12	3996	3,035	7	21,245	17,249	432
Total	4,417		492,238	175,293		1,457,393	965,155	196

since the groups are expected to repay the initial seed grant given by MSSDP, groundnut production seems attractive in providing a better opportunity for earning more cash to enable repayment.

In the case of maize, the requirement of 200 meters isolation distance in an area with limited and fragmented land has not proved to be appropriate. In addition, the need to apply expensive fertilizer to the crop has also deterred some seed groups from growing composite maize. Similarly, bean seed production has been rejected by a majority of seed groups because of the crop's vulnerability to dry spells, diseases and pests, as well as the high cost of seed combined with a low multiplication rate.

Improved seed dissemination has predominantly been through cash exchange as opposed to traditional gift exchange. This reaffirms the groups' primary objective of income generation. This feature provides a promising basis on which to build a sustainable seed supply system for small farmers.

After an initial support from MSSDP, the groups are expected to save money in their bank accounts so as to be able to continue seed delivery activities without further external assistance.

### **Transferability**

There are several features of this approach to community seed production, which are transferable to communities in other developing countries with similar farming systems. These include:

- Targeting of resource-poor farmers, particularly women, through need assessment using participatory rural appraisal methods.
- Helping to mobilize and organize farmers into groups for communal seed production and allowing a free choice of crops/varieties needed.
- A sustainable breeding source that makes available seed of appropriate improved varieties or promising advanced lines must be in place. As far as possible, farmers should be involved in assessing the performance of potential lines for desired attributes.
- Providing an initial quantity of quality seed to initiate the multiplication process.
- Capacity building through training in seed production, processing, storage and market-

- ing skills that enables an effective use of distribution channels within communities.
- Organizing field days to create awareness about improved seed and conducting publicity campaigns in churches, market places, and funeral gatherings and other venues where farmers frequently meet in large numbers.
  - Autonomy of the seed groups in setting up their own management system, and formulating rules and regulations for seed multiplication and distribution.
  - The use of a group bank account to facilitate seed replacement and diversification into new crop areas as demand changes.
  - The use of project staff that work in close collaboration with extension staff of the Ministry of Agriculture and other partners involved in the rural development process.
  - Establishing linkages between the community seed groups and related institutions especially sources of financial assistance, certified seed input, and seed dealers.
  - Encouraging groups to expand and diversify into other income generating activities so as to become viable development units in the long-term.

### **Conclusion**

The use of producer enterprises and groups by MSSDP to channel seed to smallholders in Malawi has, on the whole, proved effective and appropriate, although certain limitations are evident. The community groups have promoted high use and diffusion rates of quality seed of new varieties within farming communities. This fast spread of seed indicates that pricing and exchange methods that have been used by the groups are affordable by other farmers. The use of group pressure on individuals to repay loans have worked well and helped in sustaining the revolving funds. A major limitation of the group approach, however, had been the tendency of members to pay more attention to their private plots at the expense of the group gardens. For example, group gardens are often planted late and do not benefit much from the first rains because the members spend much time in agreeing on an appropriate schedule of activities. On the other hand, since producer enterprises invest their own capital in the business, they put maximum effort into producing and marketing the seed. Their choice of varieties for multiplication is based on potential returns and not on the interest of members within a group.

The MSSDP approach has encouraged specialization and wider participation in seed supply, with individual entrepreneurs dealing with basic seed while groups downstream are engaged in further multiplication of certified seed. Participatory rural appraisal exercises have proved effective in obtaining a community-wide representation and including a high proportion of the poorest, particularly women. Early indications are positive, as shown by widespread use of improved seed through sales to other community members and via gifts to relatives. However, since the project has been in operation for only three years, much more time is required for the system to become well established and create a sustainable impact. A real measure of impact and success will be realized when the groups expand and diversify into other income generating activities, while maintaining a strong role in seed multiplication and distribution.

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## **Contract Production and Marketing by Prithvi Seeds in Andhra Pradesh, India**

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### **Abstract**

Prithvi Seeds Limited was established in 1991 and is jointly owned by three investors with varied agricultural and commercial experience. The company was started with an initial capital of Rs2 million (equivalent to US\$45,000). Current annual turnover is about Rs100 million. The main source of financing is self-generated capital, short and long-term bank loans and advances from large seed companies. The organizational structure comprises 11 persons: three working directors, one manager, and seven field staff members. Since its inception, the company has produced hybrid seed of various crops on contract for reputed seed companies using its own seed farms and growers in surrounding villages. In 1995, Prithvi Seeds began marketing a small proportion of its total production to farmers under its own brand name. Contract production, however, has remained its major operation. A sister company, Prithvi Agrotech Pvt. Ltd., was established to handle own production and sales, while Prithvi Seeds concentrated on contracting for other seed companies. At present, both companies cultivate about 480 ha cotton, 250 ha maize, 140 ha sorghum, 275 ha pearl millet and 220 ha sunflower. Out of this production, 90 and 10% are used for contract and own sales, respectively. As part of a diversification process, Prithvi Agrotech Company now arranges bank loans and provides agricultural inputs to its growers. The company also owns a cotton ginning/delinting plant and a cereal seed processing plant with a capacity of one tonne/hour and a storage facility of 800 tonnes. This paper describes the operations of both Prithvi Seeds and Prithvi Agrotech companies, it shows how the companies have grown over a short period of time, and highlights future directions.

### **Introduction**

The organized seed sector in India developed rapidly during the 1960s with the release of hybrid varieties of maize, sorghum and pearl millet, and dwarf high yielding varieties of wheat and rice. Another important development was the enactment of a Seed Act in 1966. However, until the early 1980s, the public sector dominated the production and sale of certified cereal seed, with a market share exceeding 70%. In 1988, a new seed policy introduced significant deregulation of government control and hence attracted many national and multinational companies into the seed business. New incentives encouraged private companies to undertake seed production and also to conduct research into hybrids and other high yielding varieties of various crops. The increased encouragement given to private research has made significant impact in recent years as private hybrids now play a key role in seed production. Between 1993 and 1997, the value of private sector seed sale rose from Rs6000 million to Rs15,000 million, while corresponding increase for the public sector was from Rs4,000 million to Rs6,000 million.

At present, the public sector comprises the National Seed Corporation (NSC) and 13 State Seed Corporations, which produce and market seed of publicly-bred varieties. The private sector consists of several multinational corporations, joint ventures and research-based indigenous seed companies, which are all involved in producing, processing, and marketing both public and private varieties.

There are about 50 small- to medium-sized seed companies engaged in the production and marketing of improved seed through both public and private channels. These companies produce seed on contract for larger companies, but also supply seed to small dealers and key farmers within their localities. A lot of these companies are owned by progressive and influential farmers who have experience in seed production and join hands with technically competent persons who are experts in post harvest technology, storage, processing, marketing, and financial management. Prithvi Seeds based in Kurnool District of Andhra Pradesh is an enterprise which has grown and made a tremendous progress within seven years of establishment. The rest of this paper dwells on the activities of this company to demonstrate the dimension of small-scale seed enterprises in India and how they capture and increase market share for high profit crops.

### Ownership and Establishment of Prithvi Seeds

Prithvi Seeds was established in 1991. Its headquarters are in Kurnool District of Andhra Pradesh State in southern India. It is jointly owned by the following persons:

- Mr D. Kotiswamy (Director of Production), who is a progressive farmer with 18 years on-farm experience and over eight years experience as a contract seed multiplier.
- Mr D.Venkat Rao (Director of Finance) holds BSc and BEd degrees, with specialized training in post-harvest technology and four years seed processing experience in a public sector seed company.
- Mr L. Durgaprasad (Director of Marketing) holds a BTech degree and a diploma in seed marketing management with six years experience in agro-input marketing.

The organizational structure comprises 11 persons: three working directors, one manager and seven support staff as shown in Figure 1.



**Figure 1. Organizational structure of Prithvi Seeds.**

Prithvi Seeds was started with an initial capital of 2 million Indian rupees (equivalent to US\$ 45,000), to which the three owners contributed. Additional capital was obtained through short and long-term bank loans and advances from large seed companies.

The three main objectives or purposes for establishing the company were:

- To undertake seed production of hybrids and improved varieties of cotton, maize, sorghum, pearl millet and oilseed crops under contract agreement with large seed companies. This is the main activity of Prithvi Seeds and involves less risk since procurement price and quality premiums are agreed upon in advance. In addition, these crops are cultivated in favorable environments with adequate irrigation.
- To use seed farms and growers to produce a lesser quantity of seed of public varieties. This seed is in demand by dealers and farmers in Kurnool and neighboring districts and is distributed to dealers and other retailers for direct sale to farmers.
- To set up a cotton delinting/cleaning plant and a seed processing facility for other crops.

### **Seed Production Activities**

Seed production covers several aspects including the following:

#### **Agreement with Seed Companies**

As the main activity, Prithvi Seeds has negotiated contracts with Maharashtra State Seed Corporation Ltd. (a public sector corporation) and Mahendra Hybrid Seeds Co. Ltd. (a leading private seed company) for supplying seed of proprietary and publicly-bred hybrid varieties of cotton, pearl millet, sorghum and sunflower. The contract between Prithvi Seeds and the contracting companies stipulates the following:

- Quantity of processed seed to be supplied
- Commission to be paid according to the type of variety or category of seed
- Seed delivery schedule
- Payment schedule
- Quality per crop and variety according to the Indian Minimum Seed Standards
- Foundation or basic seed to be given on credit
- Charges for custom processing and packaging
- Time of final repayment after delivery of processed seed

According to this agreement, the procurement price is fixed at a joint meeting between the Seed Producers' Association and the Seed Growers' Association, which is binding on all parties. It is the responsibility of the contracting companies to supply packaging material such as gunny bags or cloth bags and tags.

#### **Agreement with Seed Growers**

Once Prithvi Seeds concludes a contract with the large companies, it then selects growers who are progressive and experienced farmers with adequate facilities and irrigated land suitable for specific crops. Potential sites must meet certain criteria before they are selected for seed production. These include:

- Adequate isolation
- Suitable location for easy monitoring and inspection

- Cost-effective pest/disease control
- Control of quality at important stages such as threshing and drying
- Good sampling facilities

The company arranges meetings with selected growers to discuss and finalize the terms of the multiplication contract. The contract between Prithvi Seeds and the seed multipliers specifies the following:

- Procurement price for seed produced.
- Prescribed quality standards for seed to be procured.
- Willingness to follow technical advice from company staff.
- Time of payment after receipt of test results.

### **Seed Production Guidelines**

The company prepares technical guidelines on cultivation practices for each crop, which covers aspects such as:

- Isolation distance
- Key morphological characters of varieties and parental lines
- Sowing distances and plant density
- Optimum sowing time for good yield
- Recommended fertilizer/pesticide application
- Irrigation and roguing methods
- Optimum harvest time and harvesting method
- Post-harvest handling precautions during threshing, drying, processing, storage and transport
- Moisture content requirements
- Labeling precautions
- Control of storage pests

### **Agronomic and Husbandry Practices**

In every newly contracted village there is a demonstration on the first field, which is attended by company staff and all seed multipliers selected in the village. Hand sowing and procedures such as the depth of planting, the number of seeds or kernels to be planted, and the distance between rows/plants are properly explained. This occasion is also an opportunity for a close interaction between the company staff members and growers to discuss the importance of timely planting and follow-up operations during various stages of the crop. The objective of this exercise is to ensure that all seed fields are planted on time and in the right way.

The company emphasizes timely monitoring, effective guidance to seed multipliers and cost-efficiency of all operations while ensuring high quality seed is produced. Each field staff supervises about 100 to 120 hectares of contract area and is allocated a motorcycle for fast mobility and frequent advisory visits. The company prepares a standard guide on field visits and subsequent reporting to management. Yield is calculated at crop maturity as well as estimates used for making necessary arrangements for threshing, drying, processing, and storage.

### Seed Processing

Company staff supervise all processing operations to ensure that inert matter, undersized or shriveled seed, dirt, stones, and other crop or weed seeds are removed. Representative samples are drawn and sent to a designated seed-testing laboratory for quality analysis. Seed is then packaged and delivered after receipt of a satisfactory test result. About 2% of total seed produced annually fails to meet prescribed quality standards.

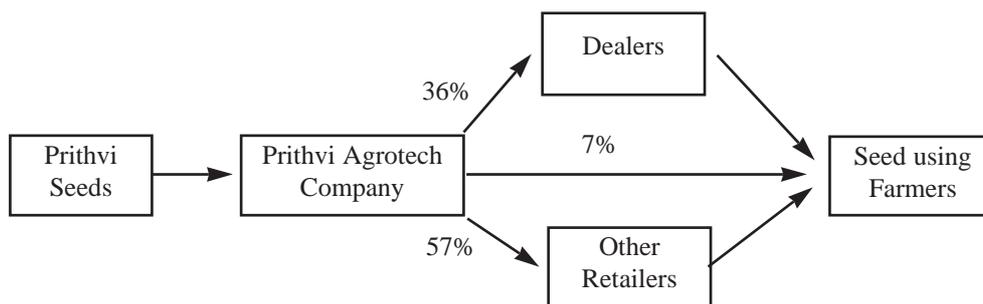
### Producing Seed for Direct Sale

Following a comprehensive review of financial performance and accrued profits by the end of the 1993/94 season, Prithvi Seeds, decided to enter the seed market in 1995 by establishing its own brand image and selling seed directly to dealers and other retailers in the neighboring districts. A certain amount of seed (between 5 and 10% of total output) is produced each year for this purpose. That same year, Prithvi Seeds established a sister concern, Prithvi Agrotech Pvt. Ltd. to handle these direct sales. As operational overheads are generally low, the company sells almost all its annual output at competitive prices every year. The capital base of the new company has risen steadily over the past three years as the area planted has increased and more dealers have become involved in seed sales.

At the community level, staff of Prithvi Seeds maintain close contacts with dealers and visit commercial fields planted with seed supplied by the company. During these visits, they advise on cultivation practices for high yield. Field days are organized on selected sites to popularize the new brand by inviting farmers, district agricultural officers and crop specialists from the agricultural university to hold discussions on the role of improved seed in increasing crop productivity. By 1996, the company's brand had become widely known that production and sales targets have gradually increased.

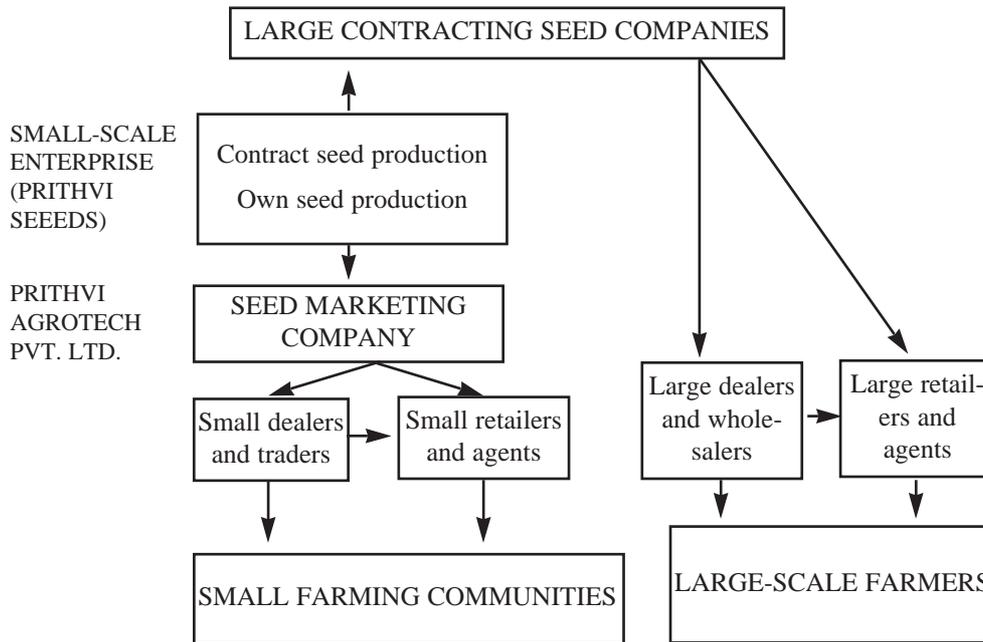
The company policy on commission to seed dealers, credit sales and terms of payment is quite flexible. A repayment package has been developed to suit the needs of small dealers in particular. To guarantee supply, a booking system has also been set up which allows dealers to deposit between 10 and 30% advance payment on their total seed order for the coming season. This serves as a basis for production and distribution planning done by the company. The marketing channel used is shown in Figure 2.

The company has recognized that small dealers lack proper storage facilities, particularly for seed that is carried over from one season to the next. It has therefore constructed small warehouses at strategic locations for this purpose.



**Figure 2. Marketing channel used by Prithvi Agrotech Pvt. Ltd.**

Rather than compete with large companies, Prithvi Seeds joined hands with them and became partners in seed production and distribution within a growing and segmented market. The relationship between Prithvi Seeds and the large seed companies which place contracts is illustrated in Figure 3.



**Figure 3. Relationship between Prithvi Seeds and large seed companies.**

### Financial Management

The area cultivated and the amount of seed produced by Prithvi Seeds from 1991/92 to 1997/98 are summarized in Table 1. The sales turnover, overheads, and net returns for the same period are shown in Table 2. A total return or net profit of Rs 1.41 million over an investment of Rs 2 million in the first year (1991/92) encouraged the management to steadily increase production targets each other year. High-seed quality was the major factor in establishing a good image for the company. This resulted in increased seed orders from 1993/94 onwards. The company also added new crops to the product portfolio and extended seed production to about 25 more villages in the Kurnool and Maheboobnagar districts of Andhra Pradesh.

The revenue/cost structure (Table 3) shows cotton as the most profitable crop with the highest net return. Next in profitability is the sale of pesticides and fertilizer, which indicates the benefit that can be realized from diversification. In all cases the purchase price of seed constitutes a high proportion of total expenditure. The profit and loss account, the cash flow statement, and the balance sheet for Prithvi Seeds are shown in Tables 4, 5, and 6, respectively. As can be seen in Table 6, the company has accumulated substantial reserves and surpluses, accounting for 56% of shareholder capital.

**Table 1. Prithvi Seeds - Seed production areas (ha) and seed yields (tonnes) from 1991/92 to 1997/98.**

Year	COTTON		PEARL MILLET		SUNFLOWER		SORGHUM		MAIZE		Total Area (ha)	Total Quantity (tonnes)
	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)		
1991/92	136	97.5	100	200	-	-	-	-	50	70	286	367.5
1992/93	210	150	125	250	100	50	-	-	100	140	535	590.0
1993/94	300	157.5	150	300	100	50	-	-	150	210	700	717.5
1994/95	310	162.8	200	400	150	75	50	60	180	252	890	949.8
1995/96	500	227.3	225	450	175	87.5	75	90	200	280	1175	1134.8
1996/97	480	253.5	250	500	200	100	100	120	200	280	1230	1253.5
1997/98	480	189.5	275	550	220	110	140	170	250	350	1365	1469.5

**Table 2. Prithvi Seeds turnover/overheads/net returns 1991/92 to 1997/98 (Rs<sup>†</sup> million).**

Year	COTTON			PEARL MILLET			SUNFLOWER			SORGHUM			MAIZE			FERT.& PESTICIDES			Annual sales turnover	Annual overhead exp.	Annual turnover
	Sales over	Over-head exp.	Net return	Sales over	Over-head exp.	Net return	Sales over	Over-head exp.	Net return	Sales over	Over-head exp.	Net return	Sales over	Over-head exp.	Net return	Sales over	Over-head exp.	Net return			
1991/92	14.56	1.17	1.17	1.60	0.22	0.18	-	-	-	-	-	-	0.56	0.07	0.06	-	-	-	16.72	1.46	1.41
1992/93	26.40	1.90	1.90	2.06	0.27	0.22	2.35	0.11	0.09	-	-	-	1.12	0.15	0.12	-	-	-	31.93	2.43	2.33
1993/94	28.14	2.10	2.10	2.47	0.36	0.24	2.35	0.11	0.09	-	-	-	1.73	0.25	0.16	2.50	0.05	0.17	37.19	2.87	2.76
1994/95	33.85	2.38	2.17	3.40	0.44	0.36	3.52	0.16	0.13	0.75	0.06	0.05	2.07	0.3	0.2	4.00	0.08	0.28	47.59	3.42	3.19
1995/96	52.41	3.56	3.10	3.82	0.54	0.36	4.3	0.22	0.14	1.44	0.09	0.08	2.45	0.37	0.25	6.00	0.12	0.42	72.42	4.90	4.35
1996/97	63.54	4.05	3.71	4.75	0.81	0.43	5.05	0.29	0.15	1.98	0.18	0.12	2.52	0.45	0.24	7.50	0.15	0.52	85.34	5.93	5.17
1997/98	72.99	5.01	4.28	5.25	0.89	0.48	5.66	0.32	0.17	2.89	0.25	0.17	3.32	0.56	0.30	10.00	0.20	0.70	100.11	7.23	6.10

† US\$ 1 = 42.57 Rs (Indian rupee) at 1998 official rate..

**Table 3. Prithvi Seeds comprehensive revenue and cost structure during 1997/98†.**

Sales	Cotton	Pearl millet	Sunflower	Sorghum	Maize	Fertilizers/ Pesticides	Total
SALES	72.99	5.25	5.66	2.89	3.32	10.00	100.11
<i>I. Total sales</i>	<i>72.99</i>	<i>5.25</i>	<i>5.66</i>	<i>2.89</i>	<i>3.32</i>	<i>10.00</i>	<i>100.11</i>
EXPENDITURE							
Seed purchase	63.69	3.85	5.17	2.52	2.45	-	77.68
Fertilizer and pesticide Purchase	-	-	-	-	-	9.10	9.10
Manufacturing and other expenses	0.66	1.26	0.25	0.39	0.8	-	3.36
Management, selling and other expenses	1.16	0.07	0.09	0.05	0.04	0.17	1.58
Depreciation on fixed assets	-	-	-	-	-	-	0.20
Tax provision	-	-	-	-	-	-	2.14
<i>II. Total expenditure</i>	<i>65.51</i>	<i>5.18</i>	<i>5.51</i>	<i>2.96</i>	<i>3.29</i>	<i>9.27</i>	<i>94.06</i>
<i>Net Profit (I-II)</i>	<i>7.48</i>	<i>0.07</i>	<i>0.15</i>	<i>-0.07</i>	<i>0.03</i>	<i>0.73</i>	<i>6.05</i>
Profit by crop as % of total sales	10.25	1.33	2.65	-2.42	0.90	7.30	6.04

† Prices are given in Indian rupees (see Table 2).

**Table 4. Prithvi Seeds profit and loss account for 1996/97 and 1997/98 (Rs million).**

	1997/98	1996/97
INCOME		
Seed sales	90.11	77.84
Other income (fertilizers & pesticides)	10.00	7.50
<i>Total income</i>	<i>100.11</i>	<i>85.34</i>
EXPENDITURE		
Seed purchase	77.63	67.37
Fertilizer and pesticide purchase	9.10	6.83
Manufacturing and other expenses	3.36	2.68
Management, selling and other expenses	1.58	1.23
Depreciation on fixed assets	0.20	0.25
<i>Total expenditure</i>	<i>91.87</i>	<i>78.36</i>
Profit before taxation	8.24	6.98
Less tax provision	2.14	1.81
Net profit	6.10	5.17
Net profit as % of total sale	6.09	6.06
Net profit as % of total purchases	7.03	6.97

**Table 5. Prithvi Seeds cash flow statement for 1997/98.**

Sources	Amount (Rs)
Cash from operations	6.30
Total	6.30
APPLICATIONS	
Increase in current assets	4.70
Repayment of loan	1.60
Total	6.30

**Table 6. Prithvi Seeds balance sheet for 1996/97 and 1997/98<sup>†</sup> (Rs million).**

	1997/98	1996/97
LIABILITIES		
a. Shareholders fund		
i. Share capital	20.00	20.00
ii. Reserves and surplus	25.31	19.21
<i>Sub-total shareholders fund</i>	<i>45.31</i>	<i>39.21</i>
b. Loan fund		
13.5% Bank loan	6.40	8.00
c. Tax provision (current liability)	2.14	1.81
<i>Total liability</i>	<i>53.85</i>	<i>49.02</i>
ASSETS		
a. Fixed assets		
i. Land	1.00	1.00
ii. Open shed	1.00	1.00
iii. Godown	6.12	6.17
iv. Machinery	8.42	8.57
<i>Sub-total fixed assets</i>	<i>16.54</i>	<i>16.74</i>
b. Investment		
Shares of Prithvi Agrotech Pvt. Ltd.	2.00	2.00
c. Current assets	35.31	30.28
<i>Total assets</i>	<i>53.85</i>	<i>49.02</i>

<sup>†</sup> See Table 2.

The overhead cost structure comprises expenditure on manufacturing and processing, as well as management, selling and administration. Manufacturing and processing expenses constitute the following:

- Traveling expenses and allowances for field inspection
- Transportation of seed from production sites to processing plant and finally to depots, distributors and dealers
- Processing and packaging

Management selling and administrative expenses include the following:

- Staff salaries and other benefits
- Daily wage payments
- Sales promotion
- Medical insurance payment for permanent employees

- Seed movement from one center to another
- Participation in seminars, workshops and similar events
- Field days, demonstration plots and press conferences
- Media communication
- Vehicle maintenance
- Taxes imposed on seed industry
- Day to day operations and sundry expenses

### Diversification

To spread risks and utilize its capacity as efficiently as possible, Prithvi Seeds has diversified its operations into the following:

#### Sales of Fertilizer and Pesticides

Since the seed business is seasonal, the company decided to enter the farm input supply trade to earn additional profit and to keep its staff busy during off-peak periods. Prithvi Seeds became an agent for reputed fertilizer and pesticide companies, by purchasing these inputs in bulk and supplying them to seed multipliers on credit at 18% interest, which is paid in kind when the growers deliver seed.

#### Cotton Delinting and Cereal Seed Processing

In 1997, Prithvi Seeds negotiated a loan of INR 8 Million from the Bank of India under the Government of India Priority Sector Lending Program, which gives loans to small-scale seed enterprises at a subsidized rate of 13.5% per annum. The company has established a modern cotton delinting and cereal seed processing plant with about 800 tonnes storage capacity. The processing capacity of the plant is one tonne/hour. This facility ensures independence and full control on all processing operations and has resulted in improved physical quality of seed and timely processing.

#### Prithvi Agrotech Company

The establishment of Prithvi Agrotech Company is a major area of diversification. By 1997/98 season, the new brand image started paying good returns. The non-contracted area and seed output from 1995/96 to 1997/98 are shown in Table 7, while the seeds turnover, overheads, and net return for the same period are shown in Table 8. The revenue and cost structure for 1997/98 are summarized in Table 9. The figures indicate a three-fold increase

**Table 7. Prithvi Agrotech Pvt. Ltd. Seed production area (ha) and seed yields (tonnes) from 1995/96 to 1997/98.**

Year	Cotton		Pearl millet		Sunflower		Total Area (ha)	Total Quantity (tonnes)
	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)	Area (ha)	Quantity (tonnes)		
1995/96	42	18.8	25	50.0	25	5.0	92	73.8
1996/97	86	45.0	50	100.0	50	10.0	186	155.0
1997/98	90	48.0	75	150.0	75	15.0	240	213.0

† See Table 2.

**Table 8. Prithvi Agrotech Pvt. Ltd. Sales turnover/overheads/net returns (Rs million) from 1995/96 to 1997/98.**

Year	Cotton			Pearl millet			Sunflower			Annual sales turnover	Annual overhead. . exp.	Annual turnover
	Sales turn-over	Over head exp.	Net return	Sales turn-over	Over head exp.	Net return	Sales turn-over	Over head exp.	Net return			
1995/96	5.69	0.91	0.97	0.8	0.17	0.3	0.55	0.15	0.17	7.04	1.23	1.44
1996/97	14.41	1.93	2.52	1.55	0.35	0.5	1.1	0.29	0.35	17.06	2.57	3.37
1997/98	15.95	2.38	2.88	2.4	0.78	0.78	1.65	0.42	0.52	20.00	3.36	4.18

**Table 9. Prithvi Agrotech Pvt. Ltd. Comprehensive revenue and cost structure (Rs million) for 1997/98.**

	Cotton	Pearl millet	Sunflower	Total
SALES	15.95	2.4	1.65	20
<i>I. Total sales</i>	<i>15.95</i>	<i>2.4</i>	<i>1.65</i>	<i>20</i>
EXPENDITURE				
Seed purchase	10.69	1.05	0.7	12.44
Manufacturing & other expenses	0.1	0.25	0.1	0.45
Management, selling & other expenses	0.46	0.63	0.3	1.39
Depreciation on fixed assets	0.02	0.02	0.02	0.06
Tax provision	-	-	-	1.48
<i>II. Total expenditure</i>	<i>11.27</i>	<i>1.95</i>	<i>1.12</i>	<i>15.82</i>
Net Profit (I-II)	4.68	0.45	0.53	4.18
Profit by crop as % of total sale	29.34	18.75	32.12	-

in total output and turnover in three seasons, indicating enhanced technical and financial efficiency. Sunflower is the most profitable crop. The profit and loss account for the years 1996/97 and 1997/98 and the cash flow statement for the year 1997/98 are shown in Tables 10 and 11, respectively. Reserves and surpluses accounting for 82% of share capital in only three years of operation are shown in Table 12.

**Table 10. Prithvi Agrotech Pvt. Ltd. Profit and loss account for 1996/97 and 1997/98.**

	1997/98	1996/97
	-----Rs million-----	
<b>INCOME</b>		
Seed sales	20.00	17.06
<i>Total income</i>	<i>20.00</i>	<i>17.06</i>
<b>EXPENDITURE</b>		
Seed purchase	14.31	12.23
Less: closing stock	1.87	1.11
	12.44	11.12
Manufacturing and other expenses	0.45	0.32
Management, selling and other expenses	1.39	0.97
Depreciation on fixed assets	0.06	0.10
<i>Total expenditure</i>	<i>14.34</i>	<i>12.51</i>
Profit before taxation	5.66	4.55
Less tax provision	1.48	1.18
<i>Net profit</i>	<i>4.18</i>	<i>3.37</i>
Net profit as % of total sale	20.9	19.8
Net profit as % of total purchases	33.6	30.3

**Table 11. Prithvi Agrotech Pvt. Ltd. Cash flow statement for 1997/98.**

	Amount (Rs million)
<b>SOURCES</b>	
Cash from operations	4.28
Total	4.28
<b>APPLICATIONS</b>	
Increase in current assets	4.28
Total	4.28

**Table 12. Prithvi Agrotech Pvt. Ltd. Balance sheet for 1996/97 and 1997/98.**

	1997/98	1996/97
	-----Rs million-----	
<b>LIABILITIES</b>		
a. Shareholders fund		
i. Share capital	2.00	2.00
ii. Reserves and surplus	8.99	4.81
<i>Sub-total shareholders fund</i>	<i>10.99</i>	<i>6.81</i>
b. Current liabilities		
i. Creditors	3.00	2.59
ii. Tax provision	1.48	1.18
<i>Sub-total current liabilities</i>	<i>4.48</i>	<i>3.74</i>
<i>Total liabilities</i>	<i>15.47</i>	<i>10.55</i>
<b>ASSETS</b>		
a. Fixed assets	0.70	0.80
b. Current assets		
i. Debtors	5.08	4.27
ii. Cash, bank deposits and other balances	7.82	4.37
iii. Closing stocks	1.87	1.11
<i>Sub-total current assets</i>	<i>14.77</i>	<i>9.75</i>
<i>Total assets</i>	<i>15.47</i>	<i>10.55</i>

**Key Constraints**

Prithvi Seeds encountered financial constraints in the beginning. Besides Rs2 million contributed by the proprietors as start-up capital, the company depended on advances from contracting companies. As a result, Prithvi Seeds had to accept low commissions offered for organizing contract seed production. Once the company became established, it was possible to seek subsidized bank credits under the crop production credit scheme. In addition, the company was now in a position to negotiate overdraft facilities and make credit arrangements for its contract growers.

Due to limited resources, Prithvi Seeds did not enter the market under its own brand name until 1995. The company competed keenly with other established small enterprises by offering higher discounts to its dealers and retailers in return for less profit.

Since the company did not own a processing facility in the beginning, it had to rely on custom hire. It was therefore difficult to effectively monitor the physical quality of seed during busy periods. There were delays and the company had to pay higher charges for timely processing.

The company had to work hard to maintain a core of loyal growers and minimize the constraint of seeking new multipliers each year and training them. Growers were attracted to Prithvi Seeds because of improved seed quality and enhanced yield. Close monitoring and supervision also created a trustworthy relationship between the company and the growers.

At the same time, efforts were made to minimize the risk of fluctuating seed orders from contracting companies by maintaining their confidence through timely and reliable information on the progress of their seed crops at critical stages, and by inviting them to make field visits.

### **Conclusion**

This paper has shown that policy reform through less restrictive legislation, which promotes positive attitudes towards the private sector and facilitates trade, has been instrumental in creating new opportunities for seed enterprises in India. The case described here shows that small enterprises are not in competition with large seed companies since there is a growing and segmented seed market. Large companies have instead joined hands with smaller enterprises and become partners in seed production and distribution. This relationship is important particularly for small enterprises during their early years when much technical, financial and marketing support is needed to become established.

The growth of Prithvi Seeds illustrates the dynamics of seed enterprise development. With growing seed demand, the company has not remained static but gradually expanded through diversification (trading in other inputs, adding new crops/varieties) and vertical integration (producing, processing, selling its own seed directly). This growth in the enterprise has been fostered by sound business practice: realistic planning, close and effective monitoring, proper feedback, and good management accounting as shown in detailed information presented in various financial statements. This impressive record of performance has also placed Prithvi Seeds in a better position to attract bank loans, which have been used for investment and growth.

The company has become known for producing good seed, for foresight in planning, for good relationships with contracting companies, and for motivating its staff, contract farmers, dealers and the seed-using communities. Within the neighborhood, Prithvi Seeds is earning a reputation of being the 'Contractor—Multiplier—Farmer Friendly Company.'

In a rapidly growing Indian seed market, the future looks bright for Prithvi Seeds as its management plans to embark on variety development and extending marketing efforts to neighboring states in the near future.

## **Small-scale Seed Production and Marketing: The Case of Aglow Agric Products Limited in Ghana**

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### **Abstract**

The proprietor of Aglow Agric Products Limited worked in the former parastatal Ghana Seed Company where he saw the potential of the seed industry and decided to establish a private seed enterprise. Business started in 1989 with an initial loan capital of US \$10,000 from two Ghanaian friends residing overseas. Aglow contracts growers to produce vegetable seed and certified seed of maize and cowpea. Seed of exotic vegetables is imported. Sales agents are offered between 5 and 15% discount on advanced orders, while the profit margin ranges from 15 to 20%. Strict internal quality control measures are adopted independent of official checks. Demand projections for seed are based on records of past sales. Pricing is based on production costs, marketing and managerial overheads and the farmer's ability to pay. Since government policy is to promote commercialization through competition, Aglow bases the success of its business on timely delivery of quality seed, proper advertising and provision of incentives. The company has close links with public institutions such as the Departments of Agricultural Extension, Crop Services and Plant Protection. It has 14 employees, 4 sales outlets, and 16 commission agents. Most goods are purchased on credit. Seed, agro-chemicals and farm equipment are offered to the farmer as an input package at the same sale point. By the year 2001, the company intends to increase its sale outlets nationwide from four to twelve, and its sales commission rate from 10 to 15%. A vigorous marketing strategy will be adopted to sell larger quantities of seed at wholesale prices. Sale of planting material for cashew and seed of groundnut, soybean and rice will also be undertaken. However, these prospects will depend on the willingness of state-owned banks, in particular, to provide credit to seed businesses at favorable rates of interest.

### **Background and Introduction**

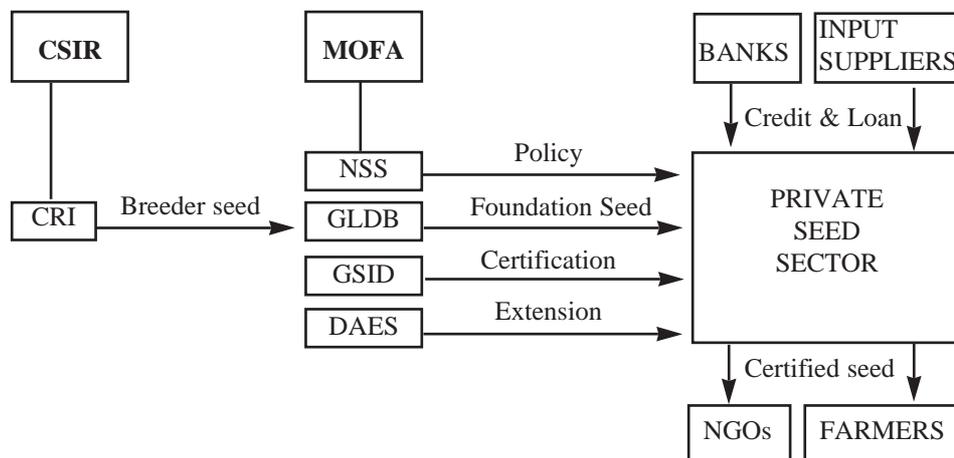
Ghana has a total land area of 23.8 million hectares, of which 13.6 million hectares (57%) is arable. The climate, soil and vegetation favor agricultural production. The agriculture sector, which comprises crop production, livestock, forestry and fisheries contributes 45% of gross domestic product (GDP), accounts for over 40% of export earnings, and employs up to 70% of the labor force.

In terms of enhancing crop productivity, the government of Ghana has for the last four decades supported the development of delivery systems for seed of improved varieties. One major step in this direction was the establishment, in 1979, of Ghana Seed Company (GSC) as a semi-autonomous parastatal with the responsibility of ensuring farmers throughout Ghana have access to quality seed. The company established its own foundation seed farms and operated a contract grower scheme for certified seed. The Ghana Seed Company also developed processing, storage, and distribution facilities nationwide, marketing seed through sales kiosks, commission agents, mobile units, and extension officers. The company was closed 10 years later in 1989, because it had failed to evolve into a viable commercial enterprise. The gap created by this closure has been partially occupied by small-scale private growers, processing/marketing enterprises and seed dealers. The Crop Research

Institute (CRI) has remained the main source of breeder seed, which is supplied to another parastatal, the Grains and Legume Development Board (GLDB) for the production of foundation seed. CRI is under the Council for Scientific and Industrial Research (CSIR), an autonomous organization within the Ministry of Industries, Science and Technology.

The Department of Crop Services of the Ministry of Food and Agriculture (MOFA) coordinates all activities of the public sector institutions that render supportive services to the emerging private seed sector. One key area of activity has been the launching of intensive educational and promotional programs through the news media and the technical staff of MOFA to inform the general public on the mode of operation of the restructured seed program and to register potential seed growers and dealers. Key external donors include USAID, which has provided funds to implement seed industry restructuring, and Sasakawa-Global 2000, an NGO which has worked closely with MOFA in providing direct financial and logistic support to both public and private sectors of the seed industry.

There are other institutions within MOFA which help to strengthen the seed sector. These include the National Seed Committee (NSC), as the highest body for addressing policy issues relating to both public and private activities within the seed industry. The National Seed Service (NSS), which is located in the Department of Crop Services of MOFA, implements policies and programs developed by NSC. The National Seed Service has been providing leadership and technical support to seed production, promoting seed sale through information on the location of seed growers/dealers, as well as planning training courses and coordinating activities of all agencies involved in the seed industry programs. The Ghana Seed Inspection Division (GSID) of Plant Protection and Regulatory Services Department registers seed growers and enterprises, conducts seed testing and certification, and provides training for seed inspectors and seed producers in internal seed quality assurance, seed processing, marketing, and packaging. The Department of Agricultural Extension Services (DAES) creates awareness among farmers about the merits of quality seed and provide technical advice on seed handling. Linkages between the private seed sector and other institutions in Ghana are illustrated in Figure 1.



**Figure 1. Linkages between institutions involved in the Ghana seed sector.**

Following these various interventions, the private sector has responded well through the establishment of small and medium-scale seed producing and marketing enterprises. Farmer groups and grower associations also participate actively as part of the new private sector. They are engaged in actual production and marketing of improved seed. Growers have organized themselves into three seed associations based on ecological zones of the country, each with an elected executive. The total number of members is about 350 who meet periodically to discuss matters pertinent to the development of the seed industry. There are many other farmer groups that also produce seed in affiliation with NGOs. Notable in this respect, is the support given by Sasakawa Global 2000 to associations for seed production and distribution.

Aglow Agric Products Limited, established in 1989, is one of the leading small-scale seed enterprises that have entered the market following the closure of the Ghana Seed Company. It has developed close links with various institutions for support services that have enabled the enterprise to grow. The activities of Aglow, its performance, and future prospects are the main subjects of this paper.

### **Aglow Agric Products Limited**

Investment in Aglow arose from experience, awareness and motivation gained by the proprietor while working as officer in charge of Contract Production, and later as sales officer in the former Ghana seed Company. Initial financing of US\$ 10,000 was obtained as a loan from two friends living overseas. The enterprise made good business in the first year by achieving a 200% return on capital.

#### **Contract Grower Scheme**

Aglow supports three contract grower groups to produce certified seed of maize and cowpea by providing them cash credit and other commercial inputs on loan. In addition, the company contracts five individual growers to produce seed of local vegetables namely pepper, okra and garden eggs. For production planning, the company uses historical sales figures to estimate demand, which has been increasing in recent years at an annual rate of around 20%. The company's trained sales agents give agronomic advice to farmers. The production of certified seed in Ghana between 1990 and 1997 is shown in Table 1.

In addition to official quality control and certification by The Ghana Seed Inspection Department, the company also conducts its own internal control measures to ensure that only seed of acceptable quality is offered for sale. This also helps in building a trustworthy relationship between the company and its growers.

**Table 1. Production of certified seed in Ghana.**

<b>Crop</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
	----- tonnes -----							
Maize	313	326	449	566	816	866	1050	1325
Rice	-	-	-	150	125	580	706	690
Cowpea	-	-	-	8	8	43	32	35
Soybean	-	-	-	41	57	60	162	92
Groundnut	-	-	-	10	15	20	28	20
<b>Total</b>	<b>313</b>	<b>326</b>	<b>449</b>	<b>775</b>	<b>1,021</b>	<b>1,569</b>	<b>1,978</b>	<b>2,162</b>

Source: National Seed Service, Crop Services Department, Ministry of Food and Agriculture, Accra.

Growers negotiate and agree on a price with the company in advance of seed delivery, usually by taking into account the cost of production plus at least 25% margin. Growers in Ghana could earn up to ¢894,000 profit (equivalent to 63% of total cost) from one hectare of seed maize farm taking all costs into account as is actually indicated in Table 2. Aglow seeks to offer reasonable levels of incentive to its growers, dealers and agents, while the company itself earns a profit margin between 15% and 20%.

**Table 2. Production cost per hectare of maize in Ghana<sup>†</sup>.**

<b>Activity</b>	<b>Cost ('000 ¢/ha)</b>
Land clearing	120
Plowing	50
Harrowing	40
sowing (15 mandays)	60
Fertilizer application (10 mandays)	40
Herbicide application (5 mandays)	20
Spot hand weeding (4 mandays)	16
Harvesting (collection, 10 mandays)	40
De-husking (10 mandays)	40
Carting of produce	15
<i>Sub-total</i>	<i>441</i>
<b>INPUT SUPPLY</b>	
Foundation seed	33
Fertilizers	252.5
Herbicides	50
Bags	50
<i>Sub-total input supply</i>	<i>385.5</i>
<b>POST-HARVEST OPERATIONS</b>	
Processing	60
Shelling	16
Drying	16
Cleaning and bagging	40
Preservation	36
Storage (6 month)	168
<i>Sub-total post-harvest operations</i>	
<b>OTHER COSTS</b>	
Contingency (10%)	98.6
Bank interest rate 38%	322
<i>Grand total cost</i>	<i>1,415.1</i>
<b>Revenue</b>	
Seed yield of 1.5 t/ha (33 bags of 45 kg each) @ ¢70,000/bag	2,310
Net revenue	894.9

<sup>†</sup> Prices are given in Ghanaian cedi (USUS\$ 1 = 2340 cedis; 1998 official rate).

Source: National Seed Services Department, Ministry of Food and Agriculture, Accra.

### Seed Distribution and Marketing

Aglow operates four retail outlets with 16 sales agents and 14 other workers who carry out direct selling of seed to farmers. In addition to a 5% sales commission, Aglow gives its long-standing and loyal dealers an additional 10% discount for advance orders. The company accounts for about 15% of certified maize seed sold annually in Ghana, the rest being sold by 120 other small-scale enterprises operating throughout the country (Brobbeey-Kyei et al. 1994).

Deregulation of prices following privatization has meant that producers and dealers are free to determine seed prices on the basis of production, marketing and managerial overhead costs, while taking also into consideration the farmers' ability to pay. Table 3 is a list of retail seed prices for selected crops since privatization of the seed industry began in 1990. For example, the price for a 45 kg bag of maize seed has increased seven times from ₵10,000 to ₵70,000 over a period of eight years.

**Table 3. Retail seed prices for selected crops in Ghana†.**

Year	Maize	Rice	Groundnut	Soybean (unshelled)	Cowpea
	₵/45kg bag	₵/64kg bag	₵/36kg bag	₵/50kg bag	₵/50kg bag
1990	10,000	7,500	3,800	-	15,000
1991	12,000	10,000	5,000	-	116,000
1992	15,000	12,000	6,000	-	18,000
1993	18,000	15,000	8,000	12,000	20,000
1994	27,000	22,000	13,000	20,000	25,000
1995	36,000	28,000	15,500	25,000	30,000
1996	36,000	30,000	18,000	40,000	50,000
1997	54,000	45,000	30,000	50,000	80,000
1998	70,000	60,000	40,000	60,000	80,000

† See Table 2.

Source: National Seed Service, Crop Services Department, Ministry of Food and Agriculture, Accra.

The Government of Ghana supports seed marketing through promotional activities, which include advertising, training, variety demonstrations, field days, and farm visits. In addition, Aglow as a private enterprise also undertakes its own sale promotion and advertising. It endeavors, in particular, to make seed available to farmers on time for sowing at a sale point where other inputs are offered as a package. For this purpose, the company has diversified its sale to cover a wide range of products including agro-chemicals, farm equipment, and vegetable seeds. Some of these are of high-value, which enable the company to earn higher profits and keep the business financially viable. For instance, besides local production, Aglow also imports vegetable seed mainly from three companies namely Royal Sluis (The Netherlands), Daehnfeldt (Denmark) and Takii (Japan). The company's import of vegetable seed increased from 300 kg in 1993 to 1,100 kg in 1997.

### **Experiences and Lessons**

After nine years of existence, Aglow is now a well-established seed enterprise. Several valid experiences have been acquired during that time and important lessons learnt, including the following:

- Develop good business relations with input suppliers so as to acquire needed goods on credit without much dependence on commercial banks for operational capital loans, which are often charged at high interest rates.
- Package seed in different units such as 1 kg, 2 kg and 5 kg to suit the needs of different categories of farmers.
- Proper drying of seed especially for packaging them in polythene bags as this ensures that a high level of germination capacity is maintained.
- Develop a contract scheme with seed grower groups which recognizes mutual benefits, where the company is assured of a reliable source of good seed, while the growers in turn receive cash advances and inputs on credit, and have a ready market for their production at a competitive price.
- Keep good and timely records of all business transactions and using historical information to forecast production, sale, and expected profit for the next season.
- Maintain good management accounting and auditing systems.
- Establish trustworthy relationships with customers by taking personal interest in their orders and providing good after-sales service.
- Disseminate information through advertising, fact sheets, brochures and posters in local languages as a means of creating awareness among farmers about improved seed.
- Promote the use of good seed of improved varieties through extension agents, youth organizations, and educational institutions.

### **Future Prospects**

By 2001, Aglow plans to extend its business operations to northern Ghana to win more market share, particularly for specific crops and varieties grown in that part of the country. This will be done by increasing the number of sale outlets nationwide from the current level of 4 to 16, and the discount rate on advanced orders from 10 to 15%. The company will also adopt a vigorous marketing strategy aimed at selling larger volumes of seed at reasonable prices. Further diversification is planned to cover other sowing materials such as cashew, groundnut, soybean and rice. The success of these plans will, however, depend to a large extent on the willingness of state-owned banks, in particular, to grant flexible loan facilities and credit to seed businesses.

### **Conclusion**

Government policy of privatizing seed and other input supply systems is in line with the 25-year national development plan launched by MOFA in 1995 (Vision 2020 Document), which sets the basis on which Ghana could be converted to a middle-income country by the year 2020. This plan assumes that the annual growth rate in agriculture will increase from its present 4 to 6% level and the overall national economy from 5% to 8%, with a decrease in population growth from 3 to 2% (MOFA1997). Private sector participation in a competitive market that facilitates timely supply and availability of inputs will be crucial in boosting agricultural productivity by encouraging domestic production to substitute for imports

and thereby save foreign exchange. There are thus important roles for the government in the emerging private seed sector of Ghana. Notable among these is the capacity to influence state-owned banks to provide seed enterprises low-interest loans.

NGOs have a key role to play too, given the experience they usually have in community development and working at grassroot level. The activities of NGOs, however, will need better coordination to ensure that efforts are sustainable without continuous dependence on external support.

A prosperous seed industry will help to reduce unemployment, enhance national income, and therefore help reduce poverty and other social inequities.

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## **Financial and Management Dimensions of a Small-scale Seed Enterprise: The Case of Karamoja Seeds Scheme, Uganda**

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### **Abstract**

Small-scale seed enterprises are known to have the advantage of being more effective in supplying seed to marginal areas that may not be served by large-scale national programs. These small businesses, however, require proper financial management if they are to survive and do well. In analyzing the financial statements of Karamoja Seeds Scheme in Uganda for the period 1985-1995, a number of issues stand out. For almost the entire period, current assets that could be easily converted to cash were not able to cover current liabilities. The business could not break when grants were removed from revenue figures. An average margin of 46% over the cost of sales was charged to cover operational costs. This was considered low compared to the level of margins charged by large companies producing seed of similar crops. An attempt was made in 1990/91 to include a 100% margin in the operational budget for cereals and 300% for groundnut. However, these levels of margins could not be achieved for several reasons, which mostly related to a rather harsh environment in which the enterprise operated. There were negative cash flows during three-quarters of each year (April-November), which could have been minimized by negotiation of favorable overdraft facilities, efficient operation of complementary enterprises and greater financial discipline in all business operations. Against this background, major problems faced by these enterprises are discussed. They include issues of capital investment cash flow, complementary enterprises, bad debt, inflation and social concerns.

### **Background**

The Karamoja Seeds Scheme (KSS) was established in 1981 as an agricultural project under the Karamoja Diocese of the Anglican Church of Uganda. The origin of this project can be traced to a small-scale research program undertaken by an agricultural missionary during the early 1970s, who tested and screened crop varieties with the potential of performing well under the semi-arid conditions of Karamoja. By 1976, up to 10 adapted varieties of various crops including maize, groundnut, sorghum, sunflower, finger millet, and cowpea were made available.

Since these materials were not yet in farmers' hands, KSS was established to multiply and distribute seed of these varieties. The Scheme began with an initial capacity of about 30 tonnes, which soon after, could not meet the increasing demand for seed. After a severe drought and famine, which ravaged the region in 1979 and 1980, the World Council of Churches decided to assist KSS with a donation of US\$200,000. This amount was meant to serve as a financial basis for converting the Scheme into a commercially viable enterprise capable of covering its operational costs. The donation enabled KSS to acquire assets in the form of a 150-tonne receiving and dispatch store, processing and warehouse facilities, four tractors and implements. Over the years, seed production has fluctuated between 70 and 300 tonnes per annum.

Trends in liquidity, pricing and profitability have been important ways of assessing the financial performance of the Scheme. Performance measures such as liquidity and profitability ratios and margins on sales have been estimated through analysis of audited balance sheets and profit and loss accounts from 1985 to 1995.

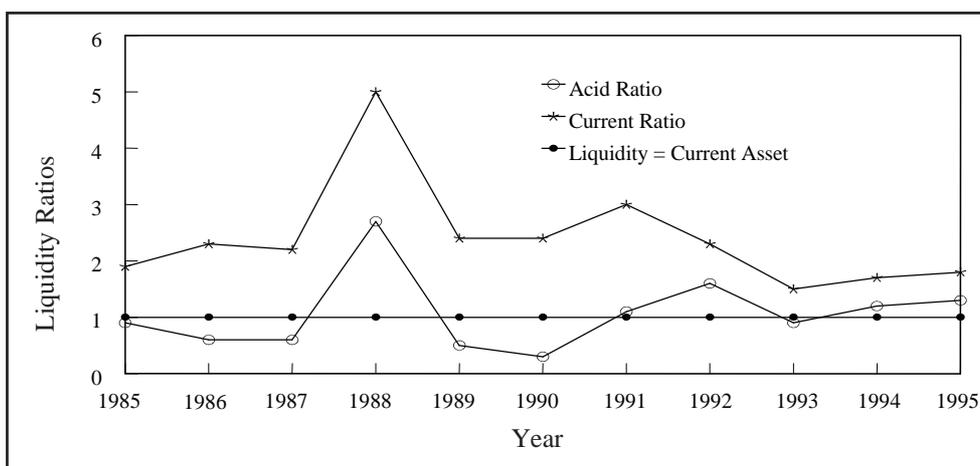
### Liquidity

The following two ratios have been useful in determining the Scheme's ability to meet short-term current obligations:

$$(i) \text{ Current Ratio} = \frac{\text{Total Current Assets}}{\text{Total Current Liabilities}}$$

$$(ii) \text{ Acid Ratio} = \frac{\text{Cash} + \text{Debtors}}{\text{Total Current Liabilities}}$$

The trend between 1985 and 1995 in the two ratios is outlined in Figure 1. A ratio of 1 represents points at which assets equally matched obligations.



**Figure 1. Liquidity ratios for the period 1985-1995.**

Current assets comprise cash, debtors, and inventory. According to the Current Ratios, one could conclude that the business maintained a good position in meeting all its current obligations throughout the period. However, this does not present the true financial picture. With the exception of 1988, more than 50% of the Scheme's current asset for each year comprised seed stocks (Table 1) which could not be converted easily to cash without a substantial loss in value. The Acid Ratios (which considered only cash and outstanding debt, but excluding stock or inventory) were a more appropriate indicator of the Scheme's capacity to meet current obligations. Cash and debtors are quick assets, which when represented as a proportion of current liabilities is an indication of instant-debt paying ability.

According to the Acid Ratios, the Scheme was able to meet its current obligations only in 1988 when the ratio was above 1. The position stabilized thereafter, with the business

just in position to meet its current liabilities. Since cash flow is the “life blood” of any business, the Acid Ratios confirm serious financial problems the Scheme faced in meeting short-term obligations, such as the timely payment of seed growers and suppliers, and of salaries and wages. Most debtors were seed growers who could only repay their obligations after they delivered seed and received payment from the Scheme.

**Table 1. Stock component of current assets.**

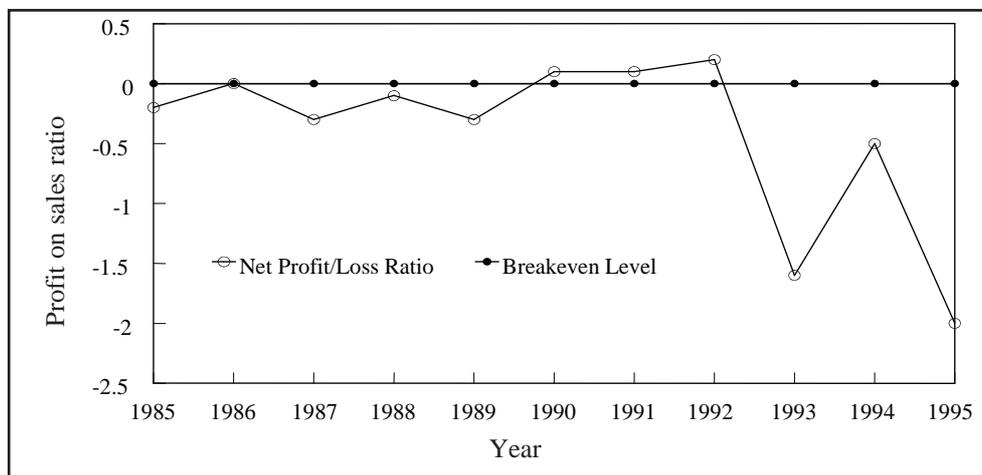
Year	Current assets as stock (%)
1986	72
1987	71
1988	46
1989	80
1990	68
1991	66
1992	32
1993	41
1994	32
1995	28

### Profitability

Profitability of the Scheme was determined by accounting for all costs, but excluding grants as part of the revenue. The net profit was then expressed as a proportion of sales.

$$\text{Profit on sales Ratio} = \frac{(\text{Sales}-\text{Costs})}{\text{Sales}} = \frac{\text{Net Profit}}{\text{Sales}}$$

The ratios are illustrated in Figure 2, with the value of 0 representing the breaks even point when sales were equal to costs.



**Figure 2. Net profitability/net loss ratio before adding grants.**

Excluding grants, the Scheme almost reached break-even point in 1986, and attained an elusive profit position between 1990 and 1992. Otherwise, grants were needed in other years for the business to show any form of profitability. These grants were largely in the form of technical assistance for capital items such as machinery. Issues of operational efficiency and pricing were particularly significant. These required an effective monitoring of transport and labor costs, bad debts and depreciation, as major components of total cost (Table 2).

**Table 2. Major components of total cost.**

<b>Cost component</b>	<b>Mean (%)</b>
Salaries and wages	12
Transport	14
Bad debts	4
Depreciation	30
Bags	13

Depreciation was clearly the largest cost item, which showed that the Scheme's operations were capital intensive. Besides processing machinery and equipment, tractors and implements constituted part of the capital assets. Tractors became an important part of the Scheme's capital structure because it was not possible to hire such services in the project area; while at the same time mechanization was essential for timely cultivation of any reasonable area of land for seed production.

Transport costs included staff travel and subsistence, costs of collecting unprocessed seed, delivery of processed seed, and transport of other supplies. Poor infrastructure, widely dispersed production zones, and far distances from major commercial centers were other factors which contributed to high transport costs. Concentration of production in fewer areas and locating simple processing and storage units in such areas would have minimized cost. In addition, better-organized trips and bulk purchase of supplies would have been other factors to take into account.

It was possible to obtain reasonably priced polypropylene bags locally for packaging 100-kg units of seed. However, more customers needed 2-kg units, which were only available in the form of expensive paper bags imported from Kenya.

Expenditure on salaries and wages was difficult to control because of rising inflation. In addition, social pressures for providing employment, pushed staff level beyond what was necessary. It would have been sufficient to maintain a small core of well-trained and essential staff, supported by seasonally recruited casual labor.

Initially, the level of bad debt was high because inputs were provided as full credit to farmers to boost production area. Later, growers were required to deposit up to 50% down payment before any mechanical land preparation could be undertaken. The cost of inputs was deducted from the value of seed delivered by the grower after harvest. This approach improved the loan recovery situation, but fluctuations in weather pattern meant that some farmers could not repay their loans during bad years. Extending further loan to such farmers often resulted in accumulated bad debt. It then became necessary in later years to screen farmers more rigorously for participating in the contract scheme, since it was obvious that some took advantage of the liberal credit system and did not pay much attention to their seed farms.

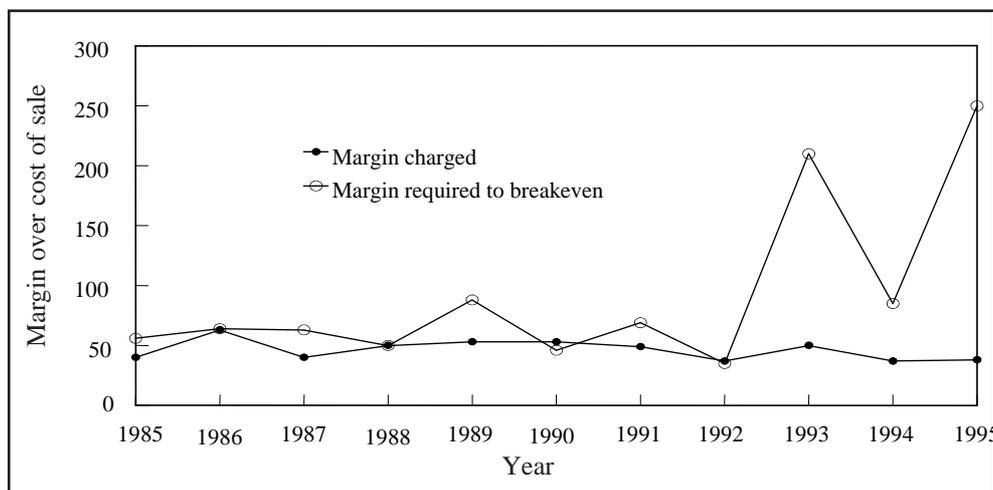
### Margin on Seed Sales

Seed pricing is a key factor which greatly influenced earnings of the business. This was reflected in the margin on sales, as illustrated in Table 3.

**Table 3. Margin charged on seed sales.**

Year	Margin (%)
1985	40
1986	62
1987	40
1988	50
1989	54
1990	55
1991	47
1992	38
1993	51
1994	38
1995	38

An average of 46% margin over the cost of sales was charged to cover operational costs of the business. The levels of margins charged and the levels required by the business to break-even are illustrated in Figure 3.



**Figure 3. Margins on sales.**

In 1986 and 1988 the business came close to breaking-even and it made a small profit in 1990 and 1992. Financial performance of the scheme sharply deteriorated from 1993 onwards.

Large-scale commercial seed companies, which are dealing in similar non-hybrid cereal crops, can add a margin of about 100% on cost of sales to cover operational expenses and

make some profit. If this had been possible in the case of KSS, a profit situation would have been achieved in several years. In 1990/91, an attempt to include a 100% margin in the budget for cereal crops and 300% for groundnut was made. However, these levels of margins could not be achieved for a number of reasons including the following:

- (i) Karamoja is a semi-arid environment with almost always a food deficit. Consequently, food prices are high. The scheme, therefore, had to offer its growers relatively high margins to prevent seed being sold on the food market. This raised the procurement price of raw seed, which in turn, meant higher selling prices for processed seed. The Scheme experienced problems in raising seed prices to high levels because many customers including government agencies, NGOs, and farmers could not understand why seed, which appeared like ordinary grain, should cost more. Up to 70% of KSS seed was therefore sold outside Karamoja region, especially to more agriculturally favorable areas which could pay high prices for seed. This was embodied in the “*What good can come from Nazareth factor*” as it became difficult to convince farmers from other areas that good seed can come from Karamoja, a region commonly associated with backwardness, drought and famine.
- (ii) Varieties that were produced by the Scheme were developed specifically for semi-arid conditions. Yet, to sustain itself, the Scheme had to market the bulk of its seed outside the region at greater expense and limited success.
- (iii) As Uganda continued to gradually recover from political and economic decline, cheaper sources of seed were becoming available in the agriculturally favorable parts of the country. Many of the Scheme’s traditional customers began turning to these for their seed supplies.
- (iv) Cost and revenue forecasts became difficult because of unpredictable increases in inflation.

### **Financing Cash Flow Needs**

Being a seed enterprise, KSS activities were strongly seasonal. Cash receipt from seed sale was realized just before and during the sowing season from January until April. On the other hand, expenditure was heaviest between November and January when harvested seed was received from growers and paid for. Cash flow was also needed to finance salaries and wages, supervision of growers, travel, administrative costs, power supply, maintenance and repairs to machinery, equipment and buildings. Furthermore, materials and various supplies for processing, packaging and storage had to be procured in advance. The business, therefore, had a negative cash flow position for most of the year, which made payments for supplies and services, as well as salaries difficult. This situation got worse when suppliers often demanded cash in return for goods and services.

The Scheme decided to diversify into complementary income generating activities that could ease the constraint of cash flow. These later contributed up to 44% of the Scheme’s income and included sale of fuel, bags, agrochemical, tools, grain and vegetable seed, hire of tractors and vehicles, grain milling, oil pressing, and sale of by-products. These activities were initially profitable since the region was isolated from major commercial centers. Procuring essential items from outside and selling these to the public was an attractive business. However, with economic recovery, the private sector became involved in providing many of these services, thereby removing the previous monopoly position held by KSS.

## **Conclusion**

Small-scale seed enterprises can involve substantial capital investment if processing equipment, stores and vehicles are to be used. Besides vehicles, other assets are generally fixed at a particular location. Therefore, selecting an appropriate base for an enterprise should be carefully done. In the case of Karamoja Seeds Scheme, the choice of Kotido town in the Karamoja region imposed formidable challenges and limitations on the business. After a good season, seed stocks were recorded high, but at such times farmers could save sufficient seed and preferred to use this. On the other hand, little seed was recovered from the growers during a year when demand for seed by farmers was high. An endemic security problem, which had deep roots in the people's cultural love for cattle, caused a lot of problems. There were incessant conflicts associated with cattle rustling, carried out not with traditional spears but with AK-47 guns. Field activities were often paralyzed for long periods for fear of 'enemies'. A manager of the Scheme was driven out in 1983 because of insecurity, while road thugs killed the last manager in 1996.

Despite these depressing features of operating a seed business in an environmentally hostile area, the activities of KSS had a lot to show that much can be achieved even under marginal conditions, provided enterprises can make an effective use of opportunities that exist locally. Since the establishment of KSS, no major famine has ravaged the region, a situation which has been attributed partly to the Scheme's role in making available new varieties to farmers and acting as a catalyst in the region's general agricultural development.

KSS put an efficient management structure in place, which generated timely information on the financial status of the business, especially regarding cash availability to meet current commitments such as salaries and paying for essential supplies. Trends in seed sales, other revenue, operational costs, and overheads were also closely monitored. At the field level, the process of actual seed recovery from growers was periodically assessed against target estimates, and any variances investigated in time. Proper recording and financial analysis were key to identifying problems and seeking solutions. Financial ratios were particularly useful in this respect. They were easy to calculate and provided a simple but good financial overview when current values were compared over successive time periods.

The case of KSS shows that small-scale enterprises play a crucial role in supplying seed in marginal areas, but often face difficult challenges. Resources are usually limited, and to be effective, all aspects of their business have to be well planned and implemented, while making efficient use of opportunities locally available as much as possible.

## **Farmer-based Seed Production and Marketing Scheme in Ethiopia: Experiences and Future Prospects**

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### **Abstract**

With technical assistance from the International Development Agency (IDA) and the International Fund for Agricultural Development (IFAD), the Ethiopian Government formulated a five-year Seed Systems Development Project (SSDP), which is being implemented by the National Seed Industry Agency (NSIA). In collaboration with NSIA, the Regional Agricultural Bureau (RAB) of the Ministry of Agriculture has recently begun organizing and guiding farmers in the production of improved seed. A major component of this project is a US\$ 14 million Farmer-based Seed Production and Marketing Scheme (FBSPMS), which focuses on the informal seed sector. The scheme has four main objectives: (i) to organize and support groups of farmers in sustainable seed production and income generation. This includes supplying materials and inputs through a revolving fund, training of farmers, and the provision of small-scale seed cleaning facilities; (ii) to produce and distribute seed of required varieties according to farmer demand, on time and at affordable prices; (iii) to strengthen the institutional capacity of the implementing agency (NSIA) by providing transport facilities, laboratory equipment, training and financial support; and (iv) to conduct needs assessment surveys and other seed-related studies. During 1997, the first year of the scheme, a total of 1,452 farmers were involved in seed production of various cereals, pulses and vegetables on a total cultivated area of 740 hectares. This scheme has expanded considerably during 1998 to cover 5,000 hectares in seven regions, with a total of 11,190 farmers participating. It is estimated that up to 194,000 quintals (19,400 tonnes) of cereal, pulses, and vegetable seed will be produced by the scheme in 1998. This paper discusses the results and experiences of the first two years of FBSPMS, and highlights prospects for the future. It is expected that over the period of five years, up to 40,000 farmer-seed growers and 700,000 other farmers will benefit, putting an estimated total area of 700,000 hectares under cultivation with seed produced by the scheme.

### **Introduction**

For centuries, farmers in Ethiopia have been using their own seed saved from the previous crop, or informally from their neighbors in the community. About 96% of the estimated annual seed requirement of 420,000 tonnes comes from farmers' own sources. The main parastatal seed organization, Ethiopian Seed Enterprise (ESE), produces and distributes only 15,000 tonnes of seed each year, while the participation of the private sector in seed supply is yet at a very low level (Dabi et al. 1998).

In an attempt to promote a wider participation in the seed sector, particularly that of private enterprises, the Government of Ethiopia introduced a National Seed Policy in 1992. This policy also recognizes the vital role that small-scale farmers could play as seed producers and has paved the way for establishing the Farmer-based Seed Production and Marketing Scheme (FBSPMS). This Scheme is part of the Seed Systems Development

Project (SSDP), which is funded by the World Bank and the International Fund for Agricultural Development (IFAD) and implemented by the National Seed Industry Agency (NSIA) of Ethiopia (NSIA 1997). The Scheme encourages small farmers to produce and distribute seed in the major crop producing regions with the final aim that these farmers will eventually emerge as successful seed producers in farming communities. This is in line with the national economic policy reforms aimed at enhancing free market forces and private sector initiatives.

The main purpose of this paper is to explain the scheme, report progress, and assess the potential of some of these farmers emerging as producers who could successfully produce and market seed within their respective communities.

### **Objectives of FBSPMS**

The primary objective of FBSPMS is to increase crop productivity through the use of quality seed of improved and adapted varieties, which is produced by small farmers themselves in their own localities and on a sustainable basis.

This is done by:

- Encouraging private investors to enter into commercial seed production, input supply, etc.
- Helping to develop regional seed supply capacities by motivating farmers to form small groups which can undertake seed production as a means of generating income.
- Training farmers groups in production practices, post-harvest handling, quality control, and basic business methods.
- Using farmers groups to produce seed of the right varieties, in sufficient quantities according to regional demands, and distributing this on time and at affordable prices.
- Training of extension staff and other subject matter specialists involved in working with farmers groups.
- Motivating farmers through organizing field days and donation of awards.
- Provision of basic equipment such as seed cleaners, threshers and shellers.

### **Organization and Management**

In each region, the lead institution for implementing the Scheme at the community level is the RAB, which develops district-level work plans, procures and distributes inputs, organizes extension services, and provides training. Staff of the Regional Agricultural Bureau, the Zonal Agricultural Bureau (ZAB), and the Woreda Agricultural Bureau (WAO) all take a joint part in working with farmers, as these are existing institutions with established and complementary functions in the community.

NSIA coordinates the linkages between participating institutions and manages the overall development of the Scheme through SSDP. As part of the planning process, it is expected that a national seed workshop is organized each year to review the previous agricultural season and to identify successes and failures in implementing activities.

### **Establishing Farmers Groups**

One of the primary tasks of the RAB is to select participating farmers and organize them into groups based on specific criteria. The choice of crops to be grown and the area allo-

cated to each crop are determined by the RAB in consultation with staff of ZAB, WAO and the Development Agent (DA) assigned to that area.

Crops selected for seed production are those that are demanded by the farming community on the basis of a comprehensive need assessment survey. Overheads, operating, and maintenance costs are covered by financial support from the scheme in consultation with NSIA.

### **Input Supply and Quality Control**

The Scheme supplies foundation seed, fertilizer, pesticides, and other inputs for seed production. These inputs and materials are provided through a revolving fund run by the RAB. The groups are required to deposit a 25% down payment for the cost of inputs and to pay the remaining loan after harvest.

To monitor the standard of seed produced, mini laboratories are established in selected zones, which are representative of the crops grown in the respective districts within the regions.

### **Results of Program Implementation**

During 1997, farmers were organized into four regional groups, namely, Oromia, Amhara, SNNPRS, and Tigray for seed production of cereals, pulses, vegetables and forages. Seed multiplication programs were established in 15 zones and 53 *woredas* (districts), with a total of 1452 volunteer farmers cultivating 741 hectares of land and supervised by 120 DAs and 40 supervisors (Table 1). During this year, 1086.5 tonnes of different types of cereal seed were produced, of which 52, 26, 14, and 7% was wheat, *tef*, maize, and barley, respectively (Table 2).

The program continued into its second year in 1998. Three new regions (Benishangul Gumz, Gambella, and Harari) were added and the number of zones and *woredas* increased to a total of 26 and 113, respectively. Similarly, the number of participating farmers increased to 9500 (554%) and the target area for seed production to 4600 hectares (174%), with 361 DAs (200%) and 135 supervisors (238%) monitoring activities (Table 3). A total output of around 11,000 tonnes of seed (912%) of different varieties is expected from the scheme (Table 4).

The total production in the first year represents only 48% of target. This low production was the result of bad weather particularly, erratic rainfall.

### **Raw Seed Procurement and Marketing**

The RABs purchase raw seed from growers and market the final processed seed. This system is not yet well developed since there are several constraints which include the following:

- Few sales centers and no retailers.
- Ineffective sales promotion and marketing.
- Low quality of seeds offered for sale.
- Low seed price paid to farmers.

**Table 1. Components of Farmer-based Seed Production and Marketing Scheme FBSPMS during 1997.**

Participating region	Number of zones	Number of <i>woredas</i>	Number of supervisors	Number of DAs	No. of farmers		Area (HD)		Training for/on		
					Target	Actual	Target	Actual	Farmers	Supervisors & DAs	Seed control quality
Oromia	3	11	12	35	540	276	246	243.5	276	36	29
Amhara	3	8	9	28	400	420	200	200	420	20	27
SNNPRS	5	15	11	30	400	399	200	185	399	84	28
Tigray	4	19	8	27	340	357	143.3	112.81	357	25	39
<b>Total</b>	<b>15</b>	<b>53</b>	<b>40</b>	<b>120</b>	<b>1680</b>	<b>1452</b>	<b>789.3</b>	<b>741.31</b>	<b>1452</b>	<b>165</b>	<b>123</b>
					<b>100%</b>	<b>86%</b>	<b>100%</b>	<b>94%</b>			

**Table 2. Seed production by regions during 1997.**

Crop	Seed produced by region (in tonnes)				Total production (in tonnes)	Average yield	Percentage of yield
	Oromia	Amhara	SNNRPS	Tigray			
Wheat	106.0	133.0	300.0	23.0	562.0	3.5	52
<i>Tef</i>	101.4	120.9	50.0	16.0	288.3	1.8	26
Barley	71.5	1.5	-	-	73.0	2.0	7
Maize	142.0	-	-	13.2	155.2	4.0	14
Potato	-	-	-	8.0	8.0	16.0	0.1
<b>Total</b>	<b>420.9</b>	<b>255.4</b>	<b>350.0</b>	<b>60.2</b>	<b>1086.5</b>	<b>27.3</b>	<b>100</b>

**Table 3. Supervisors and farmers participating in the Scheme during 1998.**

Participating regions	No. of zones involved	No. of woredas involved	No. of actual supervisors	No. of actual DAs	No. of farmers	Areas (HD)		Training for/on			
						Target plan	Actual	Target plan	Actual	Farmers	Super and DAs
Oromia	7	24	38	85	1812	1309	771.4	610	-	100	
Amhara	5	15	43	83	874	774	407.5	337.1	610	116	
SNNPRS	6	40	20	100	11190	6269	5590	3132	2120	120	95
Tigray	4	23	26	65	1515	963	502.5	350	-		
Gambella	2	2	2	10	200	200	100	100	100	12	
Benishangul Gumz	2	4	4	13	45	27	27.5	24.5	27	17	
Harrari	-	5	2	5	244	45	72	20	45	7	
Total	26	113	135	361	15880	9587	7470.9	4613.3	2902	372	95
							<b>100%</b>	<b>60%</b>	<b>100%</b>	<b>62%</b>	

**Table 4. Seed production by region during 1998.**

Type of seeds to be produced	Participating regions production (tonnes)								Total Yield (%)	Yield/ha
	Oromia	Amhara	SNNPRS	Tigray	Benishangul	Gambela	Harari	expected production (tonnes)		
Wheat	1168	450	6000	640	-	-	32	8290	75	35
<i>Tef</i>	200	310	1500	180	25	-	-	2215	20	18
Barley	125	50	-	-	-	-	-	175	1.5	20
Maize	40	-	40	100	40	80	40	340	3.2	40
Sorghum	-	-	-	-	-	14.2	12.5	26.7	0.3	20
Total	<b>1533</b>	<b>810</b>	<b>7540</b>	<b>920</b>	<b>65</b>	<b>94.2</b>	<b>84.5</b>	<b>11046.7</b>		

### Future Prospects

It is expected that over the five-year implementation of the Scheme a total of 38,900 tonnes of quality seed will be produced. The number of farmers participating in the Scheme by that time will be about 40,000 and a total of about 15,000 hectares of land will be cultivated with seed of improved varieties provided by the scheme (Tables 5 and 6). Economic benefit is therefore estimated in terms of the amount of total output that will be generated as a direct result of the project over its five-year duration.

**Table 5. Projected seed production area in hectares by project year.**

Crop types	Project Year					Total
	1	2	3	4	5	
<b>Cereals</b>						
<i>Tef</i>	280	400	660	995	1320	3655
Wheat	255	355	598	901	1196	3305
Barley	115	178	310	466	619	1688
Maize	80	195	330	498	660	1763
Sorghum	-	120	165	248	330	863
<b>Total</b>	<b>730</b>	<b>1248</b>	<b>2063</b>	<b>3105</b>	<b>4125</b>	<b>11274</b>
<b>Pulses</b>						
Chickpea	-	70	100	136	178	484
Faba bean	-	59	88	111	150	408
Field pea	-	-	-	43	75	118
Haricot bean	-	64	81	120	150	415
Lentils	-	-	50	70	85	205
<b>Total</b>	<b>-</b>	<b>193</b>	<b>319</b>	<b>480</b>	<b>638</b>	<b>1630</b>
<b>Oil crops</b>						
Noug	-	-	18	25	34	77
Linseed	-	23	32	50	64	169
Groundnut	-	23	38	58	75	194
Rape seed	-	38	55	83	109	285
Sesame	-	27	43	67	93	232
<b>Total</b>	<b>111</b>	<b>188</b>	<b>283</b>	<b>375</b>	<b>957</b>	
<b>Vegetables</b>						
Potato	10	34	54	81	107	286
S. potato	6	12	21	31	42	112
Shallot	-	-	8	13	16	37
<b>Total</b>	<b>16</b>	<b>46</b>	<b>83</b>	<b>125</b>	<b>165</b>	<b>435</b>
<b>Forages</b>						
Vetch	5	25	32	47	63	172
Cowpea	7	18	26	40	52	143
Lablab	2	23	32	47	63	167
Oats	2	-	15	24	32	73
<b>Total</b>	<b>16</b>	<b>66</b>	<b>105</b>	<b>158</b>	<b>210</b>	<b>555</b>
<b>Total</b>	<b>762</b>	<b>1664</b>	<b>2758</b>	<b>4154</b>	<b>5513</b>	<b>14851</b>

**Table 6. Number of farmers involved in seed production by crop and project year.**

Crop types	Project Year					Total
	1	2	3	4	5	
<b>Cereals</b>						
<i>Tef</i>	560	800	1320	1889	2640	7309
Wheat	510	710	1195	1802	2392	6609
Barley	230	355	620	932	1238	3375
Maize	160	390	660	995	1320	3525
Sorghum	-	240	330	497	660	1727
<b>Total</b>	<b>1460</b>	<b>2495</b>	<b>4125</b>	<b>6215</b>	<b>8250</b>	<b>22545</b>
<b>Pulses</b>						
Chickpea	-	280	400	545	710	1935
Faba bean	-	235	350	445	600	1630
Field pea	-	-	-	170	300	470
Haricot bean	-	255	325	480	600	1660
Lentils	-	-	200	280	340	820
<b>Total</b>	<b>-</b>	<b>770</b>	<b>1275</b>	<b>1920</b>	<b>2550</b>	<b>6515</b>
<b>Oil crops</b>						
Noug	-	-	70	100	135	305
Linseed	-	90	130	200	255	675
Groundnut	-	90	150	230	300	770
Rape seed	-	155	220	330	435	1140
Sesame	-	110	180	270	375	935
<b>Total</b>	<b>-</b>	<b>445</b>	<b>750</b>	<b>1130</b>	<b>1500</b>	<b>3825</b>
<b>Vegetables</b>						
Potato	100	335	535	810	1070	2850
S. potato	60	125	210	310	415	1120
Shallot	-	-	80	125	165	370
<b>Total</b>	<b>160</b>	<b>460</b>	<b>825</b>	<b>1245</b>	<b>1650</b>	<b>4340</b>
<b>Forages</b>						
Vetch	25	125	160	235	315	860
Cowpea	35	90	130	200	260	715
Lablab	10	115	160	235	315	835
Oats	10	-	75	120	160	365
<b>Total</b>	<b>80</b>	<b>330</b>	<b>525</b>	<b>790</b>	<b>1050</b>	<b>2775</b>
<b>Total</b>	<b>1700</b>	<b>4500</b>	<b>7500</b>	<b>11300</b>	<b>15000</b>	<b>40000</b>

These estimates show that an increasing number of farmers will have access to improved seed from growers and other farmers in their neighborhood, reaching a total of about 700,000 by the end of Year 5.

The future success of this scheme depends on farmers having a continuous access to small quantities of improved varieties from reliable local suppliers within their communities. Since the scheme will be implemented nationwide it will continue to rely on improved varieties coming from the agricultural research institutions which are suitable for the different agro-ecological regions. Once appropriate varieties are identified, sufficient quantities of breeder and basic seed should be made available for further multiplication.

### **Conclusion**

The farmer-based seed production scheme has expanded considerably during the second year of implementation to cover a greater geographical area, more farmers and technical staff, and larger cultivated area. Planning estimates indicate that this trend will continue for the remaining three years of the project. This rate of growth will require substantial support in terms of new improved varieties that are adapted to various localities, and sufficient supply of basic seed and other inputs. Considering the large quantities of seed that will be produced, maintaining high quality standards will continue to be difficult. This will have an effect on the seed distribution system, which is weak at present and lacks private sector involvement.

The economic benefit that will be generated by the scheme during the five-year implementation period seems obvious from the incremental quantity of seed or grain that will be produced. However, sustainability in financial terms and impact of the program beyond the project phase seem less clear and should be of greater concern. It is expected that by Year 5 strong producer groups would have been identified, which will be linked to effective seed distribution systems in the communities. This will require continued efforts in organizing potential producers into groups, providing relevant training to farmers and supervisory staff, giving start-up support, establishing quality control services and enforcing codes of conduct, linking growers to relevant institutional arrangements and promoting the merits of good seed in farming communities. The bottlenecks in maintaining seed quality, in developing an effective marketing system and in providing price incentives must be overcome in order to motivate private individuals to invest in small-scale seed enterprises and this ensures sustainability.

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## **Session III**

### **Experiences of Enterprises at Early Stages of Establishment**

## **Developing Small-scale Seed Enterprises for Food Legumes in Turkey**

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### **Abstract**

In Turkey, the international trade in food legumes mainly comprises exporters who buy grain from farmers after harvest each year. The Turkish export trade has been losing ground in the world market because of generally poor and inconsistent quality of produce coming from farms. Farmers also experience low productivity since they continue to cultivate traditional varieties, although several new high yielding and disease tolerant varieties have been developed by national research institutions. Since the new varieties have not yet reached many farmers, the production of certified seed is also low and far from meeting demands. This has resulted in high seed prices, which have further limited adoption of the improved varieties. The Legume Exporter Unions (LEU) in Turkey funds and implements a project on seed production of high yielding and disease tolerant varieties of chickpea and dry bean in collaboration with the Ministry of Agriculture and Rural Affairs and the International Center for Agricultural Research in the Dry Areas (ICARDA). The Project intends to introduce lentil into its program in the near future. An essential element of this Project is a seed production and research company, which provides foundation seed and technical advice to contract growers and purchases raw seed from them at a premium price based on quality. This seed is certified, processed and sold at a reasonable price to as many farmers as possible, who are also encouraged to view variety attributes in demonstration plots prepared for this purpose. The final aim of the Project is to facilitate the development of effective small seed enterprises that can supply farmers with good seed. The Project intends to do this through the formation of a Food Legume Seed Growers' Association that will be supported by technical advice, small-scale cleaning equipment and storage facilities. It is expected that this arrangement will have a major advantage of reduced transport and distribution costs so that good seed will be available at a reasonable price from a reliable and lasting source within the community.

### **Introduction**

In Turkey, both public and private seed sectors are well developed. Production of certified seed in the public sector is planned and coordinated by the Ministry of Agriculture. Government institutions produce seed of self-pollinating cereals and legumes since the low profitability make these crops less attractive to the private sector. Even within the public sector, the state farms produce large quantities of wheat seed but very little legume seed. The private sector produces mostly seed of cross-pollinated crops in which hybrid varieties are available.

The four main food legumes grown commercially in Turkey are chickpea, lentil, dry bean, and broad bean. Food legumes occupy between 9 and 11% of annual cropping area (SIS 1996). Chickpea is the main food legume grown, followed by lentil, dry bean and broad bean. The total area cultivated to chickpea and lentil expanded rapidly during the

1980s as a consequence of the Fallow Replacement Project, which was implemented by the Ministry of Agriculture. Government policies also favored food legumes and several instruments such as credit and subsidized certified seed were used to promote production.

However, the withdrawal of subsidies on food legumes since the early 1990s has resulted in a continuous fall in production and grain quality. This has posed a serious problem particularly for the export trade, which requires grain of high quality. There is no effective seed production system in either the public or private sectors that could support the diffusion of new improved varieties. Legume seed production is a relatively low profit business that could be suitable for small-scale enterprises (SSEs) in rural areas. The Legume Exporters Union (LEU) supports a project in collaboration with the Ministry of Agriculture and ICARDA to facilitate the promotion of SSEs in legume seed production. This activity is in its first year of implementation and shows promise for future enterprise development.

### **Productivity of Food Legumes in Turkey**

The area cultivated and yield obtained from the four main food legume crops grown in Turkey for the period 1981 to 1997 are shown in Table 1. Whilst chickpea and lentil are rainfed crops grown in rotation with cereals, dry bean and broad bean are irrigated. Broad bean production is concentrated in the north of the Aegean region where mainly the large seeded type is produced for human consumption. In contrast, dry bean production is more widely spread in the country. Several seed types have been grown in different parts of the country depending on consumer preference. Chickpea is grown in the transitional zones of central and southeastern Anatolia. Farmers in almost all the regions prefer to cultivate the large seeded kabuli chickpea. Two types of lentil are cultivated, the yellow-cotyledon lentil in central Anatolia and the orange-cotyledon type in southeastern Anatolia.

The average yield of food legumes in Turkey has remained generally low for several years. The absence of modern technology in legume farming partly accounts for this poor performance. In addition, there are biotic, abiotic and cultural constraints, which have been examined by Sakar et al. (1988), Durutan et al. (1988), Acikgoz et al. (1993), and recently by Kusmenoglu and Meyveci (1997). Ineffective production and distribution of certified seed are other contributory factors.

The total annual seed requirement for chickpea, lentil, dry and broad bean is estimated at 150,000 tonnes. This means that only a very small proportion of this quantity is certified seed as shown in Table 2. Nearly all the area is planted with farm-saved seed, which is often of poor quality and low yield potential.

The low productivity and poor quality of food legumes cannot be blamed just on the lack of seed of appropriate varieties; weak institutional support in seed production, and ineffective delivery systems must also be taken into consideration. The certified seed available is expensive and many farmers cannot afford it. The seed is also sold at points that will involve high transport costs for most farmers.

Since the launching of the National Food Legume Research Project in 1976, several cultivars have been developed and released. Some of these are included in the seed production scheme but there has been no consistency even in the small amount of seed produced. Despite yearly fluctuations, chickpea production has been maintained at a reasonable level as shown in Table 2. On the other hand, lentil certified seed production has been stopped in recent years, although Turkey is still the largest exporter of lentil in the world.

**Table 1. Food legume area, production and yield from 1981-1997.**

Year	Chickpea			Lentil			Dry bean			Broad bean		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
	'000ha	'000t	t/ha	'000ha	'000t	t/ha	'000ha	'000t	t/ha	'000ha	'000t	t/ha
1981	200	235	1.17	255	280	1.09	105	160	1.52	30	55	1.83
1982	245	280	1.14	623	550	0.88	106	165	1.55	36	65	1.83
1983	335	290	0.86	650	650	1.00	120	175	1.45	43	77	1.81
1984	343	335	0.97	604	570	0.94	112	164	1.46	42	76	1.80
1985	399	400	1.00	576	618	1.07	150	170	1.13	42	73	1.73
1986	533	630	1.18	747	850	1.13	152	170	1.11	43	80	1.88
1987	655	725	1.10	914	925	1.01	179	210	1.16	44	80	1.81
1988	773	778	1.00	980	1040	1.06	176	211	1.19	42	78	1.85
1989	796	683	0.85	882	520	0.58	177	193	1.09	40	75	1.87
1990	878	860	0.97	905	846	0.93	171	210	1.23	40	75	1.87
1991	874	855	0.97	787	640	0.81	178	214	1.20	38	70	1.84
1992	828	770	0.93	741	600	0.80	167	200	1.19	36	68	1.86
1993	780	740	0.94	711	735	1.03	161	200	1.23	34	65	1.88
1994	760	650	0.85	646	610	0.94	163	180	1.10	29	52	1.80
1995	745	730	0.97	640	665	1.03	170	225	1.32	26	49	1.88
1996	780	732	0.93	620	645	1.04	173	230	1.33	25	46	1.88
1997	778	720	0.92	553	570	1.03	173	235	1.35	25	46	1.88

Source: FAO Production Yearbook 1981-97.

**Table 2. Certified seed production of grain legumes (tonnes).**

Year	Dry bean	Chickpea	Lentil	Total
1983	25	430	444	899
1984	0	261	497	758
1985	0	223	116	339
1986	0	107	307	414
1987	0	248	384	632
1988	0	168	626	794
1989	4	217	74	295
1990	30	227	216	473
1991	47	186	32	265
1992	19	194	30	243
1993	16	58	311	385
1994	30	46	250	326
1995	18	74	0	92
1996	8	489	173	670
1997	16	377	0	393
1998	11	242	0	153

### **The Role of Exporters Unions**

Exporters of agricultural products in Turkey have organized themselves into several unions dealing in cereals, legumes and oil crops throughout the country. These unions are organized on a regional basis as semi-autonomous professional organizations. The primary objective of the unions is to increase the export market for agricultural products through efficient information exchange and concerted efforts in seeking solutions to key business constraints. The Legume Exporters Union (LEU) has three defined objectives to support:

- A short-term goal of facilitating large-scale seed production of food legume cultivars. The various research institutes and agricultural faculties in Turkey have released one broad bean, 13 dry bean, 13 chickpea and 13 lentil cultivars. However, only one chickpea and two dry bean cultivars are listed in the seed production program. The seed distribution of these cultivars is limited (Table 2), and is far from meeting farmer demand.
- A mid-term goal of influencing efforts in shortening the time periods between recommendation of a candidate line, variety release and seed multiplication. In Turkey, the registration procedure of a new cultivar takes a minimum of three years test period after initial recommendation for release. The institute that develops a new cultivar only starts seed multiplication when the registration committee releases it. The seed multiplication cycle itself requires at least a further period of three to five years. The Legume Exporters Union proposes to multiply the seeds of candidate lines as soon as they are included in the registration trials. In this way it will be possible to establish a seed stock of the new variety and save at least three years.
- A long-term goal of undertaking market-oriented breeding projects. These activities will be carried out in collaboration with national and international research institutions. The Union is aware that a considerable amount of resource is needed to achieve these goals, and is in position to fund relevant research projects.

The exporters of grain legumes obtain their produce from farmers after harvest. The international market requires grain of high quality, which is difficult to get from the crop produced by farmers at present, particularly in terms of seed size and color. The Union intends to improve this situation by supporting a project on food legumes. The Union has recently established a company named Exporter Unions Seed and Research Company (EUSRC) as a legal entity for carrying out financial transactions related to its seed and research operations.

The Legume Exporters Union is currently conducting two short-term projects, one on chickpea and another on dry bean, in collaboration with research institutes and extension services of the Ministry of Agriculture and ICARDA. The projects do not deal with seed multiplication only but also with the transfer of improved crop management technology, processing and marketing of seeds. Therefore, these projects are designated as Integrated Production Technology Transfer Projects.

### **Highlights of the 1998 Project Activities in Chickpea and Dry Bean**

The two short-term projects aim to encourage the adoption of high yielding and disease tolerant varieties of chickpea and dry bean, as well as improved crop management practices through the use of certified seed. The vicinity of Kadinhani town in Konya Province has been selected as a pilot area for the projects, since farmers are already using improved technologies in other crops and are also familiar with contract grower schemes. The projects were introduced to the farmers in early spring of 1998 during a visit to the pilot area.

The project contracted chosen farmers from village communities who were supplied with basic seed and supervised on crop management. The project provided an assured market for the certified seed produced. At harvest, the cost of basic seed was recovered from the produce and the rest of the seed was procured from the grower at a premium of up to 20% above the prevailing market price. All the seed collected from the growers will be processed, packaged, and sold to other farmers at the original procurement price for raw seed. This low price is meant as a subsidy to encourage adoption of improved cultivars and crop management practices.

As further assistance, a small-scale seed processing and packing unit has been established in the project area. This will eliminate transportation costs and thus help to lower the seed price. The first phase lasts two years, at the end of which activities will be evaluated and necessary action taken depending on the progress made. A formal study on assessing the impact of the project on the production and use of certified seed of food legumes in the pilot area is planned.

In the spring of 1998, four farmers were contracted to produce chickpea seed. These farmers were supplied 1.4 tonnes of foundation seed of the new cultivar, Gokce, which was purchased from the Central Research Institute for Field Crops and used to sow 11 hectares. A cereal seed planter was modified for sowing legumes and supplied to the farmers free of charge to encourage them to use a planter. Weed control was done completely by applying pre-emergence herbicide. The crop was harvested and threshed using a cereal combine after making necessary adjustments. A total of 11 tonnes of Gokce seed was purchased from the farmers at the premium price and processed for use next year.

For dry bean, nine tonnes seed of cultivar, Yunus 90, was purchased from a state farm in the spring of 1998 and distributed to 41 contracted farmers, who planted 107 hectares. The same procedure was followed as in the case of chickpea. The crop is still in the field and will be purchased from farmers when it is harvested.

An initial survey was conducted during the summer of 1998 to review the project activities during the first phase. This survey will be repeated at the end of the phase to assess the achievements made. The following are the major findings of the initial survey:

- Farmers in the pilot area have already been buying and using certified seed of cereals and are familiar with the benefit derived from using certified seed. That could facilitate the introduction of certified seed of dry bean and chickpea. However, it is necessary to introduce appropriate varieties together with institutional support in cost-effective seed production and effective delivery systems.
- The practice of contract production has already been employed by other organizations to produce sugar beet and sunflower. Selection of growers is vital for effective contract programs. It is important in the early years to limit the number of crops and varieties, and to select cooperative, dedicated, and hard working farmers in the community.
- Chickpea crop is generally affected by *Ascochyta* blight despite spring sowing. Since farmers still use local varieties, introducing disease tolerant varieties could be very beneficial.
- A good dry bean crop tends to generate higher gross margin than chickpea. However, it seems a more risky crop for farmers. Besides disease problems, it is a fully irrigated crop and more sensitive to soil problems.
- Farmers are aware of risks such as drought and disease they could face. A seed organization should consider assisting its growers to minimize and cope with risk. For example, payment of a guaranteed price based on cultivated area could be an option,

although the success of this approach will depend on how loyal and honest the farmers are.

- Despite poor performance in some cases, the farmers are generally keen on and interested to continue multiplying seed for the project because they perceive the introduction of improved legume varieties as vital to their farming system. However, growers need to be reassured and encouraged particularly during bad years. They expect trustworthy partnership in dealing with problems they encounter in the field. This is enough justification for organizing the growers into an association.

### **Legume Seed Growers Association**

The idea of establishing a Legume Seed Growers Association has attracted many farmers because this helps to link the projects with the grain producers who are mostly small-scale farmers. The Association will be supported with small-scale equipment, credit, and extension service. The Association also has the advantage of reducing transport, supervision and distribution costs, and will serve as the main channel to reach small farmers.

### **Conclusion**

Since the primary concern is grain export, the real impact of this project will come when the farmers adopt new varieties and use certified seed to produce grain that meets export standards. It is, however, unlikely that the project would have made a significant impact in this direction by the end of the first two-year phase. However, achievements and constraints of the project during the first year will serve as useful guide in planning activities for the following year. It will take more time to develop the Association into a commercially viable seed enterprise that produces seed at a price, which covers cost of production.

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## **Promoting Small-scale Enterprises for Potato Seed Production in the Highlands of Yemen**

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### **Abstract**

Besides multiplying, and selling quality seed, the Potato Seed Company (PSC) in Yemen also provides technical and financial support to private potato seed producers. The Company covers only 10% of national seed requirement, which is far from meeting the increasing demand for quality seed. To help increase seed supply, the company encourages private producers such as individual farmers, farmers associations, and cooperatives to purchase early generation seed and multiply this into certified seed for further distribution within farming communities. During the early stages of establishment, PSC assists new producers with extension services, local storage facilities, inputs on credit and training in business management and marketing. Encouraging results obtained by a pilot scheme involving members of the Amran Agricultural Cooperative located 50 km north of Sana'a have motivated PSC to extend enterprise development activities to three new pilot areas. This paper provides information on the management and cost structures, financing, seed pricing, profitability, loan repayment and seed quality of the Amran Cooperative and use this as a model and basis for analysis and discussion.

### **Introduction and Background**

As a new crop, potato was initially cultivated in the central highlands, where farmers used to keep part of their production as seed and exchange material among themselves. The performance of the early varieties gradually deteriorated mainly due to a lack of new, clean stock to replenish existing material. This led to a drastic drop in potato cultivation as farmers went back to their traditional farming methods.

In the early 1970s, a German-Yemeni Development Project was established at Qa Albaun (50 km north of Sana'a) as an attempt to re-introduce potato cultivation. Clean seed of new German potato varieties was distributed among farmers through the extension service. There were good results initially, with on-farm yields increasing to 10 t/ha in the project area. However, two major shortcomings of the project became evident. First, the project had focused mainly on potato production and neglected seed production and storage aspects. Second, the use of inappropriate crop rotation practices resulted in low yield and spread of diseases. The project activities came to an end when funding finished. The production of potato in Yemen between 1985 and 1997 is shown in Table 1.

Through a Dutch-Yemeni bilateral aid Project, the Potato Seed Company (PSC) was established in 1977 at Dhamar, 100 km south of Sana'a (Bakker et al. 1996). The average elevation of this area is 2400 meters, which provides suitable conditions for potato production. During the last 20 years, the production of the project has risen to 2500 tonnes of seed, covering up to 10% of total national seed requirement. The Company has done well by generating profit from potato seed production as shown by the 1997 Profit and Loss Account (Table 2) and Balance Sheet (Table 3).

At present, potato is the second cash crop after qat. Farmers in the highlands grow potato during the spring and summer seasons, while those in the lowlands use the winter season. Demand for clean seed material has increased substantially over the years. As the only source of clean seed in the country, PSC has begun encouraging individual farmers, agriculture cooperatives, and traders in the highlands to produce seed potato.

The early-generation material from PSC is expensive and is sold to private producers who carry out further multiplication before seed is finally sold to farmers for producing table potato. Since 1993, PSC has supported associations and individual farmers in the highlands to produce seed potato. Among inputs and services provided by PSC are quality seed, extension services, and storage technology using locally available materials.

### **A Model Seed Enterprise (Amran Cooperative)**

Amran Cooperative is located in one of the three major potato production areas in the highlands, about 50 km north of Sana'a. It is a pilot scheme in enterprise development which has been implemented in cooperation with PSC. Besides making high quality seed available to the Cooperative, PSC also supports the transfer of technical knowledge within the farming community through field days and training workshops. The Cooperative also carries out other activities such as:

- Providing services to its members and other farmers in the region to increase crop and livestock productivity.
- Providing possibilities for the use of adequate agricultural machinery for land preparation or other operations, and providing a stock of spare parts at reasonable prices.
- Marketing agricultural products on behalf of its members to different markets in the country.

#### **Membership**

The following criteria are used for membership of the Cooperative:

- A member must come from the same region and should not belong to another similar cooperative in the same area.
- Each member has to acquire at least one share, and must pay the specified monthly membership contribution.

**Table 1. Potato production in Yemen.**

<b>Year</b>	<b>Area cultivated (ha)</b>	<b>Production (tonnes)</b>	<b>Yield (t/ha)</b>
1985	6950	96780	13.9
1986	7271	102130	14.0
1987	9670	119566	12.4
1988	10154	127253	12.5
1989	11432	140153	12.3
1990	13603	159849	11.8
1991	12361	157125	12.7
1992	13221	179375	13.6
1993	15169	213221	14.1
1994	13213	180992	13.7
1995	13601	184542	13.6
1996	14233	182815	12.8
1997	20030	272305	13.6

**Table 2. PSC Profit and Loss Account at 31 December 1997.**

<b>Description</b>	<b>Amount in YR<sup>†</sup></b>
Sale of locally produced seed	113,965,870
Purchase of locally produced seed	51,564,625
<i>Gross Margin Seed</i>	<i>62,401,245</i>
Sale of rejected seed	16,119,840
Cost of rejected seed	16,847,793
Sale of chemical, fertilizer and packaging material	11,551,381
Purchase of chemical, fertilizer and packaging material	9,725,962
Rent of machinery services	12,120,650
Agricultural service to growers	6,027,125
<i>Gross Margin Others</i>	<i>7,190,991</i>
Cleaning costs	4,101,826
Packing materials	1,225,261
Other direct costs and sale commission	7,209,896
<i>Direct Costs</i>	<i>12,536,983</i>
<i>Total Gross Profit</i>	<i>57,055,253</i>
Salaries	8,242,037
Wages of casual labor	812,533
Other personnel costs	6,601,076
<i>Total Labor Costs</i>	<i>15,655,646</i>
Maintenance of equipment	5,282,588
Fuel, oil, and transport	1,799,530
Other maintenance	1,917,904
Electricity	7,592,051
Office costs	1,022,753
Communications	331,033
Research, extension and quality control	661,985
Clearing, insurance, public relations and other costs	5,867,349
<i>Total Other Costs</i>	<i>24,475,193</i>
Other Income	435,180
Extra-ordinary Profit	5,079,261
Depreciation	4,506,139
<i>Net Other Income</i>	<i>1,008,302</i>
<i>1997 Profit</i>	<i>17,932,717</i>

<sup>†</sup> YR = Yemeni rial (USUS\$ 1 = 137 YR; 1998 official rate).

**Table 3. PSC Balance Sheet at 31 December 1997.**

<b>ASSETS</b>		<b>LIABILITIES AND EQUITY</b>	
Fixed Assets		Long-term Liabilities	
Land	2,878,017	Donor Contributions	68,879,059
Buildings	21,710,643	Revolving Fund	3,723,778
Water and Sewerage	303,617	Total Long-term Liabilities	72,602,837
Truck and Tractors	2,308,635	Current Liabilities	
Farm Equipment	3,773,088	Creditors	5,442,037
Store Equipment	5,643,083	Staff Benefits	117,016
Tools	362,700	Total Current Liabilities	5,559,053
Cars	4,307,458	Equity	
Other Equipment	2,049,300	Accumulated Profit	146,726,673
Total Fixed Assets	43,336,541	Profit this Year	17,932,716
Current Assets		Total Equity	164,659,389
Inventories (stock)			
Seed Potato	58,730,155		
Chemicals, Fert. and Packaging Material	11,855,025		
Spare Parts	14,839,242		
Total Inventories	85,424,422		
Cash and Bank Balance	92,382,176		
<b>Accounts Receivable</b>			
Trade Debtor	23,391,108		
Pre-payment	257,317		
Doubtful Receivable	-1,970,285		
Total Receivable	21,678,140		
<i>Total Assets</i>	<i>242,821,279</i>	<i>Total Liabilities and Equity</i>	<i>242,821,279</i>

**Organizational Structure**

The structure of the Amran Cooperative comprises three main elements:

- **A General Assembly**, which consists of all members of the cooperative. This body meets once a year to elect a management board, and to approve operational plans and the yearly financial statements.
- **A Management Board**, which comprises seven persons elected by the general assembly. The board has a Chairman, General Secretary, Financial Manager, Agro-Technical Manager and three other members who meet monthly and are responsible for implementing all activities approved by the general assembly.
- **A Supervising Committee** of five persons headed by a Chairman, who are elected by the general assembly but do not belong to the management board. This committee reviews and evaluates the financial, technical, commercial and managerial aspects of the Cooperative during monthly meetings organized for this purpose.

**Sources of Finance**

The Cooperative derives its finance from the following sources:

- Shares sold to members and monthly contributions made.
- Net profit as determined by the general assembly at the end of each financial year.

- Funds provided by the government or other sources.
- Revenue derived from sale of products and services provided to non-members of the cooperative.

### **Seed Production**

At the start of the season, Amran Cooperative buys early-generation seed from PSC to distribute among its members for further multiplication. In addition to seed, the Cooperative sometimes provides other essential inputs on credit or for cash. The technical staff conduct several inspection visits to farmers fields and provide post-harvest supervision during harvesting, seed sorting, and storage. After careful selection at harvest, the product is stored for use as seed by the Cooperative or for distribution to other farmers. With the help of PSC, an improved local store of 50-tonne capacity was built in 1995. At present, members of the Cooperative comprise 220 farmers and a capital of YR 25.5m, with a share price of YR 2250. With an average yield of 17 t/ha using PSC seed, it is possible to maintain total production cost around YR 250,000 and earn a profit margin per hectare of at least YR 400,000. The seed retail price of 56 YR/kg is very reasonable compared to the PSC price of 70 YR/kg.

The Cooperative has operated effectively in the market and earns a reasonable profit because of its low production cost and relatively high seed quality. The Company is building on the success achieved so far and has established more pilot areas with the same objectives and activities.

### **The Potato Seed Company**

In 1996, the Yemen government negotiated a loan with the World Bank to establish the seed and Agriculture Service Project (SASP) as a means of improving the supply of seed and other agricultural inputs to farmers. This project will provide funds for six different units one of which is PSC, which will be converted into a public Potato Seed Company and prepared for privatization between 1998 and 2000. The first steps towards establishing the company have already been taken. Major shareholders of the company (Ministry of Agriculture and Irrigation and the Agricultural Services Corporation) and their total shareholding values have been established. The number of shares to be sold to the private sector and to employees of the company is to be determined at a later stage.

### **Conclusion**

It can be concluded from this paper that in a large segmented market, establishing effective links between commercial companies and small-scale seed enterprises can enhance efficiency in seed supply and help increase market share for improved seed. This linkage could be of mutual benefit and provides a means of reaching small-scale users who large companies usually find difficult to access. The large enterprises could provide leadership and support roles in the beginning while the smaller enterprises are in the phase of establishment. However, the results obtained so far in Yemen are tentative since the small enterprises are at very initial stages of development and will require more time to demonstrate sustainability.

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## **A District-based Seed Multiplication and Supply Scheme in the Amhara Region of Ethiopia**

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### **Abstract**

The Swedish International Development Authorities (SIDA) and the Amhara National Region State (ANRS) collaborative program in rural development started its implementation phase in June 1997. The overall objective of the program is to improve living conditions of the rural population in this region of Ethiopia through sustainable increase in agricultural productivity. This depends to a large extent on the availability of improved seed, which farmers recognize as superior in quality, accessible to them and affordable in price. The seed component of the program will use three strategies to ensure that farmers have access to quality seed. First, by strengthening informal seed supply through the establishment of a *woreda* (district)-based seed multiplication and supply scheme. Second, by stimulating the private sector (small-scale enterprises) to participate in seed multiplication and marketing. And finally, by improving procedures and regional facilities for seed quality control and declaration. This paper discusses various approaches used by the technical assistance team within the seed component to advise the Bureau of Agriculture on how to organize small-scale seed production, processing, storage, marketing, quality control and rural credit at *woreda* level in cooperation with zone and *woreda* authorities. It is intended that these measures will effectively link variety development to the seed supply system, and hence promote the development of a commercially viable seed industry which can meet the needs of small farmers.

### **Introduction**

The SIDA/ANRS rural development program has several components including seed production, road construction, and education all linked together in a holistic project. The Amhara Region of Ethiopia is the target area of the program. Land-holdings in this area are small and commercial seed production is unknown. Seed from the formal sector is therefore not available to farmers.

The approach used by the program is the establishment of pilot schemes in specific areas, which are used as the basis for future expansion. In 1997, two contrasting areas in the Amhara region were chosen for this purpose: South Wollo, which is a drought prone and East Gojjam, a high potential area. The seed component of the program has a short-term objective of producing seed and creating awareness about new improved varieties. The program intends in the long-term to stimulate the private sector (small-scale enterprises) in seed production and marketing.

A technical assistance team advises the Bureau of Agriculture in organizing a district or *woreda*-based seed multiplication supply scheme in cooperation with the zone and *woreda* authorities in East Gojjam and South Wollo. The scheme involves small-scale seed production, seed processing, storage, marketing, rural credit, and seed quality control. The technical team facilitates the following processes:

- Conducting a seed marketing and feasibility study.
- Identifying suitable sites for seed production and locations for supply centers.
- Identifying storage facilities for processed seed, inputs, and machinery.
- Drawing up contract conditions for seed growers.
- Preparing seed production guidelines for priority crops.
- Assisting in the implementation of the business plan based on marketing and feasibility study.
- Assisting in setting up a mobile system for seed processing and strategic storage.
- Establishing field inspection, seed testing laboratories and quality declaration services
- Negotiating a credit system in cooperation with the rural credit component.
- Organizing training courses in seed production, processing, storage, marketing, field inspection, seed testing and quality control.

There are several components of the *woreda*-based scheme including market research and drawing up business plans, seed multiplication, seed processing, storage and distribution.

### **Market Research and Business Planning**

A market survey, which will investigate the potential quantity of improved seed to be produced, processed and stored both in the short and longer-term is planned. The information will be collected on a crop basis to enable proper assessment of contract farming area, processing and storage capacities, area to be inspected, number of samples to be collected, etc.

In developing a marketing strategy and business plan, particular attention will be given to commercial opportunities in the seed trade, ways of influencing farmers to use quality seed and how to motivate private sector (small-scale enterprises) involvement in seeds.

The role of technical assistance will be to facilitate the expansion of a marketing and sales network. This will be done by assisting seed producers of service cooperatives to market the seed they produce. Efforts will also be made to support newly established seed entrepreneurs through sales promotion activities in the target zones and *woredas*.

### **Seed Multiplication**

Small-scale seed multiplication schemes have been established in four *woredas* during the 1997/98 cropping year: Legambo and Debre Sina *woredas* in the drought prone area of South Wollo; Awabel, and Machakel *woredas* in the high potential area of East Gojjam. Neighboring farmers who are interested in the scheme were organized into clusters of seed producers to ease supervision of field and post-harvest operations. The growers were allocated specific areas for seed production, supplied with inputs including seed and fertilizer on credit and were given supervision by the zone and *woreda* agricultural extension staff. All parties (i.e., farmers, zone and *woreda* extension staff and creditors) have signed contracts specifying their respective responsibilities, conditions and risks undertaken. In particular, the contracts take into account the risks of possible crop failure so that parties share losses fairly. Extension guidelines are being prepared for seed production of cereals, pulses, oilseeds and forage crops.

A training package is being developed for various target groups, at the zone and *woreda* levels, who are engaged in the seed multiplication and supply scheme. An attempt has been made to prepare a preliminary cost calculation, which will be used in developing business plans for small-scale enterprises that will be involved in the seed supply scheme.

Similarly, regulations for variety maintenance of specified crops and basic seed production are being prepared in collaboration with the regional research centers. These regulations are intended to guide breeders in maintaining released varieties and in securing the production of pre-basic and basic seed.

### **Seed Processing and Storage**

Since production sites are many and scattered, the use of mobile seed cleaners has been considered the most suitable investment option. Appropriate processing machines with air-screen cleaners, indented cylinders and seed treating equipment will be installed and operated by trained personnel. The running cost of the processing machines will be borne by the zone agricultural departments and gradually recovered through seed cleaning fees.

Suitable storage facilities are few and there are plans to construct more stores at strategic locations for both short and medium-term seed storage. A training package will also be prepared on seed drying, cleaning, treatment, bagging, general handling, and storage. It is proposed to establish a computerized system for managing seed stocks in both zones as soon as the quantity of seed produced justifies such a monitoring system.

### **Quality Control and Declaration**

To protect the farmer from using poor seed, two zone laboratories will be established in East Gojjam and South Wollo to control the quality of seed produced, processed, stored and marketed. These laboratories will operate in agreement with the Ethiopian seed quality control regulations. Specialized equipment recommended by ISTA is being procured and will be installed in the seed laboratories in Debre Markos and Dessie. Guidelines for field inspection and quality control and declaration are being prepared. Results of field inspections and laboratory analysis will be used for declaring quality and not for formally certifying the seed lots. Regular practical training is planned for field inspectors and seed analysts.

### **Conclusion**

Since this program is at its initial stage, it is difficult to assess its success. Experience from the first year will largely determine the direction of future efforts, especially in encouraging the participation of small-scale enterprises in seed production and distribution.

In particular, the availability of credit as start-up support to seed growers, processors and traders is fundamental for a successful expansion of the seed system in the region. The need for credit by the various groups has to be assessed at an early stage of the program.

## **Seed Supply Systems for Smallholders in Rainfed Areas of Yemen**

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### **Abstract**

In an attempt to improve productivity and liberalize activities in the agricultural sector, the government of Yemen has recently established a Seed and Agricultural Services Project (SASP) with a loan from the World Bank. As part of this project, the Seed Multiplication Centers for potato, vegetable and cereals are being restructured to operate as commercial enterprises. Improving seed security of smallholders in rainfed areas is a key objective of the new Seed Multiplication Corporation for which an outreach program will be developed involving farmer-groups and cooperatives. This paper suggests ways of improving agricultural productivity of small farmers located in rainfed areas through the development of a sustainable system for the supply of quality seed of improved and adapted varieties.

### **Introduction**

Yemen has a population of about 14 million, 60% of which live in the rural areas and depend on agriculture for their livelihood. The country has a large area of fertile land with diverse agro-climatic conditions that permit cultivation of a variety of crops. The annual cultivated area is about 1.3 million hectares of which about one million hectares are rainfed and are devoted to traditional crops including wheat, barley, sorghum, millet and maize. The rest is irrigated with high-value crops such as vegetables, fruits and qat. Availability of water is a serious constraint since ground water supply for irrigation is being steadily depleted.

The agricultural sector accounts for 20% of GDP, with crop production as the most important sub-sector and accounting for about 75% of agricultural GDP, excluding qat. There has been little change in productivity of the agricultural sector during the past two decades for several reasons. These include persistent drought, a lack of new crop varieties, inadequate supply of inputs, weak institutional arrangements, particularly for agricultural research and extension services, distorting policies relating to foreign exchange, and import regulations. An estimated annual growth rate in population (3.7%) outstripping growth in agriculture (2.2%) has resulted in increased import of food, which has risen from US\$18 million in 1970 to US\$300 million in 1994 (World Bank 1996a).

The majority of the farmers own smallholdings or have sharecropping arrangements with owner-occupiers. These farmers save their own seed and provide up to 80% of the seed that is used nationwide although the quality is not improved or guaranteed. Production in the public sector is limited and is undertaken by national projects that sell mainly cereal seed at subsidized prices, which do not cover production costs (World Bank 1996b).

Since there has been no private interest in the seed sector, the main objective of the Seed and Agricultural Services Project (SASP) is to improve the availability of quality seed and other agricultural inputs through restructuring national seed projects into autonomous and commercially viable entities. The Project also encourages participation of the private sector. A key test of the impact of this scheme will be the extent to which the seed needs of small farmers in the informal sector are served since they will continue to be the main crop producers.

### The Seed Sector

During the last 30 years, the government of Yemen has given reasonable attention to agricultural research and the production of improved seed of adapted varieties, with the objective of increasing total production and cultivated area both in the rainfed and irrigated areas. In this respect, the government implemented the following projects with the help of foreign assistance:

- The Potato Seed Center supported by the Government of the Netherlands for production of quality seed of potatoes.
- The Onion and Vegetable Seed Production Center, supported by the Arab Organization for Agricultural Development, is located at Senyun in the Governorate of Hadramout.
- The Seed Multiplication Center for cereal seed production supported by FAO and the European Community.

In collaboration with rural development projects and cooperatives, the projects have been the main channels for supplying farmers with quality seed. Besides wheat, the production of quality seed of other crops is limited (Tables 1 and 2), and covers only a small proportion of total national requirement. For instance, quality seed accounts for 15-20% of cereal and 2% of vegetable seed requirements (World Bank 1996). Even in providing such limited quantities, the Seed Multiplication Center has incurred heavy losses that have been covered by substantial government subsidy (Tables 3 and 4).

**Table 1. Area of seed production in Yemen.**

Crop	Mean Area (1990-1996) Hectares
Wheat	1330
Barley	14
Maize	17
Sorghum	35
Millet	110
<i>Total</i>	<i>1467</i>

**Table 2. Seed production by the Seed Multiplication Center.**

Crops	1990	1991	1992	1993	1994	1995	1996	Total	Mean
	Tonnes								
Wheat	1788	1590.4	971.1	1116.5	906.7	840.1	683	7895.8	1127.9
Barley	12.9	4.5	10.1	15	0.8	7.1	3.8	54.2	7.7
Maize	74.6	37.3	39.3	25.8	14.1	15	20.6	226.7	32.4
Sorghum	37.1	36.3	58.7	43.5	72.7	37.8	78.5	364.6	52.1
Millet	61.2	63	98.5	163.5	139.3	111.1	154.9	791.5	113.1
Total	1973.8	1731.8	1178.1	1364.3	1133.6	1011.1	940.8	9332.8	1333.2

**Table 3. Mean cost of seed production (1992-1997) at the Seed Multiplication Center.**

Crops	Cost	Sale	Difference	Subsidy (%)
		YR <sup>†</sup> /t		
Wheat	71,930	35,000	36,930	51%
Barley	72,580	35,000	37,580	51%
Maize	70,430	50,000	20,430	29%
Sorghum	70,370	50,000	20,370	29%
Millet	59,870	42,000	17,870	30%

† 1YR = Yemeni rial (USUS\$ = 137 YR; 1998 official rate).

**Table 4. Details of mean cost of seed production at the Seed Multiplication Center.**

Descriptions	Wheat	Barley	Maize	Sorghum	Millet
			YR <sup>†</sup> /t		
Raw Seed Cost	35,170	30,000	40,000	40,000	30,000
Processing	19,310	22,240	13,420	13,360	12,860
Storage	1,300	4,190	860	860	860
Administrative Costs	16,150	16,150	16,150	16,150	16,150
Total	71,930	72,580	70,430	70,370	59,870

† See Table 3.

Source: MOAI/SMC 1997

### Privatization of the Seed Sector

Not all seed projects in Yemen have involved the private sector. Among steps being taken by the government to encourage private investment in the seed industry is formulating appropriate seed policy and legislation. Several reasons account for the shift towards privatization including the following:

- High cost of public sector seed production arising from low output, poor sale, regulated prices and high staff costs.
- Focus on less-profitable crops for social and strategic reasons.
- Absence of competition because of an existing public sector monopoly in seed production.
- Weak internal quality control and absence of external regulation of quality.
- Ineffective contract-grower scheme that is costly and generates low quality seed.
- Lack of a marketing strategy and an effective seed distribution network.
- Lack of a seed policy and supporting legislation that could promote competition and efficiency in seed production and distribution.

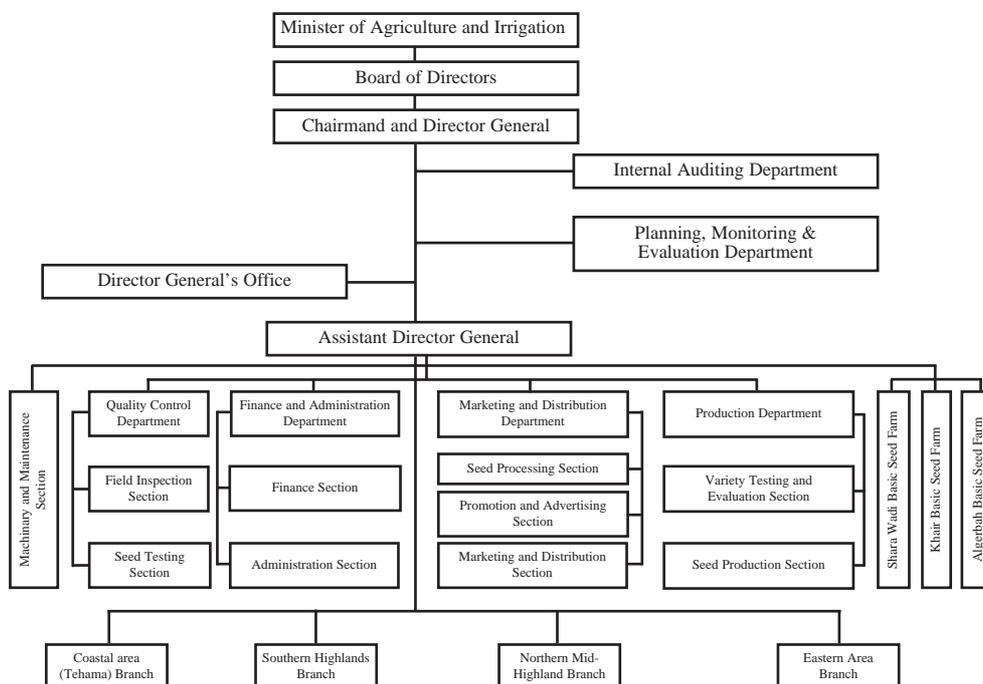
SASP provides catalytic support to the process of privatization through a Project Support Unit which will guide the three seed centers in improving commercial efficiency and preparing for privatization. The project will finance contractual services for collecting, testing and evaluating varieties, as well as upgrading production equipment and providing training and technical assistance. The centers will be required to undergo substantial organizational restructuring in key areas such as:

- Reducing excess staff and financing separation benefits for redundant employees who will no longer be needed.
- Initiating activities in testing, selecting, and developing superior landraces and new varieties of potato, onion, vegetable, and field crops through service contracts with public and/or private organizations. Seed of superior landraces and varieties will be multiplied by private seed growers under contractual arrangement and sold to farmers.
- Improving input/output distribution and marketing channels.

The General Directorate of Plant Production is given the responsibility for policy formulation, promotion of private sector participation in the seed and input supply sectors, as well as implementation of the seed and fertilizer regulatory and quality control functions. The objective will be to create competition among companies and seed producers who produce and market seed of specified quality standards. The Project will support the Directorate in building its institutional capacity, cost-sharing of investment, conducting feasibility studies to promote and facilitate private sector investment in seed and input supply projects.

### General Seed Multiplication Corporation (GSMC)

GSMC will be responsible for making available quality seed of adapted field-crop varieties to farmers. The various activities will be organized within an organizational structure shown in Figure 1.



**Figure 1. Organizational structure of the General Seed Multiplication Corporation.**

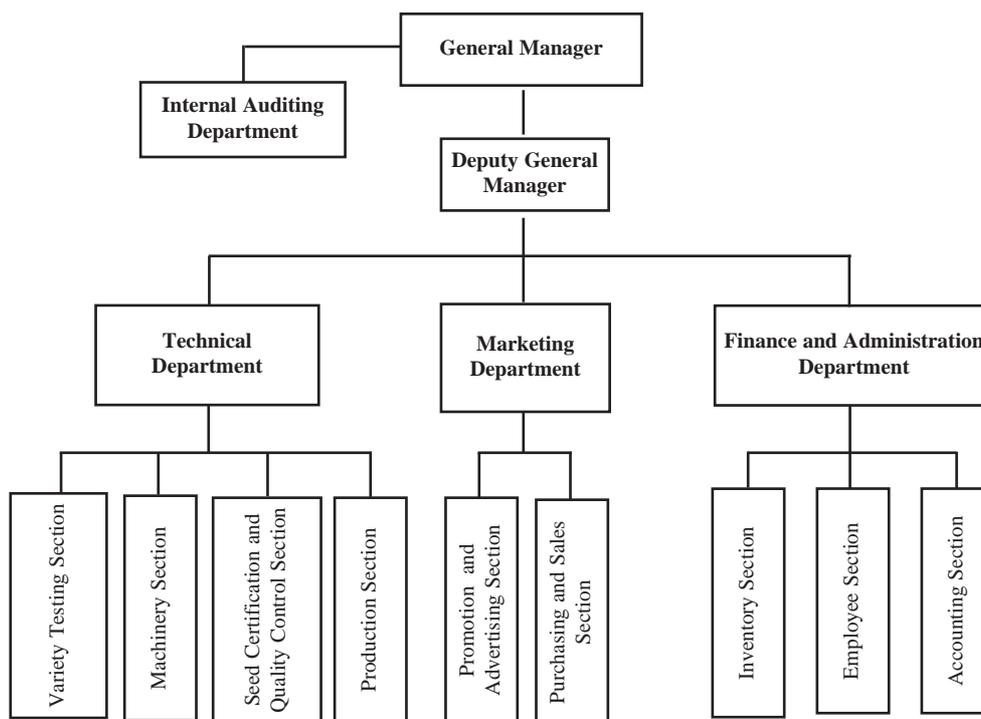
The activities of GSMC will include the following:

- Sourcing and screening of field crop varieties
- Maintenance of selected varieties
- Development of an outreach program to improve seed security of small holders in rain-fed areas. This will be carried out through the selection and multiplication of indigenous varieties and landraces where necessary.

GSMC will obtain seed samples of cereals, legumes and other crop varieties from breeders and farmers in Yemen as well as from institutions abroad. The Corporation will then contract public or private organizations to conduct on-farm variety trials. The information generated by the trials will be analyzed by consultant specialists hired by the project. Once adapted varieties are identified, GSMC will initiate a seed multiplication program at community level. Hybrid varieties will also be included in its trials and demonstration program.

### Onion and Vegetable Seed Company (OVSC)

SASP will provide technical assistance to enable continuation of breeding work for onions and vegetables. Support will be also given in seed production, processing, packaging and marketing as shown in the organizational structure (Figure 2).



**Figure 2. Organizational structure of the Vegetable Seed Company.**

### Potato Seed Company (PSC)

The PSC's major activity will be to continue providing, multiplying, and selling quality potato seed. Its second activity will be to continue providing support to private potato seed producers, through its Seed Potato Development Unit (SPDU).

### **Developing Small-scale Seed Enterprises**

Most of the cropping area in Yemen is rainfed and cultivated by smallholders who grow traditional varieties and landraces. This large informal seed market will be a target of the new GSMC since past formal sector efforts have not influenced the uptake of improved seed by small farmers in rural communities. To do this, GSMC will establish an outreach program, which will carry out the following functions:

- Obtain information on seed-related constraints, existing seed production systems and aspects that need improvement.
  - Collaborate with growers in the demonstration of seed quality and performance of adapted varieties.
  - Introduce a program for small-scale seed production by individual farmers, cooperatives and farmers' groups.
  - Establishing a seed distribution and marketing system.
- To set up smallholder enterprises as alternative seed suppliers, some form of initial support will be needed, which include the following:
- Cost sharing in conducting feasibility studies on investment opportunities.
  - Offering low-cost loans with flexible repayment terms as part of a scheme for promoting agricultural development.
  - Supporting the establishment of small farms for multiplication of foundation and certified seed.
  - Providing short-term and medium-term advances through the Agricultural Credit Bank. The bank could be used as an outlet for seed produced by these small enterprises.
  - Providing extension services.
  - Helping in processing operations and quality control services.

The management of these enterprises will require leadership skills, as well as the capacity to plan, organize, lead and control activities. A suggested structure could comprise an expert technical manager who will organize and control the overall activity and operations of the enterprise. The manager will report to a board of directors comprising experienced and knowledgeable persons, who will be chosen from among smallholders. There should be a link between the small enterprises and the formal sector in areas of screening of adapted materials, variety demonstrations and field days, and processing operations and quality control.

### **Conclusion**

For privatization to contribute to increased productivity in Yemen, small farmers and groups must have access to improved seed since they form a vast majority of the farming population. This will involve developing appropriate seed enterprises that are cost-effective in seed production and can deliver seed through local channels involving small-scale farmers.

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## **Alternative Seed Supply Systems in Ethiopia**

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### **Abstract**

Formal seed production and distribution in Ethiopia began in 1979 with the establishment of the Ethiopian Seed Corporation (ESC), which was restructured in 1994 and renamed the Ethiopian Seed Enterprise (ESE). As the main producer of certified seed, ESE currently provides 3.5% of national seed requirement. The bulk of seed used nationwide is farm-saved from harvests of previous crops, a practice that has existed for centuries. Agricultural research in variety development also has a relatively long history and several improved varieties of cereals, legumes, oilseed crops, fiber crops and vegetables have been developed. However, there is limited adoption of these improved varieties by farmers who practice traditional agriculture mainly because of the absence of appropriate seed delivery systems. The key objective of a new seed policy introduced by the government in 1993 is to encourage both public and private sector institutions to take part in seed production. Apart from the Pioneer Hybrid Company, which produces seed of maize hybrids, there is little private activity in the seed sector. An approach to privatization is to find ways of motivating farmers in the informal sector to participate in commercial seed production and distribution activities that are capable of serving the needs of farming communities. This paper discusses experiences from some attempts that have been made in developing small-scale seed enterprises for farmers in rural areas of Ethiopia. These relate to efforts by non-governmental organizations (NGOs), ESE and the National Seed Industry Agency (NSIA).

### **Introduction**

Agriculture plays an important role in the Ethiopian economy, accounting for about 55% of gross domestic product (GDP), with crop production contributing up to 60%. The agricultural system is, however, characterized by low technology, low productivity and natural disasters such as drought and irregular rainfall.

There is a long history of agricultural research in the country, as well as efforts in promoting the use of improved seed, fertilizer and extension services as part of government agricultural strategy. However, most farmers belong to the informal sector where there are no organized seed delivery systems. Farmers produce crops using farm-saved seed with limited adoption of improved varieties.

Formal seed production and distribution in Ethiopia began in 1979 with the establishment of a parastatal Ethiopian Seed Corporation (ESC). This organization was re-structured in 1994 into a semi-autonomous Ethiopian Seed Enterprise (ESE), which has a board of management that reports to the Prime Ministers office. ESE is the main producer of certified seed, besides Pioneer Hybrid Company, which produces seed of hybrid maize. ESE operates a successful contract scheme for maize and wheat seed using large-scale state farms. Although a strategic crop such as *tef* is grown on 32% of the cultivated land, seed production of this crop is not attractive to large commercial farmers for several reasons. As

a result, small-scale farmers are now being encouraged by ESE to grow seed of this crop on contract (Kugbei and Fikru 1997).

The government of Ethiopia introduced a national seed policy in 1992, which encourages indigenous private enterprises to participate in the production and distribution of improved seed. As further support to privatization, in 1997, the government enacted a seed council and a new regulation (No. 16/1997) which requires compulsory registration and work permits for private sector enterprises.

### **Crop Production Sub-sector**

Agriculture is the backbone of the Ethiopian economy, employing 85% of the working population and supplying 70% of raw materials used in the agro-based industry. The sector also generates about 90% of the country's foreign exchange earnings in which coffee alone accounts for 60% of the total value of agricultural output.

The farming system falls into three major categories: smallholder mixed farming, pastoral and commercial farming. Smallholders account for about 96% (10 million tonnes) of the total annual output of cereal crops. The average landholding per household is about one hectare, indicating the subsistence nature of farming (Table 1).

About 56% of the total land area of 111.6 million hectares are arable. However, only 15% of this area are under cultivation with annual and perennial crops. Cereals are the most important food crops occupying about 76.6% of the total cropped area (Table 2). Other crops grown include pulses, oil crops, coffee, fruit trees, and cotton.

The country faces a formidable challenge to feed its fast growing population and to gradually reduce the dependence on food aid. This requires an integrated approach to technical, socio-economics and policy issues affecting agriculture. Major factors worth considering include increased adoption and utilization of improved farming technologies, control of crop pests and diseases, effective exploitation of irrigation potential, improved research-extension linkage, improved post-harvest handling and storage, and improved infrastructure. Other wider issues such as poverty, environmental degradation, population growth, low and erratic rainfall, and scattered farmers should be considered.

**Table 1. Crop landholding in Ethiopia.**

<b>Item</b>	<b>Quantity</b>
Households ('000)	8516
Total crop land ('000 ha)	8687
Crop landholding per household	1.02

### **Seed Sub-sector**

Despite a long history of organized seed production in Ethiopia, the uptake of modern varieties by farmers is very low (about 3%). Up to 85% of total seed production is still accounted for by small farmers who save their own seeds of traditional varieties and are involved in informal exchange. The roles of various institutions, which constitute the seed sector of Ethiopia, are as follows:

- *Biodiversity Institute*  
Collection, conservation and characterization of germplasm.
- *Ethiopian Agricultural Research Organization*  
Variety development and associated technologies.

**Table 2. Estimated area of main crops.**

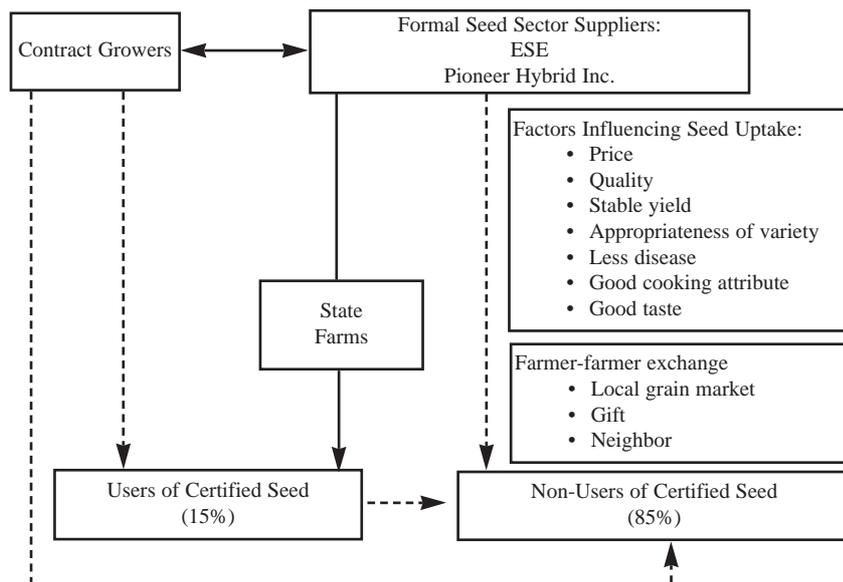
<b>Crop</b>	<b>Area 000ha</b>	<b>%</b>
<b>Temporary crops</b>		
<b>Cereals</b>		
<i>Tef</i>	2097.4	
Barley	825.54	
Wheat	882.06	
Maize	1280.68	
Sorghum	1252.41	
Millet	269.35	
Oats	45.11	
Subtotal cereals	6652.55	76.6
<b>Pulses</b>		
Horse bean	336.72	
Field pea	180.46	
Haricot bean	101.17	
Chick pea	144.92	
Lentil	65.12	
Vetch	75.95	
Subtotal pulses	904.34	10.4
<b>Oil crops</b>		
Noug	223.33	
Linseed	112.72	
Rapeseed	14.19	
Groundnut	13.26	
Sunflower	4.78	
Sesame	9.39	
Subtotal oil crops	377.67	4.3
<b>Other temporary crops</b>		
Fenugreek	13.9	
Spices	45.5	
Potatoes	38.71	
Others	81.31	
Subtotal other temporary crops	179.42	2.1
<b>Total temporary crops</b>	<b>8113.98</b>	<b>93.4</b>
<b>Permanent crops</b>		
Chat	86.76	
Coffee	202.13	
Enset	223.81	
Cotton	14.88	
Tobacco	1.27	
Fruits	17.82	
Other permanent crops	26.4	
<b>Total permanent crops</b>	<b>573.07</b>	<b>6.6</b>
<b>Total all crops</b>	<b>8687.05</b>	<b>100</b>

Source: Agricultural Sample Survey 1995/96 (91988 E.C., volume IV)  
Report on Crop Land Utilization.

- *Plant Quarantine Service*  
Regulatory control on movement of plant and seed materials.
- *National Seed Industry Agency*  
Enforcing national seed industry policy, seed regulation, variety release, quality control, certification and other regulatory functions related to seed activities.
- *Ethiopian Seed Enterprise*  
Seed multiplication, processing, distribution and marketing.
- *Pioneer Hybrid Seed Inc.*  
Seed multiplication, processing, distribution and marketing.
- *Commercial and Small-scale Farmers*  
Contract seed growers and users of seed for grain production.
- *Distributors*  
Wholesaling and retailing of seed.

The Institute of Agricultural Research (IAR), now called the Ethiopian Agricultural Research Organization (EARO), has released several improved varieties of the major crops, that is, wheat, barley, maize, sorghum, and tef. The Institute provides breeder seed which is multiplied into prebasic seed at farms operated by the Ethiopian Seed Enterprise. Further multiplication into certified seed is carried out on contract with large state farms. Processing is undertaken at five seed cleaning plants located in different areas of major crop production in the country.

The formal sector marketing system has not included small farmers since ESE sells seed directly to large state farms. There is no obvious commercial linkage between these state farms and small farmer seed-using communities (Figure 1).



Note: Loose or less-defined linkages are represented by broken lines

**Figure 1. Seed supply linkages between formal and informal sectors in Ethiopia.**

The current decentralization process is aimed at creating direct marketing links between ESE and small farmers for seed of desired crops and varieties. This requires effective participation of all parties: ESE, contract growers, intermediaries, and seed-using communities.

Besides Pioneer Hybrid Inc., there is no other significant private sector investment in seed production. Both Pioneer and ESE use similar channels to distribute seed, with limited involvement of private seed dealers (wholesalers and retailers). The willingness of intermediaries to engage in commercial seed trade depends on the margins they expect to earn. An efficient seed delivery system ensures fair returns to the growers and intermediaries, yet making seed available at prices the customers can afford and are willing to pay. In this regard, it is important that seed producing organizations maintain low overhead costs so that they can sell seed at reasonable price to farmer end-users and thereby increase the market for quality seed.

### **Promoting Small-scale Seed Enterprises**

A number of efforts in promoting small seed businesses include:

#### **Smallholder Contract Scheme for *Tef***

In Ethiopia, *Eragrostis tef*, commonly known as *tef*, is a major staple crop which occupies about 24% of total cultivated land. For this crop, maintaining pure unmixed seed of white and red varieties is as important as obtaining high yield, and poses a specific problem in seed production. Here, smallholders seem to have a comparative advantage since the seed they produce is usually of better quality than that coming from external sources. Attempts by ESE to produce *tef* seed on contract with state farms have resulted in large stocks of “mixed material” that is of far inferior quality compared with the *tef* crop produced from local varieties by small famers (Kugbei and Fikru 1997).

Since the consumer preference is for unmixed *tef* seed, which fetches a higher price, ESE has begun contracting smallholders as growers. According to a contract agreed with the growers, ESE provides foundation seed on credit, to be recovered from the grower’s certified seed after harvest, and gives technical advice through its extension agronomists and extension officers of the Ministry of Agriculture. After harvest, ESE buys back up to 80% of the grower’s output at a premium of 10% above the prevailing market price for grain, thus providing a source of income and an assured market for the grower. At the same time, the grower is encouraged to trade in seeds by distributing some of the seed through local exchange mechanisms to other farmers in the community. The gross margin earned in 1997 by a typical grower with a yield of nine quintals per hectare is shown in Table 3. This level of profitability indicates that farmers can make a good business by growing *tef* seed on contract.

This approach is aimed at developing a sustainable seed-supply system, which will strengthen the informal sector and link it effectively to the formal sector, while building indigenous capacity in quality seed production. Following good results from the *tef* scheme this approach has been extended to food barley, another smallholder crop in Ethiopia for which no external seed supply system exists.

**Table 3. Gross margin for *tef* seed production (in Ethiopian birr<sup>†</sup>).**

	Value
<i>Output Value</i>	
Mean yield in quintal (100 kg)/ha	9.0
Price/quintal/100 kg	175.00
Total Revenue	1575.00
<i>Variable Cost (ha)</i>	
Seed	113.40
Land preparation	330.12
Seeding	20.02
Fertilizer	390.00
Herbicide	47.00
Hand weeding	20.24
Harvesting	100.16
Collection and stacking	20.32
Transport from field	20.16
Threshing and bagging	40.20
Transport to village	10.54
<i>Total cost</i>	1112.16
<i>Gross margin</i>	462.84
<i>Gross Margin of Total Cost (%)</i>	41.62

<sup>†</sup> 1 USUS\$ = 7 Ethiopian birr ; 1998 official rate.

Source: ESE/ICARDA Survey Data 1997.

### **Farmer-Based Seed Production and Marketing Scheme**

The National Seed Industry Agency (NSIA) implements a Farmer-Based Seed Production and Marketing Scheme (FBSPMS) in collaboration with the Regional Agricultural Bureau of the Ministry of Agriculture, which focuses on the informal sector by organizing and supporting groups of farmers in seed production (NSIA 1997). This is a five-year technical assistance project from the International Development Agency and the International Fund for Agricultural Development.

Groups of farmers are supplied foundation seed, other inputs and small-scale seed cleaning equipment through a revolving fund. They also receive training and technical advice from the extension service. Up to 1400 small farmers participated in the Scheme during 1997, the first year of implementation, by producing seed of various crops on about 700 hectares. It is expected that a number of successful small-scale seed producers, who would be established by the end of the five-year duration of the project, will be capable of producing and distributing seed within farming communities in a sustainable manner.

### **Conclusion**

A national policy that promotes privatization of the seed sector was recently introduced in Ethiopia. The main formal sector supplier (ESE) is largely under state control although it is

being encouraged to commercialize its operations. The formal seed industry, which comprises the Ethiopian Seed Enterprise and Pioneer Hybrid, supplies only a small proportion of the national seed market. A majority of the farmers are in the informal sector because they are not covered by the formal sector and cultivate some crops which are not commercially attractive to large seed organizations. This leaves a gap in the market for quality seed, which could be best supplied by localized small-scale enterprises in the rural areas. Efforts in encouraging such enterprises are at early stages of development and require initial support from the government, development agencies and NGOs. Of particular importance are access to foundation seed and related inputs, basic equipment, credit, technical and business management training, and extension advice.

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## **Small-scale Seed Production in Central States of Sudan**

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### **Abstract**

In Sudan, individual farmers are the main producers of seeds for local vegetables, fodder sorghum, alfalfa and maize with the family members supervising all farming operations. Most farmers are not engaged in seed production per se, but sell or exchange part of their grain harvest as seeds to neighboring farmers and local traders. The farmer-producers maintain a good relationship and contact with the merchants and traders, to whom they sell seed for cash or exchange in kind, and obtain other agricultural inputs on credit. Besides individual farmers, a few other enterprises produce and market seeds on a small scale. This paper discusses the operations of two such enterprises in central Sudan, namely, The Agriculturist Cooperative and Agribusiness Sudan. These enterprises finance contract growers and provide them with seed, other inputs and cash advances on credit. The two enterprises borrow from commercial banks to pay for seeds that the growers produce. The interest rates charged by the banks are high and there are delays in disbursing loan installments, but the enterprises often have no alternative sources of loan capital. Field inspection and seed certification are carried out by the Seed Administration, an independent government organization. To improve informal seed production, the Ministry of Agriculture should provide information, seed extension service, and help organizing seed producers into cooperatives or associations. The agricultural banks play a major role in promoting seed businesses by giving loan to farmers at reasonable interest rates and by helping in seed distribution.

### **Introduction**

Sudan is the largest country in Africa with an area around 2.5 million km<sup>2</sup> and a great diversity in climate and soil types. The arable land is estimated to be around 217 million feddans (90 million hectares). The area under irrigation exceeds four million feddans, with 30 to 35 million feddans under rainfed (MAF 1997). Agriculture is the backbone of the national economy and forms the major component of GDP. It accounts for more than 90% of export earnings and employs about 80% of the labor force. Sorghum, wheat and millet are the main staple food crops, while cotton, groundnut, sesame and sunflower are the principal oil crops. The seed crops grown in the various states of the country (Map 1) are shown in Table 1.

The formal seed sector in Sudan comprises the Agricultural Research Corporation (ARC), agricultural corporations of the Ministry of Agriculture, seed companies and individual seed growers. Agricultural corporations in irrigated areas produce cotton, wheat, sorghum, groundnut, and some vegetable seed, while the seed companies produce sorghum, wheat and maize, some of which are hybrids (Table 2). The National Seed Administration (NSA) was formerly the main formal sector organization. Following the dissolution of NSA in 1997, its seed production units were transferred to the Arab Sudanese Seed Company (ASSCO) as shares of the government. The seed certification component of NSA was renamed the Seed Administration, which is now responsible for official seed testing, field inspection, enforcement of field, and seed standards, as well as control of seed import and export.

**Table 1. Seed crops cultivated by farmers in different states of Sudan.**

State	Seed crops cultivated by farmers	
	Main Crops	Other Crops
Northern	Beans, herbs	Wheat, vegetables
Nahr Al-Nial	Potato, alfalfa, fodder sorghum	Local vegetables, maize, onion, beans
Khartoum	Onion	Vegetables, potato, fodder sorghum
Gezira	Onion, wheat	Sorghum, groundnut, cotton
Sennar	Maize, sorghum, okra, jew's mallow	Radish, eggplant
Blue Nile	Maize, sorghum	Millet
White Nile	Jew's mallow, cucumber	Onion, radish, fennel
North Kordofan	Groundnut,	Sesame, cowpea, karkade
West Kordofan	Groundnut, melon	Sorghum
South Kordofan	Sorghum, sesame, cowpea	Groundnut
North Darfor	Millet	-
West Darfor	Millet, cowpea	Groundnut
South Darfor	Millet, cowpea	Sorghum, wheat
Kassala	Onion, fodder sorghum	Sorghum
Gedarif	Sorghum, sesame, millet	-
Red Sea	Sorghum	-
Southern States	Sorghum, groundnut, maize, finger millet	-

**Map 1. States of Sudan.**

**Table 2. Proportion of seed produced by various institutions in Sudan.**

Crop	ARC and Corporations	Corporations	Companies	Farmers
<b>Irrigated Sector</b>				
Cotton	100	-	-	-
Groundnut	-	5	95	-
Sorghum	-	30	10	60
Wheat	-	60	10	30
Sunflower	-	-	98 (import)	-
		2 (local)	-	
Local vegetables	-	3	2	95
<b>Rainfed Sector</b>				
Cotton	100	-	-	-
Groundnut	-	-	-	100
Sorghum	1	-	9	90
Millet	1	-	-	99
Sesame	-	-	5	95
Maize	-	-	5	95
Sunflower	-	100	-	-

Source: Update from Ali, M.H. and O.A. Yousef 1995.

The informal seed sector consists mainly of rural farming households, which are the main seed producers in the country since the amount of seed produced by the formal sector does not exceed 10% of total national requirement (Ali and Yousef 1995). In nearly all cases, these households produce their own seed. In the event that their own sources are not enough, they either buy seed from neighbors or exchange other commodities for seed. Good seed producers are well known in each community, from whom other farmers obtain seed when in need. Neighbors observe each other's farm and are able to decide whom to buy seed from for the next season. Once assured of a good source from which to get seed, farmers may sell their entire harvest as grain and purchase seed later. Producers who make the best business are those who specialize in seed production of specific crops and become well known for this by other farmers. Buying and selling between farmers depend on kinship and the commitment of a buyer to pay cash or repay in kind. Farmers in the traditional sector grow sorghum, millet, groundnut, sesame and local vegetables (e.g., okra, cucumber, pumpkin and jew's mallow) under rainfed conditions. These crops are mostly open-pollinated varieties, from which farmers can produce seed for many years without a significant decline in quality.

Financing farm operations through formal loans is one of the major constraints to seed production in Sudan. Bank loans are scarce and are associated with high interest rates, slow disbursement of loan installments and inflexible re-payment terms. The banks usually phase agricultural loans into three installments for sowing, weeding and harvesting. There are three main types of loan systems available for farmers, namely, *salam*, *murabaha* and *sheil*. The *salam* loan was introduced in 1990 as an Islamic formula that allows repayment in grain at harvest. The bank and the borrower agree on the price and amount of grain to be repaid at harvest. Variety of grain is not important for repayment once the grain delivered is of the right weight and acceptable quality. This type of loan is not suitable for seed production since there is no price advantage of seed over grain. The *murabaha* loan is similar to that

operated by non-islamic banks in terms of interest rate (about 36% per annum). The *sheil* is a traditional loan system in small farming communities, which is based entirely on relationships between farmers and merchants. Farmers mostly depend on revenue derived from sale of stored crops or animals to finance agricultural operations. Sometimes, they contact local merchants to lend money or obtain agricultural inputs on credit for repayment in the form of seed. In this case, the farmer borrows seed and money at sowing time to repay in-kind at harvest. The farmer agrees to repay three bags of grain at harvest for one bag of seed taken at sowing time. This makes good business for merchants since the price of a bag of sorghum seed at sowing time is usually about three times that at harvest.

### **Examples of Small-scale Seed Enterprises in Sudan**

In Sudan, there are few small-scale seed enterprises that produce and sell seed. The finance and management of two such enterprises are described below:

#### **Sennar Agriculturists Cooperative**

The Agriculturist Cooperative was established in 1992 and became registered officially in 1996. The main objectives of the Cooperative are:

- Help members to borrow from the banks.
- Organize contracts with companies trading in farm machinery and land preparation.
- Organize irrigation for its members.
- Market seed on behalf of the members.

The Cooperative comprises 80 members; each allocated a land area of 15 *feddans*. The cooperative uses 800 *feddans* each season to produce sorghum. This means that every member can cultivate five *feddans* with a crop he or she prefers. Most of the members grow okra and jew's mallow seed on this area, which the cooperative helps to market.

For each season, a cooperative committee reviews and approves the seed production plan, taking into account the pattern of seed demand in the previous season. Members of the committee are nominated at an annual meeting to help the agricultural manager in implementing the seed production plan. The cooperative divides the area among these committee members, who will each supervise operations in a specified area and report to the agricultural manager. Seed Administration inspects the farm upon request from the Cooperative. Use of labor in irrigation, sowing, weeding, roguing and harvesting is planned jointly by the respective committee members. Discussing field activities is easy since most members of the cooperative live in Sennar area. The committee receives 2% of the production as an incentive for its role in supervising activities. After harvest, the cooperative hires processing facilities of ASSCO at Sennar for seed cleaning.

In 1997/98, the average seed production per *feddan* was about 600 kg for sorghum, 200 kg for okra and 400 kg for jew's mallow (Sennar Agriculturists Cooperative 1998). The quantity of seed of different sorghum varieties produced and marketed between 1991/92 and 1997/98 is shown in Table 3. It illustrates the demand by farmers of improved sorghum varieties such as Gadam Hamam and Dabar 1/1/1/1, which were released in 1975 for areas under irrigation and locations with annual rainfall above 600 mm. Both varieties can be combine harvested. The variety, White Dwarf Milo, has higher gluten content than other varieties and is well known by farmers in the Gezira State. Wad Ahmed variety was released in 1995 for irrigated and rainfed areas above 600 mm while Ingaz and Tabat were released in 1996 for irrigated areas. In 1996 and 1997, the demand for Hageen Dura 1, the first sorghum hybrid

**Table 3. Seed of sorghum varieties produced and sold by Agriculturists Cooperative.**

Year	Sorghum Varieties	Quantity (tonne)	Purchasers
1991/92	White Dwarf Milo	480	Gezira Scheme, New Halfa Agric. Corp., and farmers
	Gadam Hamam	60	
	Dabar 1/1/1/1	20	
1992/93	White Dwarf Milo	450	New Halfa Agric. Corp., Blue Nile Corp and farmers
	Gadam Hamam	80	
	Dabar 1/1/1/1	10	
1993/94	White Dwarf Milo	430	Gezira Scheme, New Halfa Agric. Corp., and farmers
	Adam Hamm	30	
	Dabar 1/1/1/1	10	
1994/95	White Dwarf Milo	300	Gezira farmers, farmers
	Gadam Hamam	150	
1995/96	Wad Ahmed	250	NGOs (SC/US), El Suki Scheme, Blue Nile Corp.
	White Dwarf Milo	160	
	Gadam Hamam	80	
1996/97	Wad Ahmed	360	NGOs (SC/US, CARE) Gezira farmers
	Ingaz	60	
	Tabat	70	
1997/98	Wad Ahmed	400	NGOs (SC/US, CARE) Gezira farmers and White Nile SMOA
	Tabat	60	
	Ingaz	20	
	Hageen Dura 1	10	

released in 1986, began to rise. It is difficult to plan seed production and marketing because there is insufficient information on farmers' preference and adoption of newly released varieties.

The costs of direct seed multiplication of sorghum is SP 250,510/t (Table 4), which is higher than the cost of contract production, which is normally about SP 237,600/t. The price for contract seed is based on the market price for grain plus a 20% mark-up. Therefore, with the average grain market price of SP 18,000 per 90kg bag, the seed grower receives SP 240,000/t. This gives a profit margin of SP 2400/t, which is equivalent to only 1% of the grower's costs. The 1998 sale price for sorghum seed was SP 450,000/t at Sennar (equivalent to US\$ 236.8/t). Taking the total cost of SP 396,510/t, the net margin for the Cooperative was SP 53,490/t (equivalent to 13.5% of total cost). With this margin, the Cooperative could afford to pay the growers a higher premium price since contract production looks very unattractive with a margin of only 1%. In addition, the risks and uncertainties associated with the contract from sowing to harvest are borne solely by the grower.

**Table 4. Direct production cost of sorghum during the 1997/98 season.**

Operation	Costs	
	'000 SP†/t	Percentage
<i>Seed Multiplication Costs</i>		
Irrigation water	30	
Land preparation	50.60	
Weeding and roguing	32	
Fertilizers	60	
Field inspection	3.58	
Harvesting	58.33	
Supervision	6	
Labor and Guards	10	
Sub-total multiplication costs	250.51	63
<i>Post-Harvest Costs</i>		
Taxes and local fees	45	
Processing	33	
Storage	5	
Marketing (2%)	9	
Bank interest (36%)	54	
Sub-total post-harvest costs	146	37
<i>Total</i>	396.51	100

Source: Sennar Agriculturists Cooperative Reports.

† SP = Sudanese pound (1 USUS\$ = 196 SP; 1998 official rate).

It is the cooperative committee that authorizes the president and the treasurer to negotiate with banks for *salam* and *murabaha* loans. The *salam* loan is usually used to cover field operations (mainly labor costs) and repayable in kind, while the *murabaha* loan is for inputs, machinery and equipment, and post-harvest operations (e.g., purchase of raw seed), but is paid back in cash. During the 1997/98 season, the cooperative was successful in convincing the banks to repay the *salam* loan after sale of final processed seed instead of immediately after harvest.

The Cooperative also attracted customers of former NSA and new ones such as non-governmental organizations (NGOs) and the State Ministry of Agriculture (SMOA). It is rather unfortunate that in January 1998, a ministerial decree reallocated the areas used by the Cooperative to the Arab Sudanese Seed Company. The Cooperative still awaits replacement land to resume its seed production activities.

## 2. Agribusiness Enterprise

This enterprise was established in 1982 by two agriculturists, one of who is an agronomist/seed specialist. They started seed production as contract growers of NSA for producing wheat and fodder sorghum (Abu 70). Initial financing was from the Agricultural Bank of the Sudan (ABS) and marketing of the product by NSA according to the contract agreement. Loan repayment was in kind and served as a form of ready market. According to the loan agreement, Agribusiness Enterprise had to deliver the value of the loan in kind to the ABS stores. This agreement helped Agribusiness to market its products easily until 1988.

With time, seed production of Agribusiness Enterprise has expanded and diversified to include vegetable seed and other non-traditional crop seeds such as green gram and cowpea. Agribusiness has a permanent support staff. The field staff are contracted agriculturists with good experience in seed production, while the support staff are agronomists. Like in the case of Agriculturist Cooperative, the seed farms of the Agribusiness Enterprise are inspected by the Seed Administration on request. The seed production plan of Agribusiness Enterprise during the 1998/99 season is shown in Table 5. The figures in the Table are the areas under direct and contract seed production, which are eligible for field inspection by the Seed Administration. Growers of local vegetable seed cultivate additional areas under a special arrangement with Agribusiness Enterprise, although these are relatively small (between 0.5 and 2 *feddans*) and at scattered locations.

**Table 5. Agribusiness Enterprise seed production plan for 1998/99.**

Crop	Variety	Area ( <i>feddans</i> )	Location	Production Type
Sorghum	Geshaish	1000	Sennar	Direct
Sorghum	Serena	50	Rahad	Contract
Sorghum	Tabat	40	Rahad	Contract
Sorghum	Tabat	30	Khartoum	Direct
Sorghum	Wad Ahmed	20	Rahad	Direct
Maize	Mujtamaa 45	60	Gash Delta	Direct
Maize	Mujtamaa 45	240	Rahad	Direct
Cowpea	Buff	50	Khartoum	Direct
Groundnut	Barberton	80	Khartoum	Contract
Okra	Pusa Sawani	36	“	Contract
Onion	Sagai	20	“	Contract
Cucumber	Jamoueia	10	“	Contract
Jew's mallow	Local	30	“	Contract
Purslane	Local	5	“	Contract

Source: Agribusiness Sudan Report 1998.

Production plans are based on historical sale of seed, the level of carry-over stock and the demand for particular varieties. NGOs in south Sudan are interested in Serena sorghum. Agribusiness negotiates contracts for seed production with landowners and provides machinery for land preparation, seed, fertilizer and harvesting equipment. The landowners are responsible for all field operations including weeding and harvesting of the crop, for which they sometimes request a cash advance. The Enterprise deducts such advance payments from their harvest and purchases the remaining seed at a 20% mark up above the grain price.

Agribusiness Enterprise relies much on self-financing of its direct and contract seed operations, although it usually approaches banks at harvest time to take a loan for paying the contract growers. At the time of harvest, the Enterprise usually mortgages the seed crop to the bank for a six-month *murabaha* loan in the form of cash to pay the growers. The crop is normally harvested between December and February and processed seed is sold between June and July.

In this case, contract seed production is also cheaper than direct production, with cost of contract seed as SP 237,600/t and direct production as SP 451,070/t (Table 6) for sorghum. Contract production cost for sorghum was calculated based on the grain market price (SP 20,960 per 90 kg each bag) plus 15% premium. The selling price for sorghum seed marketed in Khartoum was SP 600,000/t. Although direct production is more expensive in Agribusiness Enterprise than in Sennar Agriculturist Cooperative, the proportion of field and post-harvest costs are identical in both cases.

Agribusiness Enterprise sells its products at two locations in Khartoum State, with NGOs such as UNICEF and some SMOA as its main customers. The Enterprise has strong relationships with NGOs, especially those working in South Sudan. However, with intense competitions from the Arab-Sudanese Seed Company and the Agriculturist Cooperative, Agribusiness Enterprise has a substantial carry-over stock of seed each year, which is sold at grain prices to repay loans or finance procurement costs for contract seed.

Agribusiness has a good reputation for producing quality seed. The flexibility in decision making and the shift from direct to contract production partly explains the success of its seed operations.

**Table 6. Agribusiness Enterprise cost of production for sorghum in the 1997/98 season.**

Operation	Costs/feddan (SP <sup>†</sup> )	Costs/tonne (SP)
	'000 SP/t	Percentage
Seed Multiplication Costs		
Irrigation water	50	
Land preparation	57.14	
Weeding and roguing	57.14	
Fertilizers	34.29	
Field inspection	3.07	
Harvesting	71.43	
Supervision	18	
Labor and guards	10	
<i>Sub-total multiplication cost</i>	301.07	67
Post-Harvest Costs		
Taxes and local fees	45	
Processing	33	
Storage	18	
Bank interest (36%)	4	
<i>Sub-total post-harvest cost</i>	150	33
<b>Total</b>	<b>451.07</b>	<b>100</b>

<sup>†</sup> See Table 4.

Source: Agribusiness Enterprise Report 1998.

## **Conclusion**

Since up to 90% of seed used nationwide is produced by the informal sector and from open-pollinated crop varieties, the government has important roles to play in supporting improved seed production as these crops attract little interest from large companies.

Two key areas that need government intervention are encouraging the development of small-scale seed enterprises and providing quality control services as assurance to producers and seed users. Small enterprises have advantages over large companies in supplying seed to farmers in Sudan. First, small businesses could incur less overhead costs and may therefore earn reasonable profits in crops with low margins. Second, there is a wide agro-ecological diversity with location-specific crops/varieties and niche markets, which could be best served by small enterprises. Third, poor infrastructure means that seed has to be carried over short distances with low transport costs, which small businesses normally do better. Fourth, seed production and distribution within village communities may require kinship relations and varied means of exchange, which are best managed by small-scale enterprises.

For small enterprises to plan and operate successfully, they may need information on farmers' varietal preferences, which could be collected by extension agents within the Ministry of Agriculture. These agents could also help in organizing seed producers into cooperatives and associations that could distribute seed and other inputs such as fuel and fertilizer. Other forms of support and incentive could include access to technical packages, new varieties, extension messages, field inspection/seed testing services and prize awards to best-performing seed producers in the various states.

Small-scale enterprises can also be good sources of quality seed of appropriate varieties that are required by NGOs, which support households in war-affected and drought-prone areas of the country with seed and tools.

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## **Alternative Seed Provision in Zambia: Integrating Formal and Informal Activities**

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### **Abstract**

During the last 30 years, Zambia has made significant progress in developing a formal seed sector. Public sector research has provided most of the crop varieties used by Zambia Seed Company, a parastatal which undertakes commercial seed production. This formal seed system, however, concentrates on hybrids of crops such as maize, sunflower and sorghum, while it vigorously promotes the use of cotton, potato, wheat and soybean. In addition, there is the informal sector, which constitutes a vast majority of the farming population that live in remote areas and cultivates crops such as cowpea, millet, open-pollinated sorghum, cassava, sweet potato, bambara nut, etc. These crops have been given limited attention in terms of commercialization and market development although they form the basis of national food security at the household level. Seed companies find such crops commercially unattractive to multiply and distribute partly because of poor infrastructure and scattered farmers. Furthermore, the farmers tend to save their own seed year after year with no significant yield loss, since many of the crops are self-pollinated. Seed companies are not assured of repeat sales from these crops and therefore ignore these areas, which often face severe seed shortage and food insecurity. In an attempt to improve this situation, the government is promoting on-farm seed systems as a means of providing seed to resource poor farmers in the rural areas. This paper discusses the results of a number of small-scale seed projects in the 'informal sector', which are funded and executed either by the government or by non-governmental organizations (NGOs). In general, repayment of seed loans is poor and marketing is weak, which raises serious doubts about the sustainability of many of the NGO efforts in seed delivery.

### **Introduction**

With the decline in the mineral sector and recent efforts in market liberalization, Zambia is rapidly becoming an agricultural-based economy. At present, approximately 60% of the ten million total inhabitants depend on agriculture for their livelihood. Over-dependence on the mineral industry in the past has limited agricultural activities, which currently account for only about 5% of the total export earnings and just 18% of the gross domestic product (UNDP 1997). Of the total land area of 750,000 km<sup>2</sup>, about 80% are arable, with good soils and abundant supply of water. There is therefore a huge potential for increasing productivity. Small-scale farmers who constitute about 70% of the total farming population dominate the sector. Besides wheat and soybeans, which are grown mainly by large farmers, smallholders account for up to 65% of the output from other crops (UNDP 1997).

During the last 30 years, there has been a significant development of the formal seed sector in Zambia. Organized and well structured plant breeding and improved seed multiplication, distribution, and marketing systems characterize the formal sector. Seed companies

(both local and multinationals) that operate within the provisions of seed laws and set certification standards dominate this sector. In the informal sector, on the other hand, seed is exchanged between farmers and there is no organized system of production, distribution and marketing. In recent years, NGOs have made efforts to strengthen the informal systems in various parts of the country as part of agricultural development objectives.

Public sector crop research provides most of the improved varieties used. The parastatal seed-producer Zambia Seed Company concentrates on hybrids of maize, sunflower, and soybean. Seed production of minor crops such as cowpea, millet, open-pollinated sorghum, cassava, sweet potato, and bambara nut have not been given much attention (Table 1) although these make a significant contribution to household food security particularly in the remote areas where a majority of the farming population live. Seed companies do not find such crops commercially attractive for two main reasons. First of all, it will be difficult to distribute seed to numerous farmers in scattered locations separated by poor infrastructure. Second, farmers can save seed for several years without a significant drop in yield potential since most of the crops are open-pollinated. Seed companies are therefore less willing to operate in rural areas since they are not assured of repeat sales, even though these areas experience severe seed shortage and food insecurity, while improved varieties are widely available in research stations.

**Table 1. Seed supply from formal sources.**

Crop	Seed from formal sources
	%
Cotton	80-100
Maize	70
Soybean	60
Sunflower	35
Sorghum	10
Millet	5
Cowpea	5
Rice	3
Groundnut	1
Bean	1
Bambara nut	0
Sweet potatoes	0
Cassava	0

Source: Zamseed Viability Study 1997.

Zambia experienced severe droughts during the 1991/92 and 1993/94 seasons and a partial drought in 1994/95, which resulted in a total grain deficit of about 800,000 tonnes (Berg et al. 1998). This led to severe food shortage, which forced farmers to consume their seed stocks and left nothing aside for sowing the following season. Widespread crop failure meant that small farmers, in particular, could not pay back loans and were consequently denied further credit. Loss of livestock also reduced the availability of cattle for draught power during land preparation. Grain import introduced new pests into the country, notably the larger grain borer. In addition, import and distribution of free seed of generally non-adapted varieties had further negative impact on agricultural productivity and seed shortage.

Both formal and informal sectors should play a part to ensure seed availability at all levels and to cope better with emergency situations. Despite state involvement in the formal sector and efforts by NGOs in the informal sector, the use of seed still remains a major bottleneck to household food security in Zambia. This situation can only be improved through cost-effective seed production of both major and minor crops, development of efficient delivery mechanisms, and means of stimulating demand for increased seed utilization.

### The Formal Seed Sector

Zambia Seed Company relies on varieties from the Research Branch of the Ministry of Agriculture, Food and Fisheries (MAFF) according to a memorandum of understanding, which gives the company exclusive rights to multiply and distribute all varieties developed by the government research system. However, following the introduction of market liberalization in 1991, several commercial seed companies including Pannar and Cargill have entered the seed industry. At present, players in the formal seed supply system are as follows:

- Public and Private Crop Research Organizations
- Seed Companies (Zambia Seed Company, Pannar, Cargill, etc.)
- Seed Stockists and Agents
- Seed Control and Certification Institute (SCCI)
- Extension Service
- Zambia Seed Producers Association

Interrelationships between the various components of the formal seed supply system are illustrated in Figure 1.

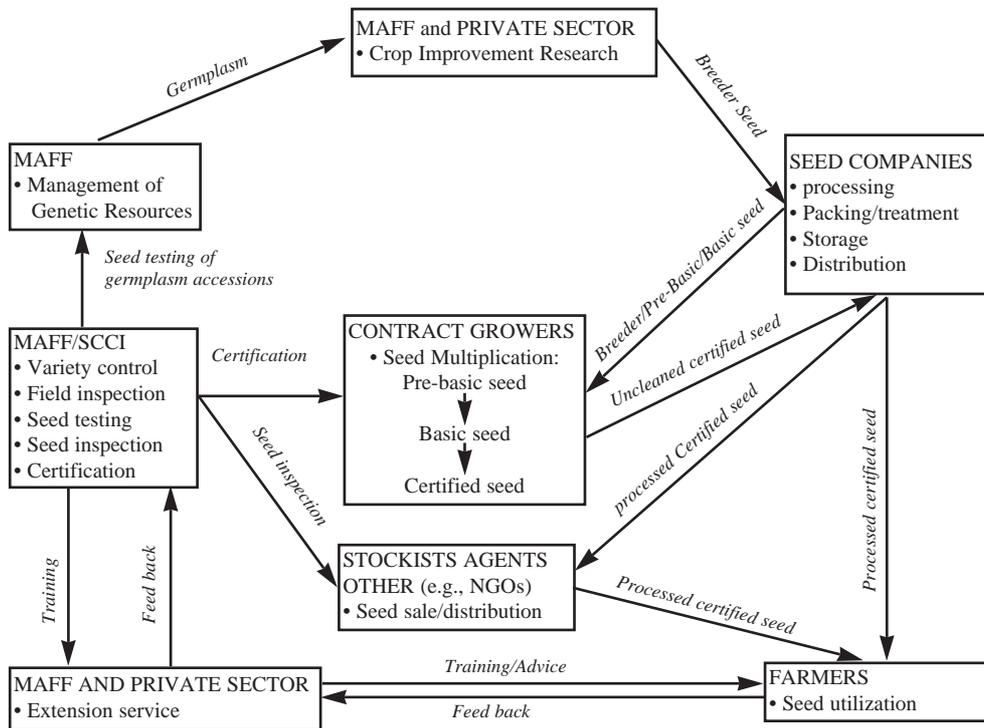


Figure 1. Formal seed sector linkages in Zambia.

The Crops and Soils Research Branch of MAFF is responsible for supplying breeder seed via commercial seed companies, while taking responsibility of maintaining some varieties to ensure a continuous seed flow. In conjunction with various private participants, the government extension service and NGOs are in charge of advising farmers in seed production and business management. A similar approach is used in enforcing minimum quality standards.

### **Seed Policy**

There is no clear seed policy in Zambia even though a Plant Variety and Seed Act exists. A general agricultural policy, which does not specifically address the status of the seed sector, has been formulated. It is now being increasingly recognized that the country needs a defined policy, which guides the growth and direction of the seed sector as well as provide a means of specifying the appropriate roles of collaborating institutions. Once ratified, the policy would provide a framework of institutional arrangements at various levels for planning, regulatory control, and training.

### **Variety Evaluation and Release**

According to the Plant Varieties and Seeds Act, only released varieties are subject to certification in Zambia. The release process involves two stages lasting two seasons. First, is the pre-release stage. It is when an application is made to the release committee for a new variety to be officially tested. At this stage, a technical questionnaire is completed and an authentic sample of the variety is submitted for distinctness, uniformity and stability (DUS) and other performance tests. Next, an application is made to release the variety following satisfactory test results.

The functions of the variety release committee are as follows:

- Review and formulate release procedures
- Recommend candidate varieties for official testing
- Release varieties for multiplication and marketing
- Recommend varieties for inclusion in the national variety register and list
- Withdraw obsolete varieties from the recommended list
- Approve nomenclature of varieties

A majority of varieties on the recommended list come from the Research Branch of MAFF and the rest are from multinational seed companies. All released varieties are a result of extensive evaluation at locations across the country.

### **Seed Certification**

Seed certification is regulated through a provision contained in the Plant Varieties and Seeds Act of 1995. Regulations for the informal sector are flexible and related mainly to purity and germination tests according to quality declared seed (QDS) standards. While the formal seed sector produces seed of different categories, the informal sector mainly produces open-pollinated crop varieties which fit well into the QDS scheme. This scheme does not usually include hybrid seed crops which require rigorous field inspection and laboratory tests.

All seed lots for compulsory certification are tested for purity, germination capacity, weed and moisture content. The existing regulations specify five crops for compulsory certification: maize, sorghum, wheat, soybean, and sunflower. These regulations are being amended to limit compulsory certification to hybrid seed crops only. At the same time seed standards are being developed specifically for the informal seed sector.

There are regulatory and standard guidelines for both crop management in the field and for purity and germination testing in the laboratory. Field management standards include requirements for rotation, isolation distances, rouging and control of pests and diseases. Registration of seed crops enables SCCI to monitor seed quality in the production areas. Crop registration has so far been restricted to well-established growers. There are plans to develop a registration system for the informal sector as well, since on-farm seed multiplication is spreading widely and there is a need for proper coordination.

With amendments to the Plant Variety and Seeds Act, private seed testing laboratories would be able to obtain license to function as agencies of the government seed-testing laboratory. In addition, personnel of seed companies would be licensed as seed inspectors, samplers, and analysts. A Plant Breeders Rights Act has also been drafted for possible enactment soon.

### **Seed Marketing**

The seed marketing system is well organized for hybrid maize, soybean and wheat, which works through a network of seed stockists and agents at provincial and district levels. This system, however, does not supply small-scale farmers.

The poor road infrastructure in rural areas increases marketing and distribution costs such that small-scale farmers who are located far from the main rail and trunk roads have limited access to improved seed. This has resulted in farmers using recycled seed with poor quality. In addition, collapse of the Co-operative Unions has further limited the capacity of reaching small-scale farmers at village level since these organizations were the main rural seed marketing and distribution channels.

In the past, companies supplied seed on credit to larger seed stockists who were mainly the co-operative unions that in turn also gave seed out to farmers on credit. However, with the liberalized economy and the removal of subsidies, credit has become very costly and seed companies now prefer to supply seed on consignment. According to this arrangement, companies supply seed to stockists or agents who will only pay and remit cash for the actual quantity sold. After the sowing season, the companies take back all leftover seed for re-testing and safe storage.

Seed companies themselves sometimes conduct direct seed sales from their own centralized shops or use mobile sale units. Since grain marketing and the credit administration have been liberalized as part of economic reform policies, the removal of credit has increased the cost of borrowing for resource-poor farmers. The price of fertilizer has also risen beyond the means of small farmers. The situation has been worsened further by the collapse of lending institutions particularly the Lima Bank, which could no longer make business and eventually closed.

The past heavy subsidy on maize and other farm-gate products created demand because of low artificial prices. As this is no longer the case in a liberalized market, there has been a drastic drop in demand for seed coming from the formal sector. For instance, sales for hybrid maize seed have declined from an average of about 15,000 to 3,000 tonnes, with a drastic reduction in cultivated area.

### **The Informal Seed Sector**

In the early 1980s, extension messages focused strongly on the use of certified seed for increased productivity. As a result, many rural farmers had high expectations the potential

benefits this new seed supply system would bring and minimized the extent to which they saved their own seed.

However, with time, it became evident that the formal seed system could not meet the seed demand of the small-scale farmers, especially for minor crops such as small grain cereals, pulses, and legumes, which are very important for household food security. Since the formal sector could not deliver seed of the right types to the remote areas in the right quantities and at the right place, the Zambian government, together with other stakeholders, recognized the need of an integrated seed system which could take into account activities of both formal and informal sectors.

### **Activities of NGOs**

Four major reasons account for a recent proliferation of NGOs in seed marketing:

- A lack of interest among commercial companies in marketing seed of less profitable crops such as sorghum, millet, and food legumes.
- An attempt to replenish seed stocks which had been depleted as a result of recurring drought.
- Promoting improved sowing materials, in particular, the open-pollinated varieties.
- A general consensus among NGOs that part of the explanation for low productivity of small-scale farmers in remote areas is limited access to improved varieties of traditional food crops.

The current activities of NGOs concentrate on a number of crops in which the private sector has a commercial interest (e.g., millet, groundnut, indigenous vegetables, sweet potato, cassava, beans, cowpea, bambara nut, sorghum). These activities have ranged from seed distribution in the form of seed handouts, cash sale, and commodity exchange to capacity building in which farmers are advised on how to better produce, process, store, and market seed at the rural level. The strategies used are as follows:

#### ***(i) Seed Loans***

The common seed marketing strategy among NGOs has been through seed loans, which are paid back mainly in kind or cash. The terms of re-payment vary, with some NGOs asking for seed in return, while some require grain. The largest NGO in Zambia, Program Against Malnutrition (PAM), distributes seed on loan to small scale farmers who are expected to pay back in kind at the time of harvest. PAM promotes early maturing and drought-tolerant varieties of maize, and in particular, small-grains of sorghum and millet. It distributes seed to small-scale farmers through a network of collaborating NGOs including the Program to Prevent Malnutrition (PPM).

#### ***(ii) On-farm Seed Production***

Other NGOs such as CARE International, Africare and Lutheran World Federation (LWF) distribute seed and assist farmers to multiply seed for their own use as well as for sale to other farmers within local communities. Africare distributes seed to agents for cash sale and receive a specified commission. CARE International and LWF distribute seed directly to farmers who are expected to pay back a specified amount of seed at the time of harvest depending on the quantity of seed received. The seed distributed comes from both traditional and improved varieties.

There are several problems associated with on-farm seed production, which include the following:

- *Weak Marketing*  
A number of farmers engaged in the on-farm seed production are not generally motivated to produce more seed due to a problem of marketing. There is no organized market for these crops and farmers find themselves sometimes stuck with seed. The situation is made worse by the lack of credit facilities and the desire by one-time buyers to re-cycle seed.
- *Poor Storage Facilities*  
In the absence of seed banks in many pilot areas, storage has become a problem and often leads to deterioration of seed while it is in the hands of the farmer.
- *Inappropriate Processing Equipment*  
Processing of seed at the on-farm level is still a major problem and often labor-intensive.
- *Inadequate Training in Seeds*  
Many seed farmers have limited knowledge and skills in modern seed production, processing, storage, and marketing.
- *Weak Coordination*  
Various NGOs operating in the country use different approaches to seed delivery with little coordination of efforts, strategies and agenda of activities. Some NGOs give free seed while others demand payment in some form. The latter often tend to be ignored by farmers regardless of their good intention.
- *Unwillingness to Buy Seed from On-farm Growers*  
There is limited market expansion since farmers sometime doubt the quality merits of seed available with neighbors who are on-farm producers.
- *Lack of Clear Policy on the Informal Seed Sector*  
As earlier stated, there is no official seed policy in the country especially the informal seed sector, which cannot develop without strong policy support. At present, there is no enforcement of seed quality standards in this sector mainly because of the remote location of production areas. Consequently, seed sold by this sector tends to be of low quality. There is a need to define some quality standards, which are enforced by the participating NGOs and extension officers.
- *Poor Loan Recovery*  
Many projects in the informal seed sector experience poor loan recovery whether in cash or in kind. This factor is recognized as one of the key bottlenecks to the expansion of on-farm seed production. NGOs distribute improved sowing materials to either individual farmers or to farmer groups. The latter approach is becoming more popular because of higher recovery rate and potential for sustainability. According to most NGOs, the possibility of defaulting is less among women, who tend to be risk averse and seek security in whichever activity they undertake. This experience also indicates that women tend to participate better in collective responsibility and have longer-term vision.

### **Conclusion and Recommendations**

There have been attempts to integrate the formal and informal sectors in Zambia as a means of ensuring effective seed delivery to small farmers. However, much more effort is needed, particularly in the supply of breeder and basic seed and in variety maintenance. The following areas will need specific attention:

### **Seed Production**

- Selection and training of seed producers.
- Provision of quality start-up seed to producers, regular extension in key aspects of seed production including isolation practices, rotation, roguing and weeding.
- Varietal purity during multiplication to avoid admixtures.
- A flexible quality control system for the informal sector.

### **Seed Processing**

There is a need to ensure that once seed is harvested it should be properly processed, treated, and packaged in designated quantities. One of the major resentments of seed in this sector is that it does not 'look' like seed because producers tend to handle seed in the same way as grain which makes users not to readily recognize any difference in value. Since the physical purity is poor in some cases, there is a need to provide seed producers with simple equipment for processing and treatment. Credit facilities to obtain necessary seed treatment chemicals should be investigated.

### **Seed Storage**

There is a need to consider the appropriateness of on-farm storage systems currently promoted by other institutions in the country, including communal stores or seed banks.

### **Seed Distribution and Marketing**

Distribution and marketing still remain major concerns in seed delivery. Problems of markets and market information have been reported in several cases as limiting factors because seed growers have difficulties in finding reliable markets for their seed. One of the problems is that there is a high level of seed re-cycling among farmers. Furthermore, farmers who buy seed to produce grain do not often have a ready market to sell any surplus production and are therefore not motivated to buy new seed. Consequently, there is a need to promote value-adding technologies that can stimulate demand such as improving the physical purity of seed through appropriate processing methods. Commodity exchange should also be promoted at the local level as another means of exploiting more market potential for seed.

### **Seed Security**

At the national level, seed security interventions are made by Zambia Seed Company, which keeps a buffer stock on behalf of the government. There are no substantial seed security strategies at the community level although village seed banks are now being established as part of initial efforts in this regard.

On the whole efforts to develop a sustainable informal seed supply system is proving difficult. Most projects operate on the basis of goodwill and therefore tend to collapse as soon as such support is discontinued. In fact, most seed delivery activities started as charitable efforts during the period of drought and other emergencies and are therefore difficult to commercialize. NGOs which are active in this area need to harmonize strategies especially in giving out loans, such that farmers are encouraged to think of seed as a business and not as purely a social good.

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## **Session IV**

### **Working Group Discussions**

## **WORKING GROUP REPORTS**

The objective of this final session of the workshop was for all participants to jointly review deliberations that took place during the plenary sessions, and to identify key themes for further analysis in small working groups. It was a general consensus that the focus should be on examining different ways in which small-scale seed enterprises (SSEs) arise, and analyze these in terms of the crop dimension, factors that influence growth, the profit potential, and sustainability of the business environment.

The session produced some lively discussions and a good exchange of views, which resulted finally in classifying seed enterprises into three broad categories depending on their mode of formation as: (i) SSEs formed in the seed market for high-margin crops, (ii) SSEs dealing in seed of less profitable crops, and (iii) SSEs formed in response to seed insecurity within farming communities.

Three working groups were formed, each with a chairman and a rapporteur, to deliberate the three issues separately, and to prepare a presentation to the entire workshop participants for final discussion and ratification. The highlights and main conclusions from the group discussions are summarized below:

### **GROUP 1**

#### **Small-scale Seed Enterprises for High-margin Crops**

Seed crops with high margins are those with the following characteristics:

- The selling price of seed is much greater than the prevailing market price for grain of the same crop.
- The producer is able to predict seed demand and plan production accordingly.
- The seed-using farmers find it technically difficult to save their own seed and therefore repurchase seed frequently.
- The revenue from seed sale covers total cost of production, leaving a good profit margin for the producer.

Examples of high margin crops include hybrids of cereals (e.g., maize, pearl millet, hybrid vegetables, cotton, and potatoes).

Since the profit potential is high, seed enterprises dealing in these crops have profit maximization as their main objective. There was a debate about the expected profitability of such enterprises, and the following simple Table was suggested as a general compromise on the broad margins that could be expected.

**Suggested profitability of small-scale seed enterprises for high-margin crops.**

	Percentage
<b>A. REVENUE</b>	
Seed sales	95
Other income	5
Sub-total	100
<b>B. COSTS</b>	
Field multiplication (contract growers)	50
Post-harvest operations (processing, storage, sales)	9
Management and administration	4
Sub-total	63
<b>C. PROFIT</b>	
Gross profit	37
Less interest/tax	9
Net profit	28

The following were suggested as essential features of small-scale seed enterprises dealing in high-margin crops:

- Enterprises should be market-oriented, producing seed strictly according to sales prospects and the capacity to sell directly to farmers.
- The business should be based primarily on seed sales. Other sources of income are possible; particularly the sale of related inputs.
- Ownership is limited to one or few persons in the beginning. This structure could expand as the business becomes well established and grows.
- Once successful, such businesses normally have the scope to expand fast.
- Enterprises tend to follow the formal sector approach, since the use of modern techniques requires close links with the formal sector.
- Since these small enterprises are usually in competition with large companies, they need to identify niche markets, which they can supply and service well.
- Since the market is usually small, enterprises should endeavor to make direct sale to farmers as a means of building good reputation, establishing trustworthiness and increasing market share.

To be sustainable, the enterprises must ensure:

- A reliable source of early-generation material.
- Production of high quality seed.
- Competitive pricing for seed.
- Good reputation within the seed-using community.
- Flexibility in responding to changing conditions, such as switching to new varieties or crops.

## **GROUP 2**

### **Small-scale Seed Enterprises for Less-profitable Crops**

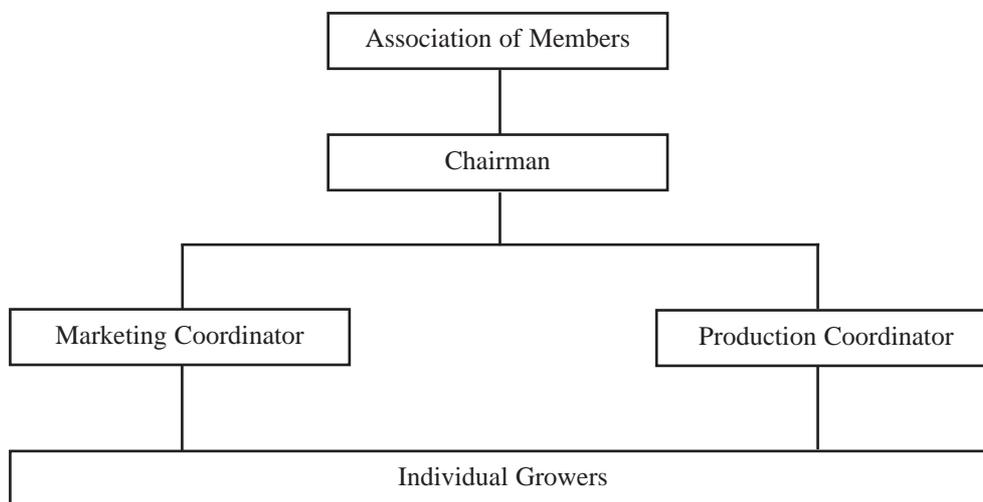
Seed of less profitable crops (self-pollinating cereals and legumes) receive less commercial attention from large seed companies because of small margins. Farmers usually produce their own seed of these crops, which is in competition with seed from external sources. Small-scale enterprises with low overhead costs are therefore best suited to supplying such seed as a primary activity. However, potential entrepreneurs wishing to enter the seed market for these crops usually face constraints including the following:

- Lack of credit from formal sources to finance start-up capital, since commercial banks consider these businesses risky because of their low profit potential. It is difficult for enterprises to generate enough margins to cover high interest rates often charged.
- For many crops, there is a shortage of new varieties, which can perform better than existing local varieties grown by farmers. A reasonable turnover of varieties is needed to encourage seed replacement by farmers.
- Seed using communities are usually dispersed over wide areas and isolated by poor infrastructure, making it difficult to be aware of merits of new varieties and quality seed.
- Insecure tenure practices mean that small farmers find it difficult to obtain title to land, and therefore cannot make long-term economic investments in land they occupy.
- Lack of cheaper machinery and equipment (e.g., seed processing facilities) that are appropriate to small-scale activities, which enterprises can operate more cost-effectively.

Seed enterprise formation needs to be encouraged for self-pollinating crops. These crops are usually very important in farming systems and food security of many countries. Therefore, reliable sources of quality seed are needed to enhance productivity of these crops. In this respect, government support is needed in various forms including the following:

- Support research in variety development so that enterprises and farmers have a wider choice of materials which are more productive, appropriate, and adaptable.
- Implement fair policies, which create a level playing field (e.g., in the provision of subsidies and tax exemption), for all producers and suppliers including state-owned parastatals.
- Strengthen the capacity of enterprises and farmers through effective extension services that provide appropriate training, demonstrations, and discussions.
- Create a liberalized market in which price distortion is removed.
- Enable small-scale enterprises to rent facilities (e.g., for seed cleaning and storage) and lease land under favorable terms where possible.
- Enforce quality standards and procedures that provide effective protection and encouragement to both seed producers and users.

The group considered creating a Seed Grower's Association as one main way in which seed production of self-pollinating crops could be organized. This structure will enable a greater mobilization of resources particularly of land, labor and capital as well as provide an effective lobbying mechanism with government. Furthermore, establishing essential linkages between the association and external institutions (e.g., research centers, quality control service, extension service and input supply agencies) seems easier. The following simple



structure of a Seed Growers' Association was suggested:

To be sustainable, the following were suggested as important preconditions:

- The capacity of the enterprise to grow and gradually diversify by incorporating some profitable activities that are in demand from customers. This could include expanding the crop portfolio to include hybrids and vegetables where applicable, or selling related inputs and tools.
- Maintaining a high level of seed quality, which farmers clearly regard as more superior to farm-saved seed and worth the money they spend on it.
- Increasing market share by extending to new areas, establishing new outlets and engaging the services of more distributors.
- Minimizing losses through effective cost control and monitoring of activities.

### **GROUP 3**

#### **Small-scale Enterprises Responding to Seed Insecurity**

In many cases, a breakdown in seed security occurs when there are natural disasters such as drought, floods, earthquakes, outbreak of pests and diseases, or man-made causes including wars and environmental destruction. The obvious consequences are loss of genetic diversity, displacement of populations and disruption in seed supply systems. Efforts to rehabilitate displaced communities and restore crop production capacities often create a sudden substantial demand for seed. Response could take different forms including large-scale relief efforts by governments and international agencies, or establishing seed projects as part of rural development programs. A long-term view may be for such projects to eventually emerge as seed suppliers on a lasting basis. At the same time, some small-scale entrepreneurs may also wish to enter the market to cater for location-specific needs with seed of locally adapted varieties.

Seed supply for disaster relief does not generally attract the interest of large private companies, since this often has more to do with fulfilling social obligations than meeting commercial objectives. It is, therefore, governments and development agencies including NGOs that are often the key players. Small-scale enterprises have a role to play where there is prospect for making business.

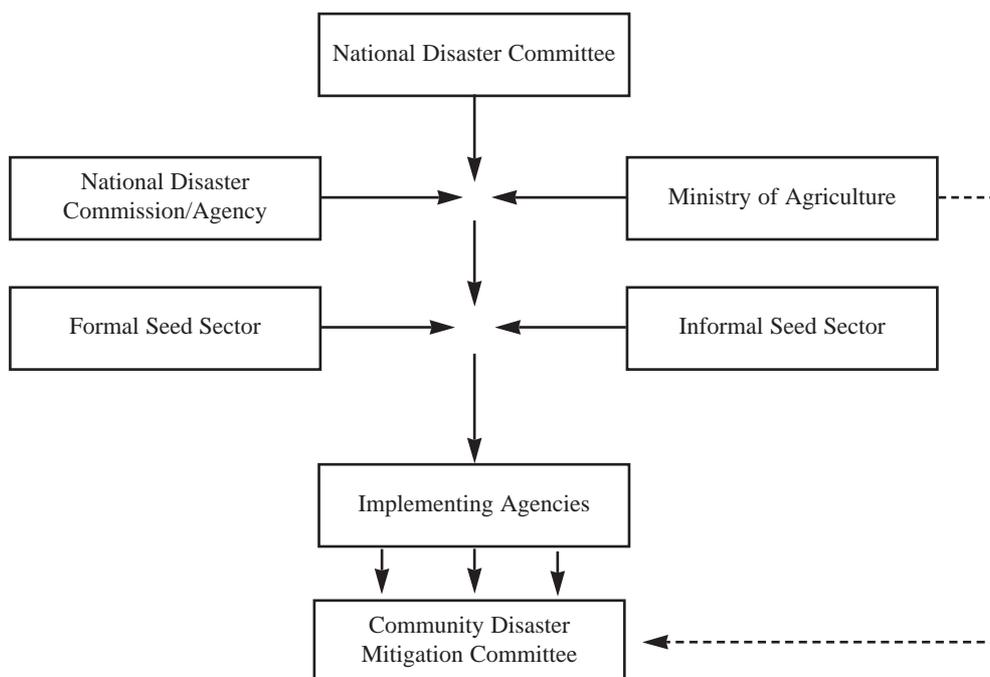
Enterprises attempting to supply seed during disasters are usually confronted with constraints such as the following:

- Limited political support or will to formulate and coordinate a rapid response program.
- Areas affected by disasters are normally characterized by poor infrastructure in the form of roads, bridges and general communication facilities.
- Limited information on the scale and magnitude of the disaster and how to reach those in greatest need.
- Existing legal structures and regulations (e.g., seed certification and phytosanitary requirements) could be a barrier to quick response.
- Conflicting objectives and practices by many interested parties who intervene in disasters.
- Insufficient knowledge about source of new materials and their attributes
- Limited resources (e.g., human and financial) to cope with the sudden demand for seed.

The group suggested three ways in which seed delivery to communities under disaster situation could be organized and implemented.

#### **Intervention at National Level**

This form of intervention is from the national level down to the community for alleviating the effects of disaster, for which the following structure was suggested:



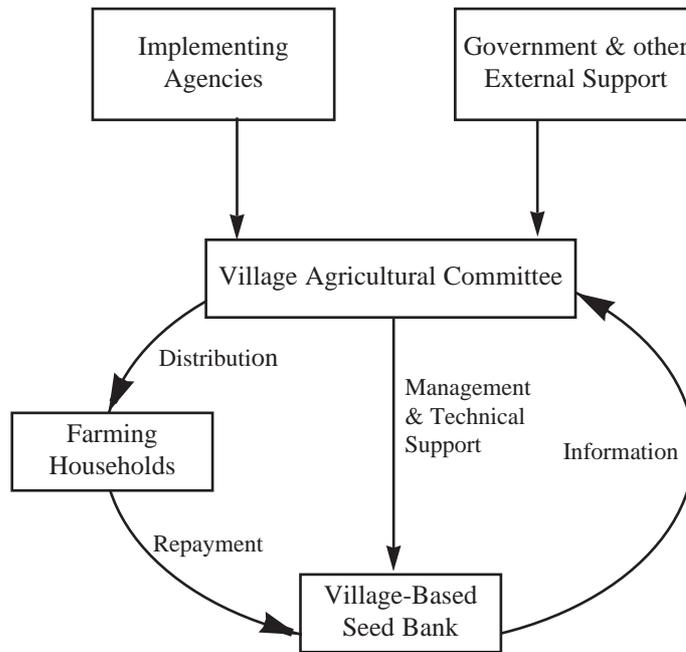
The functions of the national Disaster Commission or Agency should include:

- Continuous monitoring of situations and conditions that lead to disasters.
- Appraise the kinds of intervention required and assess the magnitude of the needs of the most vulnerable through a rapid, but comprehensive survey.
- Design an investment package which puts financial and logistic requirements in place.
- Look at various scenarios and identify sources of suitable seed from both formal and informal sectors.
- Coordinate intervention measures in consultation with the Ministry of Agriculture, which could harmonize activities of donors, implementing agencies, government departments, and representatives of affected regions.

The Community Disaster Mitigation Committee should physically coordinate and handle seed distribution at the village level. As much as possible, consideration should be given to delivering seed through agro-input supply channels in the regions as a means of building the capacity of local dealers within the community.

#### **Intervention at Community Level**

Intervention at the community level needs to involve key players including local institutions. A disaster situation can provide a good opportunity for developing more sustainable coping mechanisms such as local seed banks and small-scale enterprises. The issue of enterprises is taken up later as a separate item. The following structure of a local seed bank was suggested:

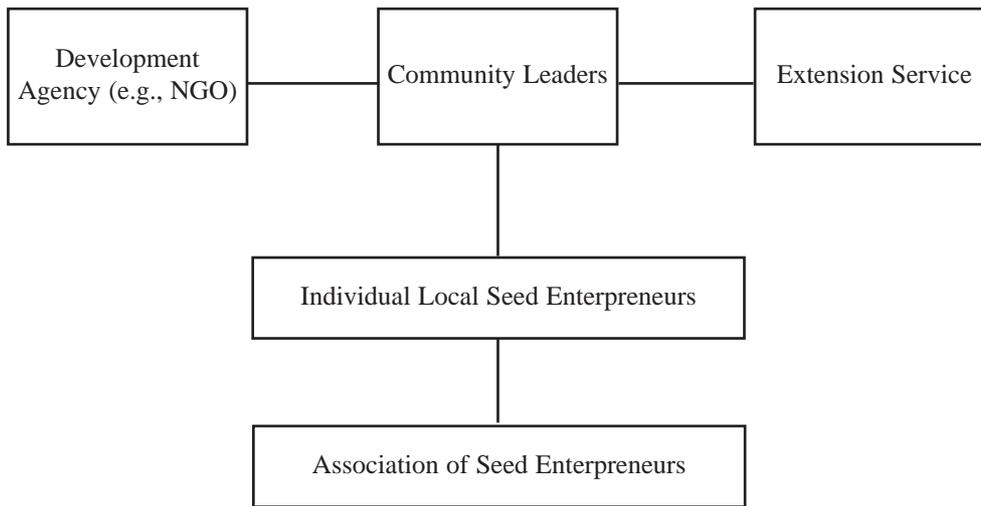


The responsibility of the Village Agricultural Committee is to organize the distribution of inputs and manage the seed bank. At the beginning of the season, the farmers are provided necessary inputs including seed, which are paid back in kind at harvest time. The quantity of seed collected should cover the cost of seed cleaning and expenses incurred in operating the seed bank. In addition, the committee may buy seed from farmers and keep this in secure storage for sale at sowing time. Support for storage and management could be sought from the government and NGOs.

The key to success is to be aware of the the need for such a facility, receiving cooperation from community members, and establishing effective links with the extension service and sources of support.

### **Opportunities for Local Seed Entrepreneurs**

Large-scale disaster situations may need a diversified form of seed supply. The increased demand for seed could encourage local entrepreneurs to undertake production and supply, although these are not easy without some form of external assistance. Development organizations such as NGOs could collaborate with extension officers to identify good farmers or traders who could become seed suppliers. Support could be sought in the form of training and investment capital from rural credit schemes where available. The following structure was suggested:



Successful entrepreneurs could be encouraged to form associations as a means of building a broader vision to seed supply and related inputs in surrounding communities.

## **The Prospects for Small-scale Seed Enterprises—A Synthesis**

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### **Introduction**

The papers presented in the workshop and here in its Proceedings provide a remarkable collection of information and experience. This final paper attempts to extract some generic issues that may be useful to others with interests in the same topic. They cover points raised in the papers and matters arising from the discussion.

Whether they are private entrepreneurs, cooperatives, farmers, or NGOs, these enterprises have a common interest in making quality seed available at a sufficiently low price to interest the farmer while generating sufficient revenue to sustain the enterprise. It is clear from many of the papers that this not an easy goal to achieve. Furthermore, the development context of these enterprises varies widely. Some are joining an expanding private sector to capture 'market share', as in India, or are in a state of transition from state support to commercialization, as in Egypt, while others are pioneering initiatives operating in very difficult environments, as in Uganda. The issues presented here are intended to be a checklist, without implying any order of priority.

### **The Conceptual Background**

Farmers obtain their seeds through two alternative supply channels. One is the organized or 'formal' seed sector comprising government organizations and private companies. The other is the informal sector, which includes farm-saved seed and various other local mechanisms such as exchange, barter, and local markets. Seed obtained from these informal channels does not usually come from planned seed production and usually represents a part of the grain crop. Both sectors have their strengths and weaknesses and it is recognized that they will always continue in parallel, except in crops dominated by hybrids where annual purchase from a formal supplier is essential.

The limitations of the formal sector, particularly in supplying the more difficult areas, are well known. They include high price, unreliable availability, and inappropriate varieties. Small-scale enterprises (SSEs) may provide a way to solve some of these problems. They represent an attempt to retain some of the local strengths of the informal sector but to institutionalize them within a commercial entity. They may be seen therefore as developments at the interface between the formal and informal sectors, extending the formal sector in a more pragmatic way and without incurring high costs. The alternative approach, also much talked of nowadays, is to 'strengthen the informal sector.' It is by no means clear how that should be done on a large scale without considerable effort. The attraction of enterprises is that they have some generic characteristics that can be described and 'transferred'.

### **Sustainability**

This is a still highly fashionable term, which has several different interpretations. In the ecological context, it refers to maintaining biological systems in such a way that they can

continue to provide the same level of outputs without excessive inputs. In the context of projects, it often refers to the ability of project activities to be assimilated into existing institutions and maintained by local staff when external funding ends. For the case of seed enterprises described here, the key criterion is the financial sustainability (or viability) of their activities. To achieve this, a continuing body of customers who will buy seed sufficiently, often to generate a reasonably consistent demand, is required. The ultimate decision on whether or not to purchase seed depends on a large number of factors that are mentioned in different papers here. We understand each of these individually, but collectively they constitute a quite complex background to the decision-making process and they increase the variability of demand. This is one of the major risks that the business faces because of the ever-present option of supply from 'informal' sources. Even in highly industrialized agriculture, seed demand can fluctuate, for instance, after a wet harvest season, farmers do not want to risk saving their own seed and prefer to buy, whereas if the harvest time was favorable, they may choose to save some grain as seed. Given that climatic fluctuations and market instability are often greater in the tropics, this presents an intrinsically difficult environment in which to develop a regular market.

### **Commercial Complementarity**

It would be foolish to try to build a new business on a single risky product such as seed. The traditional suppliers of seed in **developed** countries were mostly agricultural merchants or cooperatives who provided a range of items needed by the farmers. By doing this, the volume of business can be increased, thus reducing overheads, **and** the risks are reduced because even if one product makes a poor contribution in one year, others may still provide sufficient revenue. This horizontal diversification of the business is a classic strategy to reduce risk as discussed in the background paper on managing risks in small seed enterprises. It may also increase the technical complexity of the business but in general, other agricultural inputs are easier to handle than seed.

We can also consider this diversification in a positive way because seeds, and especially new varieties, have the potential to generate interest among farmers in a way that other inputs seldom do. Thus seeds may be seen as a 'magnet' to attract interest, even if much of the revenue is generated by other products, equally necessary but less exciting. Placing small variety demonstrations at the company headquarters or at key locations is thus a powerful technique to raise farmers' interest. This may extend to active participation in variety evaluation, as explained later.

### **Cash Flow**

Cash is the lifeblood of a business and cash flow is therefore of supreme importance. It is especially critical in the seed business, which is strongly seasonal in character in most localities. The prompt payment of growers is vital for maintaining their loyalty and securing their crops yet it causes high cash demand in a short period, which may not be recouped for several months after. This emphasizes the importance of cash flow forecasting as an essential part of financial planning, as discussed in the introductory paper on this subject. It is common for even large established seed businesses to require a bank overdraft at this time, but that may be difficult for a new enterprise to obtain, and interest rates may be high. Having complementary enterprises may in a way offset this problem. For example, milling

grain or crushing oilseeds are services which will be required after harvest and which may generate continuing cash flow when no seeds are being sold. In locations where there are two main cropping seasons each year, the cash flow situation may be easier to manage.

The need for cash liquidity also highlights a key difference between projects and enterprises. Projects are mostly concerned with disbursing funds according to a prescribed schedule. Therefore, supervising expenditure is important but little or no attention needs to be given to revenue. In complete contrast, enterprises start with little liquid assets and must be concerned with revenue from the very beginning. Furthermore, they cannot offer credit because they need cash now and the risk of non-payment of credit is very serious. Therefore, the terms of business for a new enterprise may be tough, and certainly not what can be offered by the government and development agencies for which credit was often a way of life. As a result, they made it harder for commercial businesses to enter the market if farmers have become conditioned to life on credit often to compensate for the poor prices they were paid for their produce.

### **Safety Net Funding**

When an enterprise is in the establishment phase, it is vulnerable, just like a seedling. A short period of stress can be fatal, whereas a larger organization would have the internal resources to survive. Therefore, we may easily anticipate a situation in which an enterprise, which is basically making good progress and doing the right things, may be killed and disappear during a single season of financial stress, thus losing all the future benefits it might have delivered. Furthermore, the initial investment in both financial and human energy may yield nothing. This is a very serious issue. It arises directly from the uncertainties of the agricultural markets in general and some specific attributes of seed in particular.

How can one avoid this situation? Ideally, one would like to see a mechanism by which new enterprises could have resort to a financial safety net on terms that are more favorable than bank overdrafts. However, that may be difficult to manage in practice. It would be necessary to assess the cause and extent of the financial gap and there would be a risk of malpractice. It seems therefore that the gap between the conditions of traditional development activities, in which funds are generously disbursed to ‘beneficiaries’ and the real life commercial environment, remains very wide and difficult to bridge. Well-supervised ‘micro-credit’ schemes may be able to assist an enterprise through these difficult times.

### **The Policy Environment**

National policies may seem far away from small rural businesses, but they may have a profound influence. One area of concern is the government policy on subsidies. We know that governments have often subsidized seed on a regular basis by covering the operational costs of parastatal organizations. However, they have also, in some countries, made erratic interventions such as providing ‘seed’ at very low prices, or even free, for political reasons. This is justified as a strategic intervention to help farmers in times of difficulty, but of course it may be disastrous for a new enterprise, unless the government has the wisdom to involve them in the ‘campaign’. We may hope that such extreme interventions will not happen so much in the future. Private companies may be nervous to invest much capital if they are unsure about the governments’ intentions. Some countries have developed and documented a seed policy that sets out their intentions for the sector. These documents could (and

should) incorporate a statement on encouraging ‘new entrants’ to the seed sector. This may provide reassurance to the emerging private sector. To summarize, the policy should be supportive to new enterprises and not obstructive.

### **The Regulatory Environment**

This is closely related to policy—many countries already have established seed legislation and regulations often modeled closely on systems developed in industrialized countries. They are based on field inspection and laboratory testing, usually forming part of a comprehensive package known as ‘certification’ which is intended to provide buyers (farmers) with some confidence in the purchase they are making. These systems are always run by government agencies and they may be considered as both guardians for the consumer or services for the seller. In some countries, these procedures are obligatory for seed sold through organized channels. The question is to what extent these regulations apply to the seeds being marketed by a new small enterprise. Ideally, one might say that all the procedures should be applied to assist both producers and sellers. In practice, this may not work if there is a small volume of seed being traded at a local level. It may be difficult to comply with all the procedures and the control agencies may simply not have the staff and facilities available to carry out all the work involved as they are often seriously underfunded.

If completely exempted from control, these enterprises may never learn the technology of quality assurance, which is an integral part of the seed business. If over supervised, then they may be dissuaded from further investment and there is also a risk of corrupt practice. In the past, the staff of regulatory agencies saw their role strictly as ‘policemen’ whereas in a more diverse seed market, there is a clear role for training and support for new seed suppliers. Clearly finding the right balance between education and regulation is not easy and it should be explored and perhaps supported as an element of policy.

### **Quality Assurance**

Quality control was mentioned as a regulatory issue in the previous paragraph, but there is also the closely-related question of quality assurance to consider. These terms are not always distinguished and it is helpful to consider them as two rather than different perspectives on the same subject. Quality control is imposed from outside (e.g., through official regulations) whereas quality assurance originates from within the producing organization as a way of ensuring the quality of its products. This is a concept of immense importance in every sphere of manufacturing nowadays with very high levels of monitoring and documentation being applied. The special relevance to seeds arises from the fact that it is not possible for purchasers to assess the quality or the identity of seeds accurately by visual inspection. Therefore, anything that can be done to reassure purchasers that the seed they are buying is good is a major support to marketing.

Certification labels are one solution, provided of course that all the procedures are followed carefully and seed is sold within a reasonable period of time after testing and sealing. However, it was noted above that this official system may not work so well for small producers in remote areas, so what should they do? There is much to be said for setting up a very simple seed testing system at an early stage in the development of the enterprise, to provide confidence in what is being sold, and to gain experience in the testing procedures. In Zambia, for example, flexible purity and germination standards have been introduced for

seed produced as part of ‘quality declared standards’ for seed produced in the less formal sector. It is also easier to deal with complaints from farmers if there is some internal record keeping in the company.

The facilities required for seed testing are not complicated, and in many warm climates, even temperature control is not essential, the ambient temperature being suitable for germinating most species. It should be noted also that such testing is not only to support marketing, but also provides important feedback to the production system by revealing which farmers or locations produce seed of highest quality. Any quality testing which is carried out on seed stocks must be linked to an identifiable batch (or lot) of seed. This calls for some systematic numbering system within the enterprise, which is also an important part of stock and marketing management. These are all routine procedures for formal seed organizations, but the point to understand is that any seed enterprise will quickly find a need to adopt these standard practices in the interest of sound management. In doing so, they take important steps towards being part of the formal seed sector.

### **Reputation**

Ultimately, all quality management procedures, whether internal or external, contribute to the development of a reputation among customers, which is of supreme importance in selling seed. Once a reputation for quality and reliability is established, it is a tremendous aid to the business and should be carefully protected. Aglow Agric. Products in Ghana emphasizes high quality standards as a means of building trustworthy relationships between the enterprise, its growers, and its customers. When a business is small, the personal reputation of the seller may be sufficient—being based on knowledge and trust. As the business expands, the number and distribution of customers increases so that direct link becomes unsustainable. It is then that an enterprise may seek a name or identity for its seed. It may still be the name of the producer and probably a mark or logo on the sack as well. At that point, the enterprise is at the threshold of establishing a ‘brand image’ of wishing to be in the wider market place with a recognizable product of assured quality.

This is a significant step in terms of market development because it also provides the basis for a competitive market in which different producers can compete not only on price for a standard commodity, but also on quality as well. To move away from commodities to branded products is a key step in seeds and in other spheres of marketing because in unbranded commodities competition is essentially on price, with little regard to quality considerations. Once this recognition of quality is achieved, it immediately presents risks of fraud as others may try to imitate for commercial benefit, or in the case of seeds, use sacks a second time. That is a harsh reality of a competitive market.

### **The Place of Small Enterprises in the National Seed Market**

While the focus of this meeting was on the small seed enterprises specifically, it is appropriate to consider how they may fit into the bigger picture of national seed supply. Although this is not true everywhere, we may take as a basic assumption that, as a result of economic and policy reform, a more diverse seed industry is developing in many countries and that SSEs are a part of that. But where do they fit into the bigger picture? There are several possibilities. The enterprise may already be selling seed as a local retailer for larger companies in which case seed production may be its key innovation. Alternatively, an enterprise that

starts with local production may then become an agent for national suppliers such as hybrid and proprietary varieties. This is a positive step for several reasons. It connects local companies to the mainstream seed trade and may lead to a stronger community of 'commercial seed interest' in the country. It may open up other marketing channels for locally produced seed. It may strengthen the SSEs by giving them a greater product range and the possibility of taking a retail margin on seeds that they could not produce themselves.

On the other hand, there may come a situation in which the SSE starts to lose business to larger organizations that have other strengths. This was noted in the case reported from Uganda, which, after some years of trading during a period of instability, found it difficult to maintain the business when more general economic progress returned to the country. There is no real solution to this. In a competitive, diverse market new entities arise, and others perish according to their comparative advantage in the prevailing commercial environment.

### **The Role of the 'Farmer Seed Growers'**

One type of enterprise that perhaps deserves special attention is the 'farmer seed grower' since this is perhaps closest to traditional systems and carries the least risk. The concept is that a farmer who has adequate land available grows a part of his crop with the intention of selling it for seed. In this way the farmer can 'add value' by retaining the seed until the next sowing season when there is a premium for good seed. At its lowest level, this is no different the selling of excess grain for seed which is the basis of much informal trade in seed. However, if the farmer takes positive steps to manage the seed fields to a higher standard, and takes special care of the seed after harvest, then he may truly be regarded as a 'seed grower'. There are several attractions to this approach. One is that the seed does not cost much more than grain to produce if the farm is already well-managed, and if part of the seed crop is not sold, it can be redirected to the grain market with minimum financial loss. Another positive feature is that the growing crops can be seen by nearby farmers either casually or at a 'field day' and this is a strong 'promotional tool' both for the variety and for good husbandry practices. The same is true for contract growers and indeed such growers may ultimately decide to become independent if they think they have sufficient experience and marketing contacts, as happened in Ghana.

A further strength of farmer-seed growers is that they are aware of local production conditions, for example the special needs of each variety, and can therefore back-up seed sales with good agronomic advice. They have 'field-credibility' in a way that other suppliers may find difficult to match. They also have a vested interest in providing good advice to support their seed sales, a linkage seldom found in the conventional 'extension' system.

### **Producer Groups and Local Seed Associations**

One problem, which may be faced by farmer-seed growers, is the relatively high cost of any capital equipment that they need for their own limited throughput. This may restrict their use of improved processing equipment. One way to overcome this is if a number of farmers form a group or association to share the capital cost of such equipment. This has many attractions in terms of improving production, providing quality assurance, and developing the market. For example, the group may move towards a common identity and quality standard and may trade surpluses within the group. However, such arrangements also introduce

risks of disputes among members. However, these arrangements may reduce the net benefit of collaboration if more time has to be spent maintaining coordination and harmony within the group.

### **Source of Varieties—the Access Issue**

We recognize that seed and varieties are closely linked in the minds of farmers. One of the main reasons why farmers decide to buy seed is to obtain a new variety. It is therefore appropriate to consider any special issues about varieties that may affect SSEs. One important concern is how the enterprise obtains its seed for further multiplication. If the enterprise is integrated into the organized system of seed production, and especially if its crops are being certified, the availability of such seed is a key issue. There is often a shortage of good quality basic seed and new, small enterprises may find themselves in a weak position in securing an allocation. This is a clear case where policy may have an important role by endorsing the principle of open access to public varieties in the ‘national seed policy’. Alternatively, if the enterprise does multiplication beyond the main controlled system, it may simply buy certified seed and multiply this for one or two generations as ‘commercial seed’, provided the seed control regulations permit this.

### **Increasing Variety Choice for Farmers**

Another variety consideration is whether an enterprise can easily multiply and market varieties which are especially suited to a limited geographical area. This is probably one of the strongest justifications for greater diversification in the seed market, particularly in countries where there is a wide range of agro-ecological zones. National parastatal companies were content to multiply a small number of varieties that could be grown over a wide area as this simplified their production and marketing arrangements. This policy was also supported by restrictive variety release procedures based on lengthy multi-locational testing which only allowed widely adapted varieties to be listed. As a consequence, many varieties suited to more specific environments were almost certainly set aside, because they were not officially listed or, if listed, they were not taken up for large-scale multiplication. In this way the results of breeding work were under exploited and the choice of varieties available to farmers was restricted, both of which are undesirable consequences. If small seed enterprises can help to overcome this by being more sensitive to the needs of local areas, they will do a service both to farmers and plant breeders.

### **Links to Participatory Breeding and Selection**

In the past, public sector breeding was highly centralized and generally used selection criteria appropriate to high potential areas. It therefore served the larger, uniform environments whereas the needs of more diverse and difficult environments were not so easily reflected in the variety development and evaluation system. In the past ten years or so, this has prompted a re-appraisal of breeding and selection methods for those areas in which greater weight was given to the real needs of farmers and consumers. This is reflected in the umbrella term ‘participatory plant breeding’ (PPB), although it takes many forms and is not the place to analyze that subject.

The interest for SSEs is that if variety selection becomes more devolved, it will almost certainly give rise to more varieties with specific adaptation. If it does not, then the PPB strategy is flawed. SSEs could therefore participate in the selection process by having an

area for trials and demonstrations, something that all formal sector seed organizations would do as a matter of routine. In this way they could identify the varieties best adapted to the local conditions, and hopefully to farmers' needs also. They could then take up the material for preliminary multiplication, wider testing, and eventually for commercial production of the best varieties. This is indeed an idyllic picture, of local evaluation directly linked to a multiplication system. Unfortunately, it may not easily fit with existing variety testing and registration procedures in many countries which are bureaucratic and conservative. A result of this is a constructive review of those procedures if PPB products are to be properly exploited, a topic that deserves much more objective and thorough analysis.

### **Seed Security and Emergency Supplies**

In some areas, the security of seed supply is a major concern, as a component of food security. Environmental stress or civil conflict may disrupt the harvest, and in some cases displaced persons may have to be resettled and fed for a short time, or even permanently, in a new location. Do SSEs have a role in coping with situations of this kind? In general, the seed requirement in these humanitarian disasters is urgent and there is insufficient time for serious reflection on needs. The relief agencies involved have to find something quickly. Small seed enterprises may of course be potential suppliers to this emergency 'spot market' and they may benefit from good prices paid by relief agencies. The Karamoja Seed Scheme in Uganda certainly developed a reputation for responding to this demand in Eastern Africa. However, it is, by definition, an unstable market and not a sound basis for regular business. The more prudent position would be to regard emergency seed orders as a 'bonus' to the regular trade – with perhaps some excess speculative production of varieties commonly sought by relief agencies.

As regards resettlement areas and the regular supply of seed to severely disadvantaged areas, there is certainly a case for organizing a production entity on semi-commercial lines, if only to promote efficiency and good management. This may also attract the interest of more alert farmers who may become involved on a continuing basis making the operation more sustainable. It would be much more worthwhile to create an endogenous capacity for seed production than to rely permanently on external suppliers.

Another perspective on this issue is the involvement of NGOs and other relief agencies in free seed distribution following disasters. While these agencies have a clear role in such relief work, they may continue with development activities after the crisis has passed as in the case of establishing a smallholder seed development project in Malawi. In that situation, it may be counter-productive if they continue to distribute free or highly subsidized seed. This may create dependency among the communities and it will certainly be very difficult for any enterprise to compete in the market or establish a financially viable business.

### **Social Objectives—Helping the Poorest**

Many development agencies and NGOs have poverty alleviation on their agenda. They may use this as a key criterion for assessing projects. Where do SSEs stand on this question? The provision of seed at low-cost for poor farmers is certainly a desirable objective, especially if it gives them access to new varieties. This is a weakness in the present system as explained earlier. However, it is expected to involve the poorest farmers directly in seed production, then more caution is required. These farmers will have less land, less flexibility-

ty in their production system and will have subsistence as a first priority. If anything goes wrong during the production season, they may find it difficult to keep the seed crop separate. Therefore, the production of seed by the poorest farmers, though attractive in principle, may bring many difficulties in practice. Communal plots have been used by some NGOs to promote village seed production schemes, but here again there can be many problems in maintaining equality in the inputs and outputs of all the participating members.

### **Training for Enterprise Development**

As already noted, one attraction of enterprise development is that it has certain common features which enable lessons to be learned and experience transferred. There is scope for basic training in this subject on both the technical and the financial aspects of a seed business. This could be directed at existing traders or other rural entrepreneurs who might add seeds to their range of enterprises. Training materials developed for this purpose could be used in different locations with relatively little modification, except for translation into the main local language.

It is interesting that one possible focus of 'new business start-ups' is the employees of former state companies who may be made redundant, or who simply leave their jobs, during the process of restructuring. In this way, staff who have gained experience and insight into the seed business may put this to good use on their own account, and with greater motivation because of the incentive of personal ownership. They may also have the benefit of many personal contacts within related activities such as breeding or trading. This was observed very clearly in Ghana where the former parastatal seed company was closed abruptly and its staff had to seek alternative employment. In very different circumstances, there has been a steady migration of employees from the large government sector in India to the emerging private sector.

Although this may be regarded by some as opportunism, it may also be seen as part of an evolutionary process in which the state organizations 'prepare the ground' for developing the private sector when economic conditions are favorable. With many governmental seed programs undergoing rationalization, it may be appropriate to offer enterprise training or other assistance to staff who may consider entering the seed business in a private capacity. This would make use of the previous investment in human resource development, which was often a feature of the 'project era'.

### **Pointers for Donors and Development Agencies**

These proceedings contain many points which development agencies may wish to note in the context of future investments in the seed sector. At a policy level, they should try to promote policies that are supportive for new entrants to the seed market, including small seed enterprises, as an element in the process of privatization and economic liberalization. At a technical level, they could assist with small equipment and information on topics such as quality assurance and seed processing. At the developmental level, they may consider seed enterprises within the wider context of 'rural business development' and micro-credit schemes. As noted in the previous paragraph, specific training in seed enterprise management, perhaps linked to small loans, may be a low cost intervention, which could fit into other projects and programs aimed at supporting the development and diversification of rural business.

### **Conclusion**

The encouragement of small seed enterprises is an attempt to create new diversity in the supply system, where in the past very little existed in developing countries because of government control and domination of the market. This may also offer the farmer more choice of suppliers, and hopefully of varieties too. Interestingly, this is the exact opposite of what has been taking place in most developed countries over the past 25 years or so, where there has been constant amalgamation of small companies into larger ones, so that today the truly local supplier has almost disappeared. This process has been driven by technology due to the concentration of breeding in fewer companies, and the ever present need to cut costs and achieve economies of scale. These forces may be less evident in developing countries. Certainly, the weaker rural infrastructure and high transport costs are strong justifications for local production.

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