



**EXISTING MECHANISMS FOR SMALLHOLDER SEED PRODUCTION AND  
DISSEMINATION IN TANZANIA: A CASE OF SUA B/C CRSP**

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**ABSTRACT**

In 1990, Tanzania shifted away from reliance on public seed enterprises and has since then directed more interest towards private smallholder seed production. By 1995, a number of organisations assisting smallholder farmers in the production of seeds had emerged. To date, there has been little assessment of smallholder seed production mechanisms in Tanzania. This paper examines the principle mechanisms for smallholder seed production, and provides experiences of seed production programs from Sokoine University of Agriculture Bean/Cowpea Collaborative Research Support Program (SUA B/C CRSP) and two NGOs, Christian Council of Tanzania (CCT) and Lay Volunteers International Agency (LVIA). Data were collected through personal observations, standardised interview schedules, and informal discussions with seed-producing and non-seed producing smallholder farmers in Dodoma and Morogoro regions. In addition, a checklist of questions was administered to extension workers and seed programme leaders under SUA B/C CRSP, CCT, and LVIA, and to selected members of Ilonga Research Centre, Tanzania Official Seed Certification Agency, Tanzania Seed Company Ltd (TANSEED), Msimba Foundation Seed Farm, and the Seed Unit of the Ministry of Agriculture and Co-operatives (MAC). We found that the mechanisms for smallholder seed production under LVIA worked better than that of SUA B/C CRSP and CCT. In all three projects, the most important problem that smallholder farmers faced was seed marketing. It is therefore recommended that promotion activities be conducted to create awareness among all farmers regarding the benefits of high quality seed produced by smallholder seed producers. The promotion activities should also form a base upon which farmers' willingness to purchase seed can be gauged.

**INTRODUCTION**

Improved seed is an important input in all crop-based farming systems, and is a key factor in determining the upper limit of yield, and therefore the ultimate productivity of all other inputs (Maredia and Howard, 1998; Cromwell, 1990; Ministry of Agriculture and Co-operatives, 1997). In Tanzania, until 1990 the government had been responsible for national seed production and distribution (Due, 1988). The Tanzania Seed Company Ltd (TANSEED), a government parastatal, was established in 1973 and had the mission of producing sufficient certified seed for farmers at affordable prices, and of providing seed extension, dissemination, and advisory services. TANSEED had a monopoly on seed production, importation, distribution, and sale of certified maize, wheat, rice, and beans (Ministry of Agriculture and Co-operatives, 1997; Due, 1988). However, TANSEED was not able to perform these duties efficiently or effectively, resulting in poor performance of the national seed industry. Several problems contributed to poor performance and low impact of improved seeds that were handled by TANSEED, including insufficient transport and funding, lack of

humidity-controlled warehouses, and inadequate seed drying equipment. TANSEED-produced seeds had low germination rates, and prices were considerably greater than prices of unimproved seed available through local markets (Table 1). In the early 1990's, TANSEED began to concentrate their seed production activities on the most profitable seeds. Concentration on the most profitable crops meant dropping a number of less profitable but essential crops including grain legumes (Ministry of Agriculture and Co-operatives, 1997). Thus, improved seeds of appropriate but unprofitable crop varieties became unavailable to smallholder farmers.

**Table 1.** 1997 Prices of improved seed sold by TANSEED and of unimproved seed sold on the local market, in Tanzanian shillings (Tshs).

Crop	Price per Kg Seed (Tshs) <sup>x</sup>		% Increase
	TANSEED	Local Market	
Hybrid maize	1000	100-150	670-1000
Composite maize	890	100-150	590-890
Sorghum	640-800	100-150	430-800
Wheat	610	100-150	410-610
Beans	980	150-200	490-650

<sup>x</sup> Exchange rate: 1 \$US ≈ 800 Tshs

Due to the deficiencies of TANSEED, and in recognition of the existence of a relatively large untapped market for improved seed in Tanzania, the government liberalised the seed industry in 1990. After liberalisation, a number of foreign and domestic private seed companies entered the seed sector to produce, distribute, and market improved seed (Ministry of Agriculture and Co-operatives, 1997; ICARDA, 1994). By 2000, the largest private seed company operative in Tanzania was Cargill Hybrid Seed. Other emerging private seed companies include Alpha Seed, INCOFIN Tanzania Ltd, East African Seed Company, and Pannar. All these companies concentrate on hybrid and composite maize seed, leaving a gap in the production and marketing of improved seeds of other essential crops such as grain legumes. Improved seeds of grain legumes, including beans, is one category of crops that is not handled by the private seed companies and is therefore not adequately supplied in most areas of Tanzania (Grisley, 1992; Due, 1988). Additionally, it is the large commercial farmers and not smallholder farmers who have been the major beneficiaries of the new seed industry.

Non-government organizations (NGO's), farmers' associations, and private individuals believe that the formation of a small-scale seed production sector is necessary to meet the needs of smallholder farmers. Through this means, seeds of new, improved varieties of traditional smallholder crops such as beans will be available in a timely fashion and at affordable prices to many smallholder farmers. Smallholder seed production programs are not in competition with the large commercial seed producers. They are intended to compliment large-scale seed production by being part of a seed production system that integrates small- and large-scale seed production systems (Ministry of Agriculture and Co-operatives, 1997).

### **Study objectives**

The general objective of this study was to examine the mechanisms for smallholder seed production in Tanzania. Through these investigations, we hope to better understand the existing mechanisms for seed production and distribution, and to develop appropriate seed production mechanisms to be used by SUA B/C CRSP. Specific objectives in the study were to:

- i). Examine the criteria used by the different organisations in selecting seed producing farmers
- ii). Assess seed producing farmers' technical skills in seed production
- iii). Examine the approaches used to provide foundation seed and other inputs, seed storage, seed quality, extension, marketing, and distribution.

#### **MATERIALS AND METHODS**

The study was conducted in Dodoma and Morogoro Regions of Tanzania. Respondents for the study included farmers, professionals, and NGOs involved in seed production. In Dodoma Region we surveyed farmers and seed professionals from Dodoma Rural and Kongwa Districts. In Morogoro Region, farmers from Kilosa District were our target study population.

The three organisations involved in the study included: Sokoine University of Agriculture Bean/Cowpea Collaborative Research Support Programme (SUA B/C CRSP), Christian Council of Tanzania (CCT), and Lay Volunteers International Agency (LVIA). These 3 organisations were the only ones engaged in seed production and distribution in 1998 in the study area, the time when this study was initiated. SUA B/C CRSP seed program focuses on bean seed production while LVIA focuses on maize seed production and CCT seed production programs focus on sorghum seed production.

In the study area, six villages that participated in SUA B/C CRSP, CCT, or LVIA smallholder seed production programmes were selected to participate in this study. These villages were Chipanga, Mpalanga, and Chiguluka in Dodoma Rural District; Mlanje in Kongwa District; and Kisanga and Msolwa in Kilosa District. The sample size included 20 smallholder seed producers and 10 non-seed producing farmers from each of the three selected villages in the Dodoma Rural District; 3 seed producers and 2 non-seed producing farmers from the selected village in the Kongwa District; and 3 seed producing and 2 non-seed producing farmers from each of the two selected villages in Kilosa District. The number of farmers included in the study amounted to 105.

To assess seed production activities in the villages included in this study, six extension workers and project leaders who were working with SUA B/C CRSP, CCT, or LVIA seed production programmes were also included in the study sample. To assess institutional mechanisms for smallholder seed production, the study included: one breeder from SUA (Morogoro) and Ilonga Research Centre; heads of TOSCA (Morogoro), TANSEED Production Unit (Morogoro), and Msimba Foundation Seed Farm (Msimba-Kilosa); and three village extension workers, three seed production project leaders, and two staff of the Seed Unit, Ministry of Agriculture and Co-operatives. Thus, a total number of respondents in this study was 118.

Data were collected using two types of interview schedules. The first interview schedule was for the sampled farmers in the selected villages. The second interview schedule was for officials from SUA B/C CRSP, CCT, LVIA, TOSCA, TANSEED, Foundation Seed Farms, village extension workers, and staff of the Seed Unit - Ministry of Agriculture and Co-operatives. In addition, informal interviews and discussions using a checklist of questions were used for all respondents except farmers. Data collected from interviews and informal discussions were coded, and analysed using the Statistical Package for Social Sciences (SPSS) computer programme. Descriptive statistics such as frequencies and percentages were used.

## **RESULTS AND DISCUSSION**

Through this study, we were able to identify several components of SUA B/C CRSP, CCT, and LVIA smallholder seed production and distribution programs. Components of all three seed production programs included farmer selection, farmer training, and seed provision. Each of these components are described below.

**Selection of Farmers** In the Mlanje village of Kongwa District, LVIA conducted several meetings with farmers in the area. The purpose of the meetings was to make farmers aware of the smallholder seed production system and its importance to seed accessibility and food crop production. LVIA also encouraged farmers to participate in the smallholder seed production programme, and selected farmers who showed interest in the maize seed production programme. A consideration for farmer selection included the financial status of the farmers. This is in line with the thinking that seed production is an enterprise needing relatively high cash outlays. Cash investment is required for non-labour inputs such as fertilizers, seed dressing fungicides, pesticides, etc.

In the case of SUA B/C CRSP and CCT, village extension workers (VEO's) were responsible for selecting farmers to join seed production programmes. Gender balance and education were major criteria used to select farmers by SUA B/C CRSP. CCT selected smallholder farmers for the CCT Sustainable Seed Multiplication Programme (SSMP) who were progressive and innovative in terms of knowledge of improved agricultural production, and who were in possession of agricultural implements such as ploughs and ox-carts.

**Farmers' Training** Under the SUA B/C CRSP and LVIA seed production programmes, selected farmers and VEOs received training in the technical skills of seed production, seed farm management, and marketing. CCT sponsored various District Agricultural and Livestock Development Officers (DALDO's) in their project areas to receive a training course on seed technology at the TOSCA head-office and laboratory at Morogoro.

It was noted through the course of this study that farmer's training in seed production was not very effective. For example, some farmers in the SUA B/C CRSP program were observed to inter-crop beans with other field crops such as cassava, pigeon peas, and pumpkins. Farmers who were trained by CCT did not follow the isolation distance of 300m for seed crops, and agronomic practices such as soil fertilisation and weeding schedules were not followed. Many farmers under CCT and LVIA seed production programmes did not practice detasseling for maize seed production.

**Seed Provision** According to Jaffee and Srivastava (1994), and Rohrbach *et al.*, (1997), a seed provision mechanism involves the following sections:

*i) Plant breeding, variety selection, and production of source seed.*

In Tanzania, plant breeding is housed within the Ministry of Agriculture and Co-operatives. Plant breeders are responsible for developing, testing, and adapting improved seed varieties, and for providing breeder seed of improved varieties to Foundation Seed Farms (ICARDA, 1994; Due, 1988). For smallholder seed production in Tanzania, Ilonga Research Centre produces breeder seed for sorghum and maize, and SUA produces breeder seed for beans. Breeder seed is provided to Msimba Foundation Seed Farm for multiplication and bulking, and Msimba Seed Farm in turn provides foundation seed to organisations dealing with smallholder seed production.

*ii) Seed Multiplication*

SUA B/C CRSP, CCT, and LVIA relied on individual farmers or groups of farmers to produce certified seed. Farmers participating in seed production were given adequate training and advice on seed production techniques. The study results showed that of all 69 seed producers interviewed, 83% of them produced seed individually and 17% produced seed in small groups of 2-3 farmers.

*iii) Seed Quality Control*

Most small-scale seed projects require on-going technical advice on seed production. In this study we observed that SUA B/C CRSP and LVIA supported smallholder seed producers with training and subsequent advice on agronomic practices, storage, and marketing, while Tanzania Seed Certification Agency (TOSCA) conducted field inspections and sample testing of seeds for germination and purity. In addition, TOSCA provided training personnel to advise farmers about the agronomic aspects of seed production

*iv) Seed Processing and Storage*

Proper seed processing and storage are important aspects of seed production that contribute to seed quality and viability (Cromwell *et al.*, 1992). LVIA provided seed processing machines, and in collaboration with seed producers, built a small seed storage silo in one village to cater for all the villages that participated in their seed production programme. Seeds produced by smallholder farmers were treated with insecticides such as Actellic Super and Fernasan D before storage. Smallholder farmers that participated in the SUA B/C CRSP seed production project were unable to store substantial amounts of seed as they sold most of the seeds due to cash needs. The seeds were sold as food grain and not as certified seed. CCT built storage structures in two villages, Chiguluka and Mpalanga, that participated in their seed production programme. It was observed that the seed storage structure in Chiguluka village was not completed and therefore was not used as a storage facility during the course of this study. In Mpalanga, the CCT- built storage facility was too small to hold all the seed produced by participating farmers.

*v) Seed Marketing and Distribution*

In all the three project areas, it was assumed that if seed of a new variety was made available to a few seed producers, seed of that variety would find its way through local distribution channels to many other farmers in the community. However this assumption was optimistic and did not prove to be accurate. We observed that farmers under SUA B/C CRSP and CCT seed production programmes were not able to sell their seeds easily within their communities, so they sold some of their seed outside their community areas. Even LVIA's seed producers faced this same problem when they first began their seed production programme in 1996-97.

Marketing opportunities for certified seed are very important and can be a means to guarantee seed quality (Fergus and Seth, 1998). Generally, price of seed is set to enable growers to cover their costs and at the same time to maintain purchasing demand. In all study areas, it was observed that smallholder seed producers were faced with seed marketing problems that included low price of seeds, distrust of seed by other farmers, and delays of payment to seed producers after seed sales. Low prices and distrust of seeds produced by smallholder farmers were due to purchasers' lack of awareness of smallholder seed production systems within their communities. Therefore, seed promotion, field visits by other farmers, and training of merchants or farmers' marketing groups/associations that will be selling seed are necessary to increase sales. In Kenya, the Kenya Farmers' Association appears to be more successful in seed marketing (Rusike, 1995), and in Tanzania, the Kibaigwa maize grain-marketing group has also been successful in maize grain marketing.

These experiences can be expanded upon to develop more effective seed marketing systems throughout Tanzania.

### **CONCLUSIONS**

- i). The mechanisms for smallholder seed production varied among the three organisations dealing with smallholder seed production. The study concludes that the mechanisms for smallholder seed production under LVIA were more successful than the mechanisms under SUA B/C CRSP or CCT.
- ii) Criteria such as gender, education, farmers' commitment, and willingness and innovativeness in agricultural activities were used by SUA B/C CRSP, CCT, and LVIA to select smallholder seed producers. In addition, LVIA also included financial capability of farmers to contribute to seed production. To help create financial sustainability of smallholder seed production, the financial capability of the farmers should be considered. Our observations indicate that farmers who become successful seed producers have the financial capability to share in the costs of seed production.
- iii) Smallholder seed producer's technical skills in seed production are still low in the study area. Seed producers appeared to be unable to carry out basic agronomic practices for quality seed production. In addition, problems such as unreliable weather, too many farmers in a group, land shortage, and farmers' inability to afford seed production costs resulted in poor quality and quantity of seed produced by these smallholder farmers.
- iv) In all study areas, it was observed that smallholder seed producers were faced with seed marketing problems such as unreliable markets for seed, low prices of seed, and distrust of seed by non-seed producing farmers.

### **RECOMMENDATIONS**

- i) Smallholder farmers' knowledge and technical skills regarding seed production should be reinforced frequently through field inspection by extension workers under organisations producing seed as well as by TOSCA personnel. Additional seminars on seed production as well as exchange visits with other farmers producing seed may be helpful and will broaden smallholder farmers' knowledge and technical skills on seed production.
- ii) Seed promotion activities should be conducted to raise awareness of all farmers in villages under smallholder seed production programs. Promotional activities should focus on the advantages of improved seed and the quality of seed produced in their own villages by smallholder seed producers. A primary objective of these promotional activities would be to increase the willingness of farmers to purchase seed from smallholder seed producers. We observed that promotion of activities were effective in Mlanje village in Kongwa District under LVIA's sustainable maize seed production program.
- iii) When selecting smallholder farmers for seed production, their financial capability must be considered. In most cases, smallholder farmers have not been able to share in the costs of seed production or store adequate amounts of seed for sale. Instead, smallholder farmers have been selling seed as grain, or they themselves eat the seed during periods of food shortage. For successful seed production, there is a need to consider medium- and even large-scale farmers who are financially capable of meeting the cost of seed production, especially when the projects supporting seed production activities phase out. Organisations involved with smallholder seed production systems

do not need to deal with large farmer groups. Instead, a small number of smallholder seed producers, or a single smallholder seed producer, could produce enough seed for the entire village community.

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