COMMUNITY- BASED SEED PRODUCTION MANUAL

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Abstract

This manual is a guide for community-based seed production focusing on small grains. It gives an overview of the formal and informal seed systems. The manual further explores how these systems can be integrated to ensure that smallholder farmers have access to quality, affordable seed of the crops on which they depend for food security and livelihoods. It further describes step-by-step key principles of seed production modalities and practices for selected cereals. A comparison of the current markets and market opportunities at local, national and the region is also given. Community Technology Development Organisation's (CTDO) experience in community-based seed production is shared through case studies. Last but not least, the manual outlines some of the major socio-economic and policy challenges and draw-backs in community-based seed production initiatives.

It is hoped that the manual will contribute to the improvement and sustainability of community-based seed production systems in Zimbabwe and many other countries in the region.

Acknowledgements

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Acronyms

AGRITEX	Agricultural Extension Services
CBD	Convention on Biological Diversity
CTDO	Community Technology Development Organisation
CSB	Community seed banking
CTDT	Community Technology Development Trust
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ITPGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
NGO	Non-Governmental Organisation
OPV	Open pollinated variety
PBP	Participatory Plant Breeding
PVS	Participatory Variety Selection
SADC	Southern Africa Development Community
SNV	Netherlands Development Organisation
UMP	Uzumba—Maramba—Pfungwe
WTO	World Trade Organisation

Definitions of Key Terms

1. Seed - a basic unit of crop production. The term 'seed' in this context refers to generative part of plants that is used for multiplication. A viable seed is one that has sufficient living tissue to be capable of germination in the absence of dormancy and if environmental conditions such as water, temperature, and light are favorable.

2. Small grains: cereals (such as sorghum and pearl millet) with relatively small kernels

3. Seed security - At the farmer household level, seed security is defined as the state in which a farmer has access to the sufficient quantities of seeds of preferred varieties with adequate physical quality, at the right time of planting (Sperling and Cooper, 2003). As the majority of smallholder farmers (poor and marginalised) operate in low input systems, their seed security is guaranteed when they produce enough grain and put some in reserve to be use as seeds for the next season.

4. Seed System – the totality of the physical, organisational, and institutional components that determine seed supply and use in qualitative and quantitative terms. It denotes the activities that start from selection and breeding, to the marketing and use of the seeds, by farmers for growing crops and its close linkages with other systems, particularly, research and extension

Executive Summary

Over 80% of the total population of Zimbabwe derives its food security, livelihood and income from their agricultural production. Seed is the single basic unit vital for agricultural development. However, most smallholder farmers have limited access to quality seeds of improved crop varieties. Currently, the formal sector meets less than 5% of the total seed requirements for major food crops (Baniya, et al., 2005). According to Maredia, et al (1999), smallholder farmers mainly obtain their seeds from informal channels which include farmer-saved seeds and seed exchanges among themselves. These channels contribute about 90% of seed supply depending on the crop. In this context, farmer-to-farmer seed exchange and local seed markets meet most of the seed requirements. Governments have not put much effort in terms of research and development to support this vital informal seed supply system. Chapter 1 of this manual looks at both the formal and informal seed systems in terms of their associated advantages and disadvantages. Development processes of the informal systems are also discussed in detail.

On farm seed production system is detailed in Chapter 2. Smallholder farmers have produced seed using different approaches. Traditionally, farmers use their back-yard gardens to produce seed. The plot is well protected from livestock and its proximity to the homestead ensures close monitoring. The block system is where a group of farmers open up a piece of land completely isolated from other fields.

Seed is a basic unit, an important catalyst for the development of agriculture. The availability of quality seed is the foundation for food production and productivity and a precursor to crop and food diversification. Seed quality is achieved when principles of seed production are strictly followed. Chapter 3 looks at technical aspects of seed production for selected crops.

Community-based seed production can only be sustainable when it is well supported with marketing. Chapter 4 explores marketing options and opportunities available for small grain seeds within the country and in the region. An analysis of protocols and international instruments governing smallholder seed production is further articulated.

CTDO has over the years worked with smallholder farmers in Tsholotsho, Chiredzi and UMP to produce quality seed. From the 1990s, the Zimbabwe seed industry faced viability changes owing to economic melt-down, coupled with other calamities like drought. The land reform programme resulted in a sharp decline in seed production as commercial farmers who were mainly responsible for producing seed through out-grower schemes lost their farms. All farmers faced acute shortages of seed, as both the formal and informal seed supply systems crumbled. The community-based seed production initiative was central to fill a great need for seed. Chapter 6 looks at CTDO experiences in community-based seed production. The chapter focuses on two case studies highlighting both successes and challenges.

Chapter 1

Understanding Seed Systems

1.0 Introduction

Most smallholder farmers living in drought-prone areas continue to rely on drought relief and informal farmer-to-farmer exchange to obtain seed of improved varieties. Over 90% of smallholder farmers' requirements are met through these channels. Formal seed systems, supply only a small portion of the total amount of seed required by farmers. Local seed systems, which have been responsible for plant domestication and the development of land-races, alone, may not be sustainable under rapidly changing climatic conditions. Integration of both systems may be a technically interesting option.

The informal seed supply system consists of farmer selection, on-farm seed production and local diffusion which include seed exchange. These activities are equivalent to breeding, production and marketing in the formal system. Since the farmer is primarily interested in the regular production of seed for his next planting and because selection and diffusion are not always equally important, the local seed systems can be considered horizontal.

These systems are also referred to as traditional, informal, or farmer-managed seed systems.

There is never one seed system in any country, but seed supply is built on a number of dynamic processes of formal and local variety development and maintenance, local and formal seed production and diffusion. From a farmer's point of view, seeds of optimum quality should be available at the right time and at an acceptable price.

1.1 Informal Seed Supply Systems

In the informal seed system, seed related activities tend to be integrated and locally organised, and the informal system embraces most of the other ways in which farmers themselves produce, disseminate and procure seed: directly from their own harvest, through barter among friends, neighbours and relatives, and through local grain markets or traders. The same general steps take place in the informal system as in the formal but as integral parts of farmers' grain production rather than as discrete activities. Local technical knowledge and standards guide informal seed system performance, including the prevailing market forces.

An informal or local seed supply system contains the same elements as a formal system. These include collecting germplasm, crossing, selection and testing of the suitability of the material at different locations, multiplication, storage, cleaning and maintenance, and finally the stage of diffusion.

1.1.1 Local seed supply systems and their limitations

Local seed systems are the predominant source of seed of the majority of crop seeds in the country. In most cases, less than 10% of the total quantity used by farmers is supplied by the formal sector (Almekinders, et al. 1994). Local seed selection has been the basis of domestication of wild and weedy species and the subsequent development of a wide range of land-races within crop species with high levels of adaptation to local agro-ecological and socio-economic conditions. The apparent qualities of local seed supply mechanisms, combined with the experienced inability of the formal seed sector to supply large segments of the farming community has the risk of romanticizing these local seed supply systems (Almekinders, et al., 1994).

1.1.2. Quality aspects

Quality of seed can be affected by a number of factors. Poor storage conditions resulting in low seed purity and germination can hinder crop production. Seed producers should ensure that seed is kept safely so that it remains viable. It was must be kept in a well aerated moisture free condition away from pests.

1.1.3 Availability

One of the major advantages of local seed supply system is the high level of availability of seed to a wide range of farmers who cannot afford to purchase certified seeds.

1.2 Formal Seed Supply Systems

Smallholder farmers, use many systems to access seeds. The formal seed system can be characterised by a clear chain of activities. It usually starts with plant breeding which will develop materials for formal variety release and maintenance. Regulations exist in this system to maintain variety identity and purity as well as to guarantee physical, physiological and sanitary qualities Seed marketing takes place through officially recognised seed outlets, and by way of national agricultural research systems (Louwaars 1994) and even through relief seed programmes. Seed houses like Seed Co, Pioneer, and PANNAR Seeds are the major outlets of seed in the formal sector in Zimbabwe. ARDA and Agri-seeds support the informal sector through the out-grower schemes. Formal systems are especially important when seed is used to grow crops for commercial purposes (for example export or further food processing) and the uniformity and high quality of the product have been guaranteed.

1.3 Formal seed supply systems and their limitations

The economy of scale of seed processing, research and production supervision in formal seed systems result in rather centralised large scale formal seed supply units. This arrangement allows for a strict control on physical, physiological and often also sanitary seed quality and on genetic identity. Whether the focus is on commercial or developmental aspects of seed supply, some level of economic returns has to be attained in order to reach an acceptable level of sustainability of the system.

1.3.1 Quality aspects

An important reason why the formal sector often fails to supply seed to the majority of smallholder farmers is its inability to produce sufficiently adapted varieties (genetic quality of the seed). Breeders in the formal system, both in private and in public organisations, have to select for wide adaptation of their varieties. Breeding of specifically adapted varieties would result in a wide range of varieties. Very poor contact between the 'scientific' breeders and their target groups often results in a total misconception of the needs of the small holder farmers, and in varieties that are not adopted by them. Guaranteed seed quality through legislation and formal seed certification and quality control can be very effective to promote the production of high quality seed. It may also adversely affect effective seed supply when bureaucratic variety release and seed quality control procedures are adopted. Seed legislation which is meant to protect the farmers can thus complicate farming.

1.3.2 Availability

The large investment in equipment and the necessary costs for research, marketing and managerial overheads necessarily raise the seed price well above the price of grain. The cost involved in supplying a small scale market generally results in a poor or total absence of seed supply to remote and resource-poor farmers.

1.4 Integrated approaches

Formal seed systems, although valuable to supply seeds of a number of crops to certain groups of farmers, are unable to reach large numbers of farmers. Their lack of sustainability mainly derived from economic parameters. On the other hand, local seed systems, which prove very valuable to supply large quantities of seed, appear to neglect some quality aspects. Integration of both systems may yield the most effective and most sustainable way to secure the supply of optimum quality seeds of all crops to all farmers.

1.5 Development process of the informal systems

Box 1: Issues in Seed System Development

The objectives of a functioning seed system are to

• provide seed of appropriate varieties for use by different categories of farmers.

• develop and identify new and more productive varieties with traits sought by consumers.

• multiply and distribute these on a timely basis and at a price acceptable to farmers.

• maintain quality control through training and regulatory systems

Adapted from Monyo, E.S., D.D. Rohrbach, and M.A. Mgonja. 2003. New partnerships to strengthen seed systems in Southern Africa

1.5.1 Strategies to Improve the Informal Seed System

According to Monyo, et al. (2003), in spite of massive investments in plant breeding research, the rate of adoption of improved seed in sub-Saharan Africa remains at less than 5%, partly due to the fact that local seed systems are not used. It is rare to find modern varieties bred at research stations being passed on to the informal sector for multiplication and sale, as an essential part of the national seed policy. Yet it is the informal sector that holds the key to improving crop productivity among smallholder farmers. In recognition of this fact, some nations in the region have enacted policies permitting the smooth flow of such seed to the farming community.

The quality of informal sector seed used by small-scale farmers can be improved in several ways:

• Train farmers in better selection, treatment, and storage of seed from their own farms. Own-saved seed is often the most appropriate, certainly for farmers who cannot afford to purchase seed. The training will help them increase production through better use of their own saved seed.

• Encourage farmers to make their own selection of traditional varieties, to multiply and store seed of such varieties, and to sell this quality seed of traditional varieties to other farmers. This strategy is best suited to farmers capable of some experimentation and who are potential users of modern varieties. Initially they should be encouraged to stabilise varieties they themselves have selected. This can be done in Farmer Field Schools.

These are farmers with limited resources, but living in medium to high potential areas.

• Develop new varieties at research stations, and produce good quality seed of these varieties through either formal or informal channels—whichever provides good (or acceptable) quality seed at affordable prices. This strategy will work best for farmers who can be persuaded to buy inputs, provided seed is available at prices considered worth the risk by those farmers. ICRISAT and partners are implementing several strategies in Tanzania (Rohrbach, et. al. 2002) and Zimbabwe (Monyo, et al. 2003). These strategies are sustained by ensuring a reliable supply of foundation seed, which is availed to seed producers, and by providing them with advice on multiplying foundation seed to generate commercial seed. Costs can be kept low if this seed is unprocessed and uncertified (Monyo, et al. 2003)

Government agencies can assist the informal sector in many ways, the most important being to provide access to foundation seed, extension advice on seed production, processing, treatment and storage, and a legal framework that permits the marketing of on-farm seed. This will facilitate the growth of small-scale entrepreneurs in the informal seed sector. Referred to as the “decentralised farmer-based model,” in this approach researchers’ involvement in the seed development stops at producing breeder/and or foundation seed. This seed is shared with farmers who perform downstream activities of multiplication, harvesting, drying, processing, storage and marketing.

Effective extension is important. Extension plays a crucial role in training farmers in seed production and is therefore a pre-requisite to establishing a seed system, particularly informal systems, where farmers need training in various aspects of seed production. Just as it is difficult for a seed system to be effective in the absence of extension, it is equally difficult for farmers to adopt extension recommendations in the absence of a seed system that satisfies the following criteria:

- It covers all of the crops that most farmers grow.
- The varieties are appropriate and endowed with critical traits. For example, for smallholder farmers in high risk areas, yield stability is more important than yield per se (Monyo, et al. in press).
- The political and legal environment must allow regular release of new varieties, with high quality seed.
- The seed must be sold to farmers at affordable prices.
- Farmers' rights to breed, exchange, save, and plant off-spring from the seed must be protected by the governments and honoured by the formal seed breeders.
- The system must be compatible with the level of agricultural development. For example in situations where most farmers are poor and infrastructure is lacking, it is not desirable to put in place a sophisticated system involving too many institutions before the "basics" are in place. The system should be supported by effective research and extension services; availability of inputs such as fertiliser, pesticide, agricultural credit; and an efficient commodity marketing system.

Box 2: A Checklist for a Sustainable Seed Production Scheme

- Define the purpose of your scheme and the intended product(s).
- Describe how you will select the crops and varieties for which you will produce seed.
- Identify the source of the foundation seed you will use.
- How many farmers will be involved?
- How much seed will you produce?
- Is the target community well defined?
- What are the responsibilities of the various partners in this scheme, both in the short term and once the system becomes self-supporting?
- What are measurable incentives for the various partners to adhere to those responsibilities?
- What measures can you take to minimise costs while maintaining the quality standards of the seed?
- What guarantee does a potential purchaser or user of the seed have that they get value (genetic characteristics, viability of seed) for investment (seed price)? Are quality control measures in place?
- What is the incentive for a farmer to buy seed from your seed production scheme?

Source: Monyo, et.al., 2003. 'New Partnerships to Strengthen Seed Systems in Southern Africa: Innovative Community/Commercial Seed Supply Models'.

SEED SUPPLY FUNCTIONS AND ORGANISATIONS

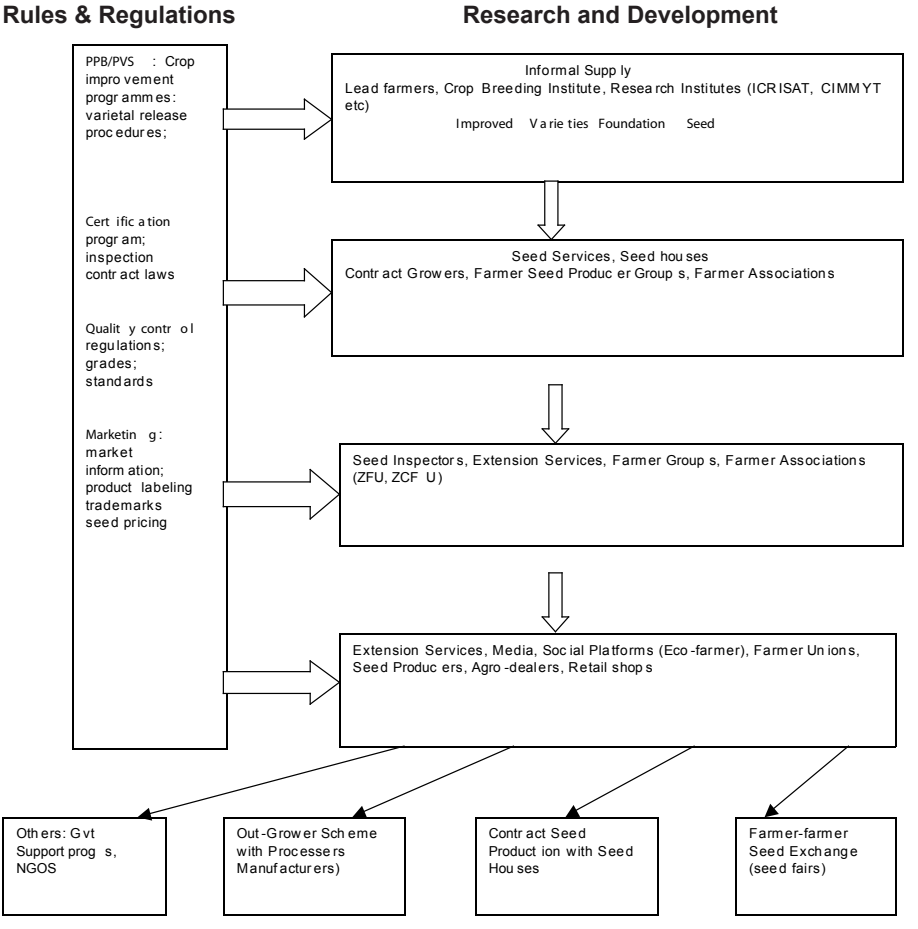


Figure 1: Seed System: An Organisational and Institutional Framework

1.6 Indigenous Knowledge Systems related to on-farm seed production

Traditionally breeders and, farmers have been breeding seed through participatory selection. There are several indications that farmer communities have some capable breeder/selectors, often women, who are involved in process of selection.

They select varieties which are best suited to their local agro-ecological conditions. Selection of seed starts in the field where cobs or panicles with desired traits are identified and marked with coloured cloth. The selected panicle is harvested separately from the grain. The processed seed is treated and stored in secured places. Treatment is done using available pesticides and other traditional methods like smoking, wood ash and finger millet glumes.
The seed is then multiplied and planting is done in best available soils usually close to the homestead. Research has shown that soils close to homestead are rich in organic matter. Anti-hills are also favored due to the good soil structure. The seed crop is planted close home in gardens for security reasons and to allow easy monitoring.

1.7 Socio-economic benefits of on-farm seed production
Community-based seed production in small grains is an important economic activity for farmers in the dry regions like Matabeleland and Masvingo provinces providing assured returns and additional employment. When seed production activity is run as a business entity, it creates employment for especially youths in the community. Its economic impact assessed at individual and aggregate levels indicates that the activity provides stability, equity in income distribution across the group and helps enhance family welfare. The venture helps improve liquidity in the communities who otherwise have dwindling income from dryland farming due to recurrent drought conditions.

Equally important, households in the area are able to obtain seed of their preferred varieties, which they know to be adapted to their particular production conditions. People usually know the person supplying seed to them and often will have seen the crop from which the seed is supplied growing before harvest. Individuals and households supplying seed charge lower prices because they do not face the additional transport, seed certification and information-sourcing costs of the formal sector seed suppliers.

Box 3: The impact of the on-farm seed production on the welfare of the growers include

- Reinvestment into agriculture, such as purchase of farm equipment
- Household food security
- Procurement / acquisition or construction of better houses
- Higher education for children,
- Improved living standards for farmers and their children
- Youth employment involving scientific and indigenous knowledge
- Enhanced sharing among producers promoting community problem-solving
- Increased local empowerment
- Increased market linkages with small commercial seed companies, promoting exchange of knowledge, planning

1.8 Seed Sovereignty

The seed is the first link in the food production and seed sovereignty is the foundation of food sovereignty. If farmers do not have their own seeds or access to open pollinated varieties that they can save, improve and exchange, they have no seed sovereignty and consequently no food sovereignty. The deepening food crisis in the world has its roots in changes in the seed supply system, and the erosion of seed diversity and seed sovereignty.

Seed sovereignty includes the farmer's rights to save, breed and exchange seeds, to have access to diverse open source seeds which can be saved and which are not patented, genetically modified, owned or controlled by emerging seed giants. It is based on reclaiming seeds and biodiversity as commons and public good.

Adaptation to climate change is a major issue in the current food security discourse. Adaptation options in agriculture involve changes at the farm management level as well as changes in the policy and institutional decision environment. In terms of on-farm adaptation strategies, crop adaptation (changing to crop varieties that are resistant to climatic stress) is one key measure.

Crop improvement programmes should focus on producing seeds that are adaptable to local conditions. It is important to breed for micro-climates within highly variable ecological conditions. Attention to specificity is a way to encourage high adaptation as farmers become able to obtain seeds of their choice. Farmer involvement in the breeding programme can never be over-emphasised. Breeding objectives should be set out clearly and they should address problems facing farmers as they adapt to changing climatic conditions.

1.9 Agricultural biodiversity conservation and sustainable use by smallholder farmers through on-farm seed systems

On farm management of agricultural biodiversity contributes to sustainable livelihoods of rural and marginal farming communities. Community seed banking (CSB) plays a key role in conserving valuable plant genetic resources, by conserving, re-generating and multiplying the crop seeds within community. The intervention is recognised as an important strategy to reduce the effects of seed insufficiency among small-holder farmers in Zimbabwe. This practice enhances conservation and seed accessibility for food and agriculture even during the years with climatic stresses.

In CTDO project sites, CSB has conserved and enhanced seed availability and accessibility to the farming community, has greatly reduced dependency of the farmers to outside seed sources. Seed multiplication programme is a complimentary activity where bulked seed is stored for distribution to farmers. Lost diversity is repatriated from seed banks, and goes through regeneration and further multiplication.

Chapter 2
On-farm Seed Production Systems

2.0 Introduction

Smallholder farmers have produced seed using different approaches. Traditionally, farmers use their back-yard garden to produce seed. The plot is well protected from livestock and its proximity to the homestead ensures close monitoring. The block system is where a group of farmers open up a piece of land completely isolated from other fields to demonstrate effective isolation. The block can be as big as 20 hectares.

2.1 Back-yard Garden seed production system

Farmers produce seed on their individual back-yard gardens. The garden is fenced to provide security from stray livestock. A diversity of crops is grown for the purposes of producing seed. Usually women grow the most preferred crops close to the homestead and the least preferred species are planted at the furthest point. The pattern is called diversity gradient. This implies that the cropping pattern follows a certain design with more crops concentrated close to the homestead. The most important seed crops are grown close to home where soils are more fertile, monitoring frequency is high, and for security reasons.

Figure 2: Pearl millet seed crop in a fenced back-yard garden

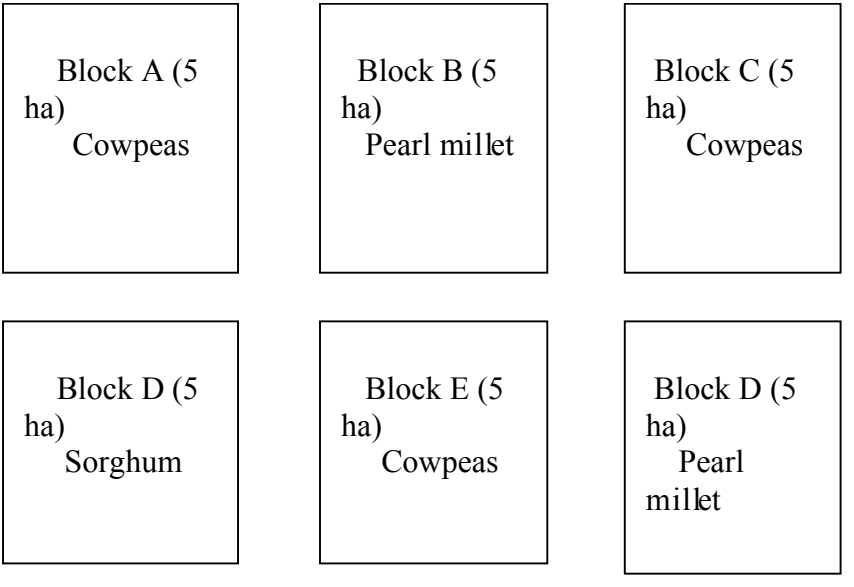
2.1.1 Advantages of back-yard seed production system

The major advantage of the system is security and reduced distance. The back-yard field or garden is usually fenced to protect the crop from stray livestock. Research has also shown that soils in the back-yard field are rich in organic matter. Farmers often spread cattle manure and any other available organic materials as fertilisers are applied in the garden or back-yard field. Due to its proximity to the homestead, it is easy to monitor production activities. Problems are noticed quickly and correctional actions are taken on time to ensure quality seed is produced.

2.2 Block system

The block system is feasible where farmers have larger tracts of land. In Tsholotsho, communities opened large pieces of land to start community seed production activities. A group of 20 farmers came together and opened the huge field for the purposes of producing seed. The big field is further sub-divided into blocks. In the contract seed production approach, seed companies, and in recent years an increasing number of non-governmental organisations (NGOs), have set up schemes to involve smallholder farmers in seed production.

Figure 3: Diagram showing Block system



2.2.1 Advantages of block seed production system

- The blocks will facilitate crop rotation. A well planned and agreed cropping pro gramme is easy to work out which is compliant to good farming practices in cluding rotations. For example, Blocks A and C can be planted to a legume (e.g., cowpeas) in year 1, and then rotated with sorghum in year 2.
- In addition, the issue of isolation distances within communities becomes easy as producers agree on a cropping plan.
- It is cheaper to work with producers in terms of logistical costs for input delivery, field inspection and seed collection. Production costs can be significantly reduced resulting in increased returns to the farmers
- It is easier for extension agents to work with organised farmers in a group than to work with individual farmers in isolated fields

Chapter 3

Modalities of On-Farm Seed Production of Selected Crops

Introduction

Several stages in the crop cycle require attention if the crop is to be used for seed. Correct site selection, good crop establishment and management, together with careful harvest and storage of the seeds are essential to ensure quality. Seed production techniques differ from crop to crop. This chapter looks at general technical aspects of community-based seed production.

3.1 Field selection

The most important thing to consider when choosing a field for seed production is field uniformity. A uniform field which is level and even is preferred (lower spots tend to be wetter, higher ones will be drier).The plot should not lie on a slope, should have uniform soil throughout, and does not have tall trees close to it. It would also have the same degree of fertility throughout. A perfectly uniform field is almost impossible to find, but try to guard against extremes of all of the above.

3.2 Isolation distances

Seed of self-pollinated crops such as rice can be multiplied by farmers with some training, with little risk of admixtures, since off-types can be easily removed. Isolation distances required are minimal..

Cross-pollinated crops such as maize are more difficult to manage, since off-types are more difficult to detect. Larger isolation distances are necessary (300 + meters). One option is to select good seed growers who can manage the crop properly, register their plots, and certify that only seed is grown in these plots. These can be contract farmers producing for private and public sector companies.

Table 1: Isolation distances for seed production of various crops

Crop	Distance
Maize	300m
Pearl millet	300m
Sorghum	100m
Cowpeas	3-6 m
Groundnuts	3-6 m
Soya-beans	3-6 m
Bambara	3-6 m

3.3 Time Isolation

With time isolation you try to avoid a situation in which an outside field is producing pollen while the female flower parts in your seed field are receptive to pollen. Staggering planting will ensure that flowering of seed crop and other crops (of the same species) around will not take place at the same time. Planting of the seed crop can be done two weeks earlier.

3.4 Use of barriers

A plot of a crop of different species which separates seed plots, preventing crossing and mechanical mixtures is known as a barrier. This strip would theoretically catch windblown pollen and distracts insects from visiting the plots on either side of it. The crop on the barrier strip is called a 'catch crop' as it 'catches' pollen and prevents it from contaminating the seed crop.

3.5 Land preparation

Till the soil as evenly as possible, to ensure that seeds germinate easily and evenly. Land preparation should be done in time to allow early planting with first rains. Community seed production has been done using conservation agriculture techniques. Basins or furrows are made using correct spacing (75cm x 60cm for cereals and 45cm x 15 – 30cm for legumes). Apply manure and/or basal fertiliser using recommended rates.

3.6 Planting

It is important to plant with first rains and give the crop a full growing season. The foundation of a good crop is laid by proper planting. Moreover, most mistakes made at planting cannot be corrected, so it is very important to get it right at planting. Use recommended spacing to achieve optimum plant population. Plant in a well prepared soil as described in land preparation to ensure that seeds germinate easily and evenly. The key thing to note is to plant with precision.

3.7 Crop rotation

Growing one crop on the same field year after year is not good farming practice. If a crop is planted for a number of years on the same piece of land without rotation, the farmer will run into problems with diseases accumulating in the soil, as well as with exhaustion of soil fertility. Some of the diseases may be seed-borne, and reduce the quality of seed. An additional problem when growing seed is contamination by the 'volunteers' that grow from seed spilled the year before. It is recommended that the seed crop is rotated with a different crop specie. A cereal rotated with legumes is a common combination. If rotating is not possible, then try to use one field for the same variety and this is possible when farmers are using field blocks. If you have a problem with volunteer weeds that are related to your crop and look very similar to it, rotation will also give you the chance to properly eradicate them.

3.8 Crop management

3.8.1 Fertilisation

Seed crops require broadly the same amounts of fertilisation as crops for grain, so farmers can use the normally recommended fertilisation rates. It is important, though, to guard against over-use of nitrogen (N). This leads to excess vegetative growth (stalks and leaves) at the expense of flowering leading to a weaker plant, with less vigorous seeds. The best method is to apply nitrogen in at least two installments, one at two weeks after crop emergence, and one halfway between planting and flowering. In this regard, phosphorus (P) and potassium (K) are more important than in normal crops, because they stimulate flowering and the production of more and hardier seeds.

3.8.2 Weed control

All farmers are aware of the dangers that weeds pose to crops. They compete for water and nutrients from the crop; they grow faster, create shade, and can smother a crop completely. In seed production a weed is any crop/plant (including volunteers of the same crop species) growing where it is not wanted. When the seed crop is weakened by weeds, it produces weaker seeds which are undesirable for good quality seeds. At harvest, the seeds of weeds can get mixed with the seed crop, which will give farmers a lot of work in cleaning. Normal methods of weed control can be used in seed crops. It is important to ensure that your crop is as clean as possible. Where conservation agriculture practice is used, it is important to follow weed management guidelines. The rule of thumb is that all weeds should be hammered at about 2cm height. All volunteer crops and rogues, diseased crops and off-types should be up-rooted and destroyed (see picture below)

Figure 4: Picture showing off-type (rogue) plant

3.8.3 Pest and disease control

Incidence of pests and diseases, with the resultant damage, can greatly compromise seed quality. The goal to keep the crop free from pests and diseases is achieved through proper farming practices like weeding, rotations, and use of disease-free seed. The common pest in sorghum and pearl millet are birds. Farmers devise methods of scaring away birds using tins tied to poles. The string is stretched across the field in such a way that when wind blows the tins crash against each other making noise which scares the birds. The most common disease is called smuts. It is a fungal disease which affects panicles of both sorghum and pearl millet. Once noticed, the affected plants should be up-rooted (rogued) and burnt to destroy the spores. Crop rotation is encouraged to prevent disease occurrence.

Harvesting Seed Crop

The general rule is that the seed should be harvested when it has reached physiological maturity, when a black layer has formed at the bottom of the seed where it attaches to the glume and attained recommended moisture content.

- Let the cob or panicle completely dry either in the field or after you harvest in mesh bags (turn frequently to ensure proper drying).
- For legumes, harvest when the seeds begin to rattle in their pods, but keep a daily check to ensure the pods don't open and you don't waste any seed.
- For cereals, a light and gentle hit with sticks during threshing is required to remove the seed from cob/panicle without damaging the seed. Home-made threshers can be used.

3.10 Post harvest handling and packaging

Hand harvesting is done, and seed harvested from smallholder fields seldom have weed seeds in the sample because this harvesting technique is normally employed. The crop is harvested into bags. Contamination often takes place because of threshing on earthen floors, which if adjacent to other seeds can result in varietal admixture. The crop and dirt admixture is easily picked out by hand. Grading is very key, and the seed should be packaged and well labeled. For on-farm saved seed, cleaning focuses on winnowing. Smallholder storage is an area which still requires attention. The whole harvest should be stored in rat-proof containers. Sometimes, tradition requires that these sealed units be reopened after/during the wet season for further drying.

3.11 Preservation of seed

Seed must adequately dry before it is stored. At household level, seed is stored in empty drums, sealed to prevent entrance of pests. Traditional methods to protect seed from pest damage are used. Mexican marigold, a weed with pungent smell, is used in many households to preserve seed. Cow dung is also commonly used in seed granaries in most households. Mopani, eucalyptus and umkusu tree leaves are known to have repellant attributes to most grain and seed storage pests.

3.12 Germination Testing

Good quality seed has a high percentage of seeds that are capable of germination. For cereals this should be a minimum of 85 - 90 percent, depending on the crop. For pulses, the minimum is usually 75 percent. These are official seed certification standards which the smallholder producer would do well to try and achieve.

3.12.1 Testing Procedure

Box 4: Practical way of testing seed for germination

- Randomly select three sets of 100 seeds.
- Take a shallow basin, which you have previously covered with a wet cloth, or clean jute sacks soaked in water.
- Place each set of 100 seeds on a cloth then cover them with the same cloth.
- Place the basin in the shade.
- Slightly moisten as necessary. Avoid the seeds drying out.
- After 7 days, count the number of seeds that have germinated in each set. If more than 80 of the 100 seeds have germinated, the seed is good. If less than 80 of the 100 seeds have germinated, farmers should be advised to increase seed rate at planting.

Germination testing can also be done in field conditions by planting at least one hundred seeds in a properly tilled piece of ground with adequate watering near the house. You will, however, not be able to control things like excessive rain, disease, insects, or animals. Your soil must also be suitable, not too heavy and without stones or too much manure.

Box 5: Checklist for Important Aspects of Community-based Seed Production

1. FIELD SELECTION
2. SEED QUALITY
3. CROP ROTATION
4. SOIL TYPE (Fertility levels)
5. PLANTING TIME
6. PLANT POPULATION
7. FERTILISATION
8. WEED CONTROL
9. PEST AND DISEASE CONTROL
10. SEED SELECTION
11. PACKAGING AND LABELLING

3.13 Seed Production of Sorghum and Pearl Millet

3.13.1 Seed Production Procedures

Procedures governing production should conform to the national seed act. Farmers producing seed should meet standards as required by the regulatory authorities, Seed Services.

3.13.2 Site and Field Selection

Important factors to consider when selecting a field for seed production include the following: adequate isolation distance, the presence of shade, birds, diseases, and insect pests. The field should be relatively fertile, free from water logging, and with a pH not below 4.5.

3.13.3 Field Preparation

Field preparation should be done on time. Sorghum and pearl millet seeds are small. Soil should have fine tilth. Ploughing should be done when the soil has adequate moisture. The field should be weed free at the time of planting.

3.13.4 Planting

Planting is best done in furrows that are of 2-3 cm deep. It is important to know the maturity period of the cultivar. Recommended seed rates are 4-6 kg/ha for pearl millet and 8-10 kg/ha for sorghum to achieve plant populations of 60,000-80,000 and 130,000-150,000 respectively. The recommended spacing for pearl millet is 75 cm between rows and 20 cm between hills within a row or 60 x 60 cm. For sorghum, 60-75 cm x 50 cm is recommended, with 4-8 seeds per station, later to be thinned to 2-3 plants per station. It is advisable for a block of farmers to plant the same variety at the same time. Dry planting is not recommended.

3.13.5 Fertiliser Rates

Farmers are advised to send soil samples for testing. The recommended application rates: 200 kg/ha of Compound D as a basal fertiliser and 100 kg/ha of urea as top dressing. Where soils are light and prone to leaching, top dressing can be applied in two splits. Fertiliser applications will differ according to local soil type and fertility. It is also important to consider organic manure where it is available. The suggested application rates: 5 scotch-carts of well decomposed organic manure per hectare or one 500g tin per planting station as basal application. However, farmers should ensure that organic manure should be of good quality and well decomposed to be effective.

3.13.6 Weeding

Seed plots are normally weeded 2-3 times using hoes, oxen, or tractor-drawn cultivators to keep fields weed-free at all times. For sorghum, a combination of mechanical weeding and pre-emergence herbicide can be used to control weeds. Farmers should also tap on their indigenous knowledge and use as much as possible organic herbicides to control weeds and avoid damaging the environment. Herbicides and other synthetic substances are hazardous to the environment. Weeds compete with the seed crop for nutrients, sunlight, and soil moisture. They can also harbor pests and diseases that contaminate the crop at harvest.

3.13.7 Thinning

Thinning to the recommended spacing and plant population is required before tillers form. Gap filling is not recommended in a commercial seed crop. Thinning should be done when the soil is moist to avoid root damage.

3.13.8 Plant Protection

Improved sorghum and pearl millet cultivars are tolerant of most prevailing diseases. Avoid growing seed in disease-endemic areas. Bird damage, potentially the most serious problem, can be minimised by careful selection of the site, growing larger areas, scaring the birds, and planting varieties with some “resistance” to birds (for example, brown high-tannin sorghum and bristled types of pearl millet).

3.13.9 Inspection and Rogueing

Rogueing is done to remove weak, diseased, and off-type plants before they shed pollen, during flowering, and before harvest. Diseased plants should be completely destroyed by burning.

3.13.10 Harvesting, Threshing and Post-Harvest Handling

Harvesting should be done when the seed crop is fully mature when the black layer has formed at the bottom of the glumes. This should be done before the crop has logged. Hand harvesting is the most common practice. Combine harvesting is possible for short varieties. Manually harvested panicles are sun dried for a few days and then threshed using suitable mechanical threshers, mortar and pestle, or sticks (beating).Care must be taken to avoid breaking or cracking the seed. Clean the threshing equipment before using it on a different variety or seed class.

Clean the threshed seed by winnowing, then treat with available chemicals, and properly store them in well labeled bags. There are quite a number of organic pesticides and producers should use these and avoid commercial pesticides as much as possible. The only challenge is that dosage rates are not well documented but farmers should use indigenous knowledge as much as possible.

Chapter 4

Seed Marketing Systems

4.0 Introduction

Most farmers produce small grains for family consumption, with surplus sold to augment household income. Variation in levels of production of small grains is highly dependent on its demand by the brewing, animal feed, and food industry. When there is high demand for small grains, demand for quality seed increases. Maize is a staple food and smallholder farmers tend to grow maize even in very marginal areas where farmers succeed in harvesting only once in every five years due to drought. There is need to create greater demand for small grains seed through readily available local and regional markets.

Increasing productivity, consumption, and industrial use through appropriate policy regimes, farmer support services, and market mechanisms that promote food processing and utilisation in industry have potential to improve demand of small grains and thus increase income potential for many small-scale producers. They stand ready to revert back to the drought tolerant small grain crops.

4.1 Current markets

Agri-Seeds, ARDA Seeds, and Seed Co contract farmers to produce legume and small grains for certified seed production. Seed companies prefer to contract smallholder farmers to grow small grain crops such as cowpeas, bambara nuts, millets, and sorghums because these crops are not popular with large-scale farmers. There is huge local market for the seed in the country. In the rural market, sorghum is commonly priced about the same as maize. Pearl millet is commonly priced 10-30% more than maize. Due to shortage of quality seed, farmers, using their knowledge and experience, select seed from their own harvests. For many reasons, discussed above, yields can very poor averaging at 0.6 tonnes per hectare.

4.2 Potential markets

Marketing of small grain seed greatly depends on the demand by processing industries. Commercial market deliveries of sorghum and pearl millet are estimated to average less than 10,000 tonnes per country in all SADC countries, except Zimbabwe and South Africa. In Zimbabwe, the opaque beer industry purchases approximately 15,000 tonnes of sorghum per year for malting.

In South Africa, 1995 estimates indicate industry purchases of about 300,000 tonnes for use in animal feed (41%), opaque beer brewing (43%), and the manufacture of a range of other food products. Botswana has a growing sorghum-based milling industry, manufacturing sorghum meal for the retail market. Small-scale millers purchase around 300,000 tonnes of sorghum grain in a year. (Rohrbach, D. D. and Kiriwaggulu, J.A.B. 2001). However, at least three-quarters of this Botswana purchase is based on sorghum imports, largely from South Africa, Zambia, and from smallholder farmers in Zimbabwe.

The magnitude of regional sorghum and pearl millet trade has been very small compared with trade in maize and wheat over several decades. Sorghum and pearl millet account for roughly 2% of the total volume of grain traded in the SADC region and only 1% of the total value of grain traded. However, climate change and failure of maize due to water stress provides an opportunity for increased demand for small grains, translating into high demand for good quality small grain seed.

4.3 Intra-regional trade opportunities

National programmes in the SADC region, in partnership with international agricultural research centers like ICRISAT, have released a number of improved varieties. Some of these varieties are adaptable to conditions across the region making them suitable for regional use and therefore, multi-country release. Regional coordination would create a much larger potential market, making it more economical for active private seed companies in the region to deal with smallholder semi-arid tropical crops, as well as maize OPVs. Currently, stringent phyto-sanitary rules make it harder for the smallholder farmer to gain access to seeds from other countries. Innovative, community-based seed production and distribution strategies, coupled with policies supportive of regional variety registration and release, will have a positive effect on smallholder

access to the products of international centres and national programmes. At the same time, CTDO is strongly against a single uniform seed law for the region, for it would be very detrimental to smallholder farmers. As the African Centre for Bio-safety (ACB, 2012) explains, by 'harmonising' seed laws, Africa would be rolling out a 'red carpet for the corporations' to enter and easily control seed systems. A uniform seed law will facilitate the spread of genetically modified organisms (GMO) into the region once bio-safety laws are harmonised in favour of GMOs. A step that will genetically erode farmer saved seeds and will fuel dominance by the corporate world, as they gain total control of the local seed industry.

4.4 Policy, Legislation frameworks

4.4.1 Policy options for empowering communities to enter into the seed sector

- The contract seed production model is still confronted by many challenges, the biggest of which are probably lack of an all-encompassing legal frame work and side-marketing. Given their lack of bargaining power and limited access to legal services, farmers are known to sign lop-sided contracts without proper understanding of the risks and benefits of contract farming. Typically, farmers also complain about the prices offered by contractors, which they argue are too low to enable them to outgrow contract seed production and become self-sustainable.
- There is need to institute a legal framework that clearly articulates the interests of both farmers and contractors. Strengthening of Agritex and the Zimbabwe Farmers' Union, as well as enhancing members' access to legal services can create institutional frameworks that allow both the farmer and the contracting seed company to have the same understanding of the contract.
- A policy framework should be put in place that allows farmers to sell their small grains seed in shops and at any designated points.

4.5 Farmers' Rights

Seed-saving, a term used to refer to traditional practices where farmers keep and re-use grain from their harvests as seed for new cultivation, has been under increasing attack from seed industry leaders seeking to limit the multiplication of varieties under their protection (Mushita, n.d)

Farmers should have the right to produce, save, exchange and multiply their own seeds. Current national law does not recognise smallholder farmers as breeders. Farm-saved seed cannot be sold in the formal markets outside 40km radius. Policy makers need to review and enforce the farmers' rights legislation articulated in the Convention on Biological Diversity Article 8 (j) and reiterated in the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA).

4.6 Institutional capacity building

Training in community-based seed production modalities for both extension staff and producers is critical. Government agencies are poorly resourced and need additional support to enable them to participate fully in seed production activities. The government and other stakeholders need to invest more in research and development through public private partnership arrangements. The government alone over the years has failed to fully support research and development. Keeping abreast with changes taking place in the environment, crop improvement programmes like participatory plant breeding and participatory variety selection will help develop improved small grain varieties which are adaptable to harsh conditions. Extension service personnel together with NGO staff should be trained to improve and sharpen their skills. The trainings should not leave out lead farmers, taking cognisance of the fact that smallholder farmers are the primary source of investment and of knowledge about local seeds.

Agricultural inputs are not easily accessible to farmers who are cash-deficit, and there is a diminished capacity of public sector agencies to support smallholder farmers. Contract farming has been recognised by many as a system that has the potential to increase productivity and reduce rural poverty. Contract farming can potentially provide farmers with many benefits that extend way beyond the provision of markets, including access to input loans and other credit, provision of extension and technical advice, use of appropriate technology, and management systems. These benefits are particularly relevant at this time for Zimbabwe's smallholder farmers who are experiencing unprecedented economic hardship. Contract arrangements can be used to build the capacity of seed producers particularly during the initial stages of starting community-based seed production initiatives. However, it must be noted that contract farming can also be a disaster to smallholder farmers, for they take on almost all the risk.

When a seed production activity is owned and directed by the participating groups, it creates employment, especially for women and youth in the community. Its economic impact assessed at individual and aggregate levels show that it provides stability, equity in income distribution across the group and helps enhance family welfare. The venture helps improve liquidity in the communities who otherwise have dwindling income from dry-land farming due to recurrent drought conditions and other natural calamities.

Equally important, community-based initiatives enable households in the area to obtain seed of their preferred varieties, which they know to be adapted to their particular production conditions. People usually know the person supplying seed to them and often will have seen the crop, from which the seed is supplied, growing before the harvest. Individuals and households supplying seeds charge lower prices because they do not face the additional transport, seed certification, and information-sourcing costs of the formal sector seed suppliers. All these translate to socio-economic benefits arising from community-based seed production activities.

Box 6: Benefits of on-farm seed production on the welfare of the growers include the following:

- Reinvestment into agriculture, such as purchase of farm equipment
- Household food security
- Procurement / acquisition or construction of better houses
- Higher education for children
- Improved living standards for farmers and their children

4.7.1 Contract seed production

The most successful method of producing small grains and legume seed has been to contract smallholder farmers to grow the seed for sale by local and small commercial seed companies. Farmers produce seed for the specific buyer. The farmer enters into an agreement with the buyer, usually a seed company. Organisations like CTDO and SNV have helped farmers market their produce to viable markets through market linkages (see case studies). Under this scheme, a seed house provides all inputs including foundation seed and contracts the farmer to multiply seed. The farmer is already assured of market before production of seed takes place. Both parties have contractual obligations which keep them working together, enhancing the capacity of both.

The seed contract is a legally binding agreement between the seed house and the smallholder farmers. Both parties must make a certain commitment under the seed contract.

For example, the seed house (contracting party) must

- provide foundation seed to the contracted farmers. Foundation seed of small grains can also be sourced direct from ICRISAT;
- provide close supervision and technical backup, working together with regulatory authorities, Seed Services;
- purchase the seed at the agreed price at a specified time.

The farmer (the producer) must

- multiply and produce high quality seed using the foundation seed provided by the contractor. The contract must be clear on what happens when the crop fails.
  The farmer should not go into debt to pay for the foundation seed;
- grow seed following the recommended guidelines given by seed inspectors, the contracting company, and AGRITEX;
- sell seed to the contractor

.

Contract prices are based on estimated yield, production costs, specific project requirements, and the cost of imported seed. Contracts are arranged before the crop is grown, and the farmer ensures that land is prepared for planting. Regular visits are made to ensure that crops are properly managed, and seeds are harvested in a timely way. The challenge is that the farmer depends on rain-fed agriculture and often, the crop fails. The contract should be very clear on what happens in such a situation. The risks of Mother Nature should be shared between the contractor and the farmer.

4.7.2 Small-holder seed production associations

Several small groups get together forming a larger group. The association can be product specific, e.g., pearl millet seed production association or a general small-grains seed producers association. The idea is to give voice to the producers so that they are in a position to negotiate for better prices, lobby for favorable policies. Generally, they become better producers, as well as better organisers, increasing their competence for the market.

4.8 Challenges of marketing of small grains seed

The key market challenges are largely policy in nature. These challenges include weaknesses in marketing systems with a disproportionate disadvantage to women who are traditionally major producers of the small grains. Studies have shown that there is limited knowledge about existing market policies and programmes (national and regional), not just among farmers, but also agriculture staff. Long-term national policies skewed towards maize, sidelining small grains, pose a major challenge in marketing of small grains. At higher levels farmers are more often excluded and do not participate fully in policy issues relating to marketing.

4.8.1 Side-harvesting and Side-marketing

Side-harvesting occurs when farmers surrounding the contracted farmers collude with neighbours and friends to feed their non-contracted produce to the company in order to benefit from higher prices. This is of major importance in the seed production industry where farmers receive a premium price over and above the commodity prices. Side-harvesting is a serious threat to small-scale seed production because the quality of the seed is seriously compromised. The ‘seed’ from the neighbours is not from the foundation seed and results in mixed seed. To curb side harvesting there is need for close supervision throughout the season.

Side-marketing is also a key challenge bedeviling contract farming, and it occurs when the contracted farmer sells his produce to a third party in breach of his/her contractual agreement. It is a considerable problem in Zimbabwe, and according to Setimela et.al. (2003), 60% of contracted farmers engage in side-marketing harvested produce. Side-marketing results in reduced quota delivery to the company, which in turn results in decreased processing efficiency and increased production costs. Reasons for side-marketing are price-related. Farmers are tempted to sell outside of the contract agreement when competitors offer more money than the contracting company.

4.9 How community-based seed producers contracted by seed houses benefit from efficient local market linkages

Despite challenges and other risks associated with contract farming, well executed contracts have certain benefits:

- Farmers benefit from better prices, larger and higher quality yields, and as sured markets, services and input supplies.
- The process can raise the income of farmers and provide an incentive for im proving their management practices to gain higher farm productivity. The in come of the farmers can be enhanced by increasing production of good quality seed, adding value for better marketing options.

Chapter 5

CTDO Experiences of On-farm Seed Production

5.0 Introduction

CTDO initiated, developed and formalised a community-based seed production approach for a sustainable seed supply system for marginalised smallholder farmers. It is an approach of producing and distributing seeds with the participatory involvement of farmer groups. In this approach, seed producer groups are formed to multiply the seeds of farmer-preferred varieties. The project works closely with stakeholders like ICRISAT, Crop Breeding Institute, AGRITEX (Government of Zimbabwe agricultural extension services) and seed houses. CTDO sourced foundation seed from the research institutes and distributed to selected lead farmers for further multiplication. The research institutes are the primary source of foundation seeds under this initiative. This initiative is also linked to other programmes, such as participatory varietal selection (PVS), participatory plant breeding (PPB), and community seed banking. In a normal situation, contract seed production arrangements should build sustainable partnerships for the farmer groups, commercial seed houses, traders, entrepreneurs, the corporate world, governmental and non-governmental research and development organisations. However, smallholder farmers are usually left on the periphery of the consultations, given their relative lack of cash and heavy dependence on rain-fed agriculture. When natural disasters like drought, floods, pest and disease occur, contracted farmers suffer most due to lack of mechanisms to reduce their investment risks.

The programme of on-farm seed production comes with a number of benefits, chief among them:

- Increases productivity and hence food security through the timely supply of large quantities of quality seed of improved varieties to farmers;
- Provides an opportunity for local income generation through the business of selling seed;
- Facilitates the development of a local seed market;
- Increases options in terms of available crop diversity in the community.

The major constraint in seed propagation under contract is the execution of the contract agreement. Many times the contract is crafted in such a way that it favors the buyer. First of all, producers have to meet certain conditions, and they are price takers. Farmers in most cases are not afforded space to negotiate terms of the contract. When the producer fails to meet his/her obligations s/he is penalised. The contract is usually silent about what happens when the buyer fails to deliver what s/he promised.

5.1 Contract seed production framework

Box 7: Salient Features of Community-based (on-farm) Seed Production

Normally, the private seed companies enter into a written/oral contract with farmers individually or a group for the production and supply of seed at an agreed price. The member farmers are provided source seeds of the crop varieties locally adapted or found tolerant to stress conditions in order to include them in the seed production programme. Foundation seed is sourced from national and regional breeding programmes. The community seed production groups are also provided with simple technology such as weighing scales, seed mixers, and production inputs such as seed and fertiliser. The seed bank facilities provide space to participating farmers to store their seeds. The community seed production groups bear the costs of cleaning, storage, and fumigations. Every community seed bank member pays a nominal fee of USD2.00 per year and this money is used for the day to day operations of the seed bank.

Technical guidance on crop agronomic aspects and special operations such as harvesting and processing are provided to the farmers through regular field visits by trained supervisors and seed inspectors in collaboration with Agritex field staff. Although farmers are organised in groups, production is done individually and contract arrangements are done on an individual basis. The group aspect comes mostly in order to meet the quantity or volumes required by the contractor. Logistically, it's easier to work with groups than with individual farmers, but marketing is done with individual group members. It must be pointed out that one of the big problems of "contracts" is that they are with individuals. Group contracts, rather than individual ones, give smallholder farmers negotiating powers for better contracts. The seed bank management committee can sell the seed on behalf of farmers. Seed is properly packaged, weighed, and labeled before it is brought to the seed bank or collection points. Payment is done either instantly, or later, depending on the agreement.

5.2 Tsholotsho Smallholder Farmers Linkage with Seed-Companies of Zimbabwe

CTDO, ICRISAT and the Seed Co of Zimbabwe worked together to strengthen smallholder farmers' capacity to produce quality seed. ICRISAT is an international research organisation specialising in drought tolerant crops; Seed Co is the leading seed-house in Zimbabwe with an extensive retail network. ICRISAT supplies improved, open-pollinated released varieties of sorghum and pearl millet to farmers through Seed CO, and CDTO offers training and supervision in seed production to over 350 farmers in Tsholotsho. Under this arrangement, Seed Co provides a market for the small grains seed produced by the contracted smallholder farmers.

5.3 UMP Farmers Linkage with Agri-seeds through Contract Farming

Box 9: Case study 2: Uzumba- Maramba – Pfungwe (UMP) Farmers' Linkage with Agri-seeds (Pvt) Ltd and SNV

Agri-seed (Pvt) Ltd. is a seed company in Zimbabwe, contracting mostly large scale commercial farmers for their seed production. The company wanted to diversify its
out-grower base and was also convinced of the necessity of including more smallholders into their business model. During the 2009-2010 cropping season, Agri-seeds, with the help of a donor funded programme, aimed at improving food and income security for smallholders, embarked on a 2,200 smallholder contracting scheme. These smallholder farmers (70% male and 30% female) were in Mutasa, Uzumba-Maramba-Pfungwe (UMP), Mutoko, Murehwa and Wedza. These statistics indicate that men become interested once they realise it is now "business". Each farmer grew, on a hectare of land, cow peas (0.2 ha), sorghum (0.2 ha) for sale to Agri-seed, groundnuts (0.2 ha) seeds, and maize (0.4 ha) for household consumption. The farmers worked in groups of ten to enhance shared learning, peer support, and coordination with the extension officers.

CTDO mobilised and trained over 450 smallholder farmers in UMP on contract farming. The objective was to improve agronomic and business skills of seed producers. Agri-seeds provided intensive agronomic extension, logistics for all input provision, and a stable market. Farmers produced a grand total of 120 tonnes of seed, including groundnuts (20t), sorghum (45t), and cowpeas (55t). The average selling price of $0.55 per kg of sorghum was slightly above the average for maize grain which was pegged at $0.45/kg.

Lessons Learned
Business training does contribute to improved relationships between the contractor and the farmers. Adult learning principles need to be applied to make the capacity building effective. In this project, one of the aspects participants rated very highly was the business training provided by the CTDO. One farmer (a woman) in UMP observed, during a field visit by funding partners and Agri-seeds officials, that "The business training and the close support we receive from CTDO and extension officers make the difference between this programme and others before it; now I can calculate my profit, interpret the contract, and understand why I need to repay."

5.4 Challenges

- Contracting seed houses told CTDO that they were incurring high transport costs to move large quantities of seed from production sites (650km - Tsho lotsho) to a processing plant in Harare. They explained that, to make a marginal profit or just to break even, they offered unattractive prices for the seed ($0.55/kg for small grains). The price was low, and farmers were not happy.

- Sorghum and pearl millet are susceptible to bird damage if grown by few farm ers in isolated blocks. This problem is particularly severe in seed production. Seed is produced in isolated small areas where the crop can be wiped out by birds. More farmers need to grow the crops on their fields to reduce the impact of birds' damage.

- Kelly and Rusike (1997) indicate that one of the major constraints in seed technology is difficulties with contract execution. If spot market prices exceed forward contracted prices, farmers tend to sell the crop to buyers with cash in hand. In drought years, the farmers may consume the seed crop, even though the planting seed and other services are provided free of charge. These difficulties discourage seed companies from working with smallholder farmers.

5.5 Recommendations

- There is need to establish a seed processing plant close to areas of production, to reduce mileage when delivering inputs and transportation of seed
- The block farming system improves isolation distance. According to Monyo, et al. (2003), for this concept to work, the community must agree to grow only the identified variety of the selected seed crop.

5.6 Conclusions

Community-based seed production can be used as a vehicle for providing cash-deficit farmers with seed of improved varieties. Given the necessary support in terms of knowledge through training, inputs (foundation seed, fertiliser, etc.), smallholder farmers have the capacity to produce quality seed. They may be 'cash poor' (finance capital), but they are very rich in intellectual capital (e.g., knowledge about indigenous seeds), social capital (e.g., organising and sharing), and natural capital (e.g., soil, pollinators). Public Private Partnerships (PPP) may be a means to implement successful community-based seed production of adaptive varieties, which complements the formal seed systems; as in contract seed production, success depends on the terms of the partnership and their implementation. Seed producers should "produce for the local market", and not produce and then look for a market. The linkages created with seed houses under the CTDO project in Tsholotsho and UMP provided a ready local market for the seed produced by groups in the two districts.

Contract farming is only effective if it makes business sense to both parties. Where one party feels they do not have a fair share in the relationship, there is always the tendency to default. In the CTDO/SNV project in UMP, all input costs and output prices were discussed, accepted and agreed by all parties. Training was conducted with producers on the basics of accountancy and planning. The trainings also covered important aspects of group dynamics, and conflict resolution among other things. These trainings helped establish mutual trust which led to confidence in the project by both parties, hence the high take-up rate in the project.

Contract negotiation is key, and it should be done well and on time to avoid rushing farmers to sign contracts that increase their risks because of unequal power relationships with the seed companies. Farmers should be involved more in the development of the contract terms, and they should never be treated as price takers. Their knowledge (intellectual capital) and labour (human capital) contribute to investment in seed propagation, as much or more, than the cash and seed advance of the companies. Each needs the other and therefore, building a good working relationship between the company and the producers is essential. Most contracts are constrained by problems, because there is tendency by the contracting parties to ignore pertinent issues like what happens when prices change. Experience has shown that when there is an increase in price on the market, buyers do not want to adjust the price accordingly, but will only change prices offered when the market price slumps.

Community seed production initiatives and commercial seed production complement each other in the informal and formal seed supply systems. Over 80% of Zimbabwean seed requirements comes from the informal system. Community-based seed production programmes are critical in producing adaptive seeds that also meet other farmers' and consumers' requirements.Strengthening relationships through equitable contracts between seed producers and seed houses benefits both parties from input/technology supply, through production to output marketing. Another relative advantage of community-based seed production is that seed producers gain increased incomes, contributing to the multiplier effect of increased liquidity (cash flows) for the whole community.

Community-based seed production needs to be supported with good policies, as explained above. "Harmonisation" of seed laws, working toward one uniform law across the region, will promote big corporate entities. It will kill the smallholder farmers' initiatives and access to adaptive seed. As discussed, smallholder farmers work for many varieties of seeds, available in relatively small quantities, to increase adaptation to micro-climates across their farms. In contrast, the big corporations promote very few new varieties to sell to many farmers, along with the necessary inputs of fertiliser and pesticides. Large-scale sales in all these inputs increase corporate profits. The two systems could not be more different.

Community-based seed production has demonstrated it does increase commercial sales of farmers' varieties, benefiting smaller, local seed companies, as well as local food production. Farmers work together with local companies to increase knowledge about best propagation practices, to multiple varieties of seeds sold, and to enhance the local markets.

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