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14

Current Marketing, Supply and Demand of the Agricultural Seeds in Zimbabwe

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WORKING PAPER

Number 14

CURRENT MARKETING, SUPPLY AND DEMAND OF AGRICULTURAL SEEDS IN ZIMBABWE

by

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The views expressed in this paper are personal and do not reflect the official position of ZIDS nor do they reflect the opinions for The Centre for Development Research or members of its staff.

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PREFACE

Future agricultural growth in the communal areas of Zimbabwe must come from intensified land use. This cannot be achieved on any large scale until the needs of small-scale farmers are met with respect to agricultural technique and supporting services. Improved seeds are one of the most important techniques in this regard. The genetic quality of seed determines the potential yield and thus the productivity of complementary agricultural inputs and crop husbandry practices. Moreover, and this is of special importance for resource-poor farmers in communal areas, improved seeds can, if appropriate, make a substantial contribution to productivity independent of other inputs.

In an African context, Zimbabwe has a reputation for a very high standard of agricultural research and for a highly efficient private seed industry - the largest of its kind in Africa.

This working paper examines the equity function of seed supply in Zimbabwe, and analyses the extent to which improved seeds are delivered of the types and quantities required by communal farmers in a timely manner to appropriate locations, and at affordable prices.

Standard textbooks on rural development in Africa pay little attention to agricultural seed in their discussion of input supply systems. Written material on agricultural research and seed production in Zimbabwe is indeed very limited and scattered. The information used in this report is primarily based on interviews of key persons within the industry and surveys in two communal areas, Silobela and Chiduku, covering 70 households.

The author has been a research associate at Zimbabwe Institute of Development Studies (ZIDS) during the period from 1989 to 1991, involved in a research project entitled "The Role of the Seed - Prospects for Food Security and Sustainable Development in Communal Areas of Zimbabwe".

ZIDS has provided a fruitful and highly conducive environment for discussion, for which I am very grateful. I particularly appreciate the support that I received from the head of department, Sam Moyo, and research colleagues Ismir Sunga and Roger Mponde. I am indebted to the ZIDS secretarial, administrative and library staffs for the excellent assistance they have given me.

I am also grateful to the many persons within the industry and ministries who have taken time for interviews. Last but not least, I am thankful for the interest and patience shown me by the 70 communal households followed during the research period.

Despite these many contributions, I alone am responsible for the views expressed and for those deficiencies which may remain.

Copenhagen, February 1991 Esbern Friis-Hansen

1.0 INTRODUCTION

1.1 The role of seed in agriculture

Seed is the most neglected of all agricultural inputs in Africa. During the green revolution of the 1960s, Asia and Latin America experienced a significant yield increase from adoption of improved self-pollinated crops such as rice and wheat. In contrast, the improvement of traditional African open-pollinated food crops has been stagnent.

Seed has a huge potential for improving the livelihood of small holder farmers. Intensification of agricultural production is critical for development given population pressure on arable land and the resulting increased cultivation of marginal areas. Increased use of improved seed may be the cheapest and technically simplest way of increasing productivity of small holder farmers. Four major issues for smallholder adoption of improved seed emerge from this paper:

1. The varieties offered to farmers have to be right. To adopt the seed the small holder farmer has to benefit and the seed thus has to be adapted to his/her conditions of farming. Plant breeding in Africa has in many cases been biased towards high potential areas and optimal management conditions rather than the circumstances faced by smallholder farmers.

2. A viable, economic and efficient seed industry has to produce sufficient quantities of high quality seed to meet the demand. Less tha a third of the African countries have established a formal seed industry,[1] and many of those which do exist are running with large operational losses and moreover fail to efficiently meet the demand for seeds by smallholder farmers.

3. An efficient system of distribution is required for smallholder farmers to get access to seed. The difficulties and costs involved in performing this task cannot be underestimated and are a major constraint in the adoption of improved seed.

4. Adoption of improved seed has to be supported by active agricultural policies. Pricing policies have to be such that it is economically viable for the farmer to adopt the improved seed; usable information and advice have to be given by the extension service; and complementary inputs have to be available.

1.2 Major issues in the Zimbabwe seed industry

The seed situation in Zimbabwe differs from the rest of Africa in the sense that it 'inherited' a well-functioning and highly efficient seed industry from the Rhodesian regime. This industry was, and still is, privately owned, but supported by the government through close cooperation with the state and monopoly agreements. Before independence, the seed industry supported the needs of the large-scale

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[1] FAO 1987. *Evaluation of the Seed Improvement and Development Programme.* Paper presented to 24th conference session. Rome.

commercial sector only. The industry has to a varying degree managed to re-orient its objectives to be consistent with the new political goals of including both farming sectors, i.e. retaining a viable commercial faarming sector, while including the communal sector in the objectives of research, and to suggest options.

Tripartite and Bipartite Agreements
The exitence of tripartite and bipartite aAgreements is a unique component of the Zimbabwean seed industry. The agreements determine the industry's conditions of production by granting monopoly for production of government bred germplasm to a group of large-scale commercial seed producers, today known as Seed Co-op. Two issues emerge with regard to tripartite and bipartite agreements:

a. The extent to which the Seed Co-op has managed to re-orient its aims from exclusively serving the seed requirements of the large-scale commercial sectors before independence, to including tyhe communal sector. The communal sector is today by far the most important market for seed, purchasing more than three-quarters of all seed. The report argues that the Seed Co-op under the tripartite agreements in the early eighties was very successful in disseminating hybrid maize into the communal sector, but that not much progress has taken place since then for other crops.

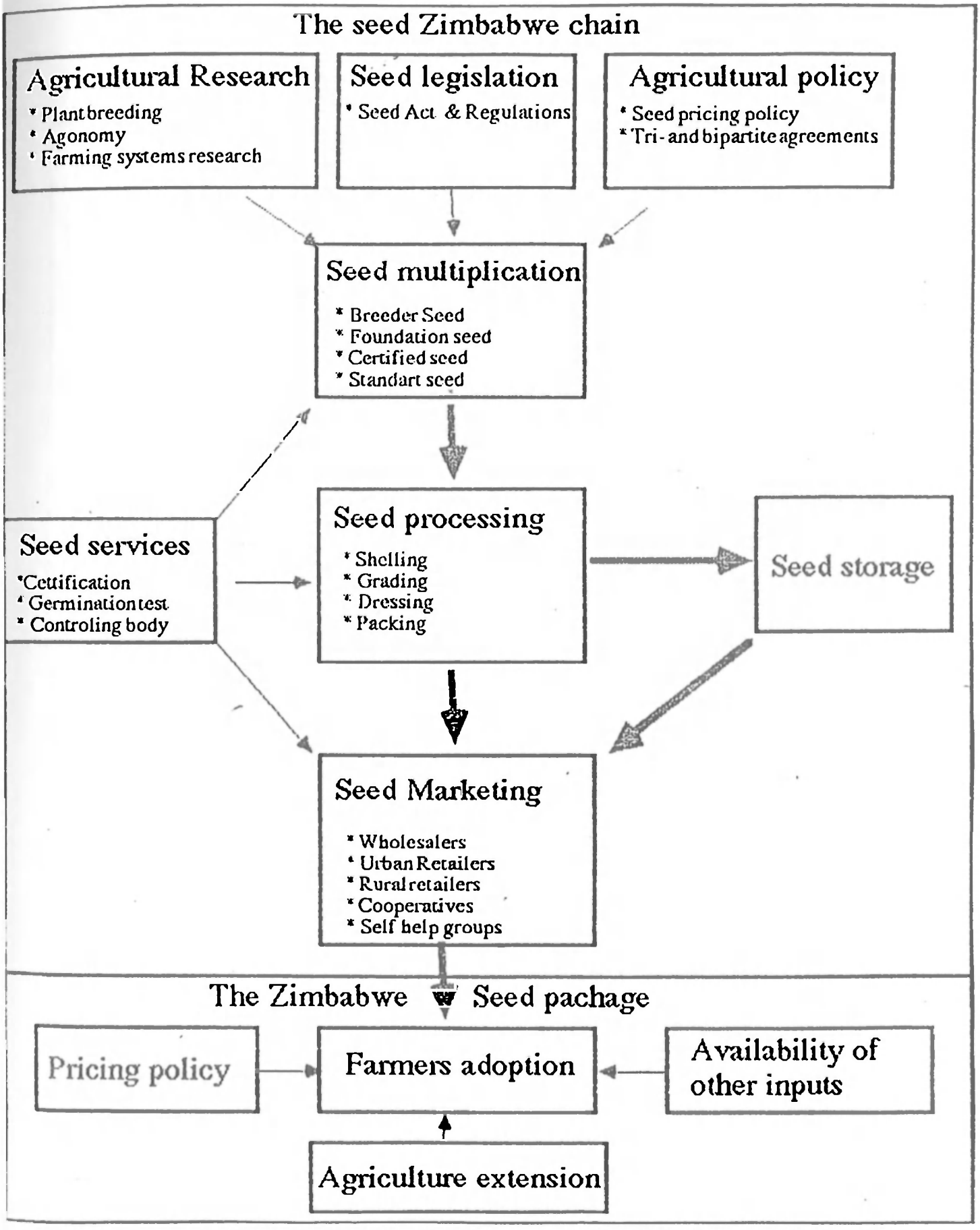
b. There is a consensus that the tripartite and bipartite agreements have served their purpose in establishing an efficient and economically viable seed industry. It may be appropriate now, after the first decade of independence, to review whether such monopoly agreements are still required to secure the existence of the industry and moreover whether they are economically and politically desireable. Part of the analysis necessary to answer these questions is to assess the extent to which unutilized capacity exists to produce agricultural seeds within the private (outside the Seed Co-op) and public sector.

Private and public participation in the seed industry
Both the public and private sectors have a role to play in the seed industry. Seed production is management-intensive and is vulnerable if wrong management decisions are made. Evaluation reports analyzing public seed industries in Africa, agree that weak management has been the major reason for its overall failure.

Attempts have been made in Zimbabwe during the eighties to increase the public participation in seed production and distribution, i.e. involvement of GMB and ARDA. In the case of GMB, the result has been disastrous, while ARDA's results have been far from impressive.

Certain parts of the seed industry should be kept private for the major crops, but parastatals can play an important role in producing crops which are less attractive for the commercial sector, i.e. open-pollinated varieties. Private distribution of seed for other crops than maize is not functioning well.

Figure 1
Chart of the Zimbabwe seed industry.



2.0 SEED MARKETING AND DISTRIBUTION

2.1 Organizational structure of seed distribution

The structure of seed marketing in Zimbabwe is shown in figure 1. As shown here, part of the seed is delivered directly from the seed growers to neighboring commercial farmers. This is possible for Seed Co-op members because the seed is processed and certified on-farm.

The seed growers who are members of the Seed Co-op are obliged to account for all produced seed to the co-op. All seed is not transported to Harare, where storage and warehouses are expensive, but some seed is sold directly from the grower to the consumer/wholesaler. The paperwork is still handled by the Seed Co-op and the price is the same, but it saves the Seed Co-op the transport expenditures and alleviates the total pressure on the transport capacity. Permission for direct seed sale has to be granted by the Seed Co-op, who can overview which varieties are needed where and when.

In recent years, an increasing proportion of seed is also delivered directly from the seed grower to the appointed distributors. In both cases, it is only the seed which is physically moved directly from the grower to the farmers/distributor, while the transaction has to go through the Seed Co-op, which must permit the sale. There is no difference in price, and the major advantage is that it saves unnecessary transport costs and alleviates the pressure on the transport system. The last point may be the most important, given the very limited capacity of transport.

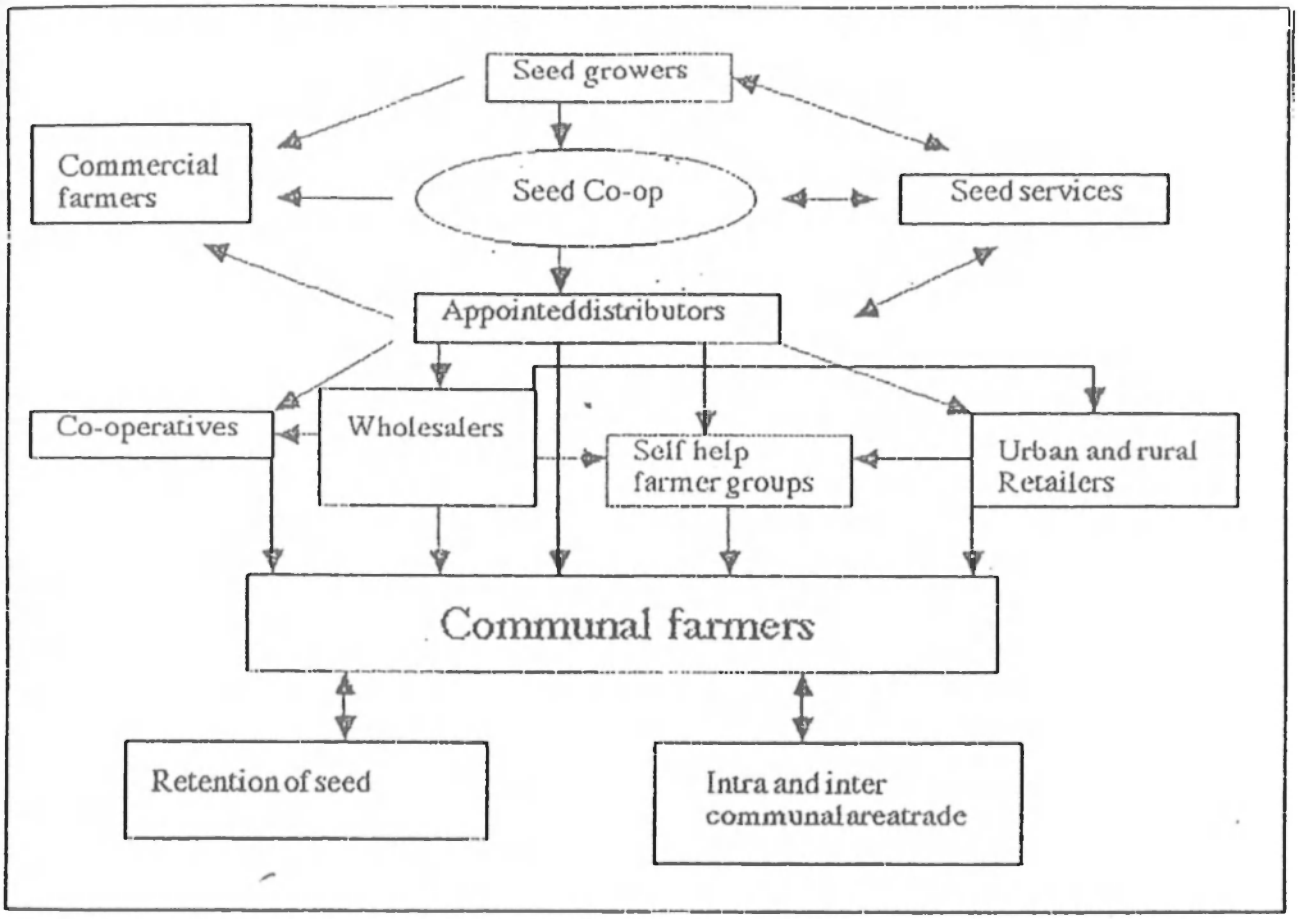
As shown in figure 2, there are six ways for the seed to be marketed from the distributor to the communal farmers.

a. Direct purchase by the farmer at the distributors retail outlets.
b. Through the local farmer cooperatives, who market the seed through their rural depot system.
c. Through other urban based wholesalers, who resell the seed to retailers or sell directly to communal farmers through retail outlets.
d. Through self-help groups, consisting of small groups of farmers who informally pool money and send a representative to town to buy seed.
e. Through urban retailers who resell to farmers from their outlet, e.g. supermarkets etc.
f. Through rural retailers, who buy seed from town and transport it to their rural shop for resale.

The Seed Co-op has 23 appointed distributors, who handle all seed sales for the Seed Co-op outside its own retail sales outlets in Harare and Chinoye. These fall in four groups:

a. National co-operatives
b. Community co-operatives
c. National wholesales
d. Wholesalers within a given geographical area.

Figure 2
Organizational structure of seed marketing in Zimbabwe.



As appointed distributors, they have the sole right to sell seed produced by the Seed Co-op and are given comprehensive discounts to operate on. To achieve this status, a number of conditions are imposed on them by the Seed Co-op in a four page densely written contract, including:

* Prohibition to market seed from other companies
* Provision to keep given quality standards
* Duty to report all incidences of repacking on wholesale/resale level

In principle, the distributor system is based on a monopoly situation with a certain level of limited competition build into the system. It was set up by the Seed Co-op in the early eighties succeeding a more liberalized system which did not function satisfactorily. The arguments for appointed distributors are that:[2]

* The logistics of transporting seed from the Seed Co-op warehouses to the wholesalers are less problematic with a smaller number of large lorries than a large number small lorries. Very large quantities of seed are handled at the peak of the selling season in October and November, and the lorries queue outside the Seed Co-op warehouses.
* As there is only one distributor in each area, he is big enough to serve all fragments of the market, including the more marginal rural areas.
* When the discount margins are relatively low (between 5-20%), a large turnover is required to generate acceptable profits.

The Seed Co-op closely monitors the performance of its appointed distributors, and in case of bad performance, e.g. reduced sales, the Seed Co-op may choose to terminate the contract and choose another wholesaler as distributor in that particular area. This has only occurred in a few cases. The distributors' operational practice in terms of seed delivery to farmers differs remarkably.

2.2 The communal farmer's access to seed

The communal farmer has three options for purchasing improved seed, from the rural depot or retailer, through an Agritex or self-help group, or by individually buying from urban based retailers. The difference in price between the rural retailer and wholesaler/retailer in town and availability/cost of transport are the two most decisive factors for the communal farmers choice.

This section is based on interviews with 70 communal farmers and 8 rural retailers in two communal areas, Silobela (Midlands province) and Chiduku (Manicaland province).

Rural retailers

A large proportion of hybrid maize seed is sold to communal farmers by rural retailers. In Silobela communal area rural retailers sold about half of the total seed, while the proportion was less in Chiduku communal area where the farmers were situated closer to town.

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[2] These arguments were expressed at a conference for the Seed Co-op distributors at Holiday Inn, Harare April 1990.

The rural retailers are often located in groups at the growth points or other rural business centers. The shops are owned by local businessmen and sell a range of products ranging from cigarettes and beer to blankets and kitchenware.

Some rural retailers own or have access to transport, often in the form of a lorry. Some of the retailers act as approved buyers for GMB, and transporting the product for the farmers is for these businessmen a major business. An estimated three-quarters of the grain sold in Silobela communal area is handled by the three retailers situated there.[3] Many farmers cash their GMB checks in the three retail shops, and tend to use part of the money to buy their input requirements there at the same time. Compared with buying and transporting grain, sale of seed is a minor business activity, though it is important during the peak sales of October-November.

Using their own transport, the rural retailers interviewed in Chiduku and Silobela communal areas purchased seed from either the Farmers Co-op or the Seed Co-op distributor, i.e. Zimba Seed in Midlands (Gweru) and Wiruma in Manicaland (Rusape). The seed was purchased in small loads closely following the demand, or rather one step behind it. The demand for seed starts already in August when farmers prepare their watered gardens. In September, demand builds up little by little. The customers are farmers who have the cash and wish to buy seed in good time before planting. The bulk demand for seed starts in October and continues until November/December. During this period, the rural retailers sell seed as fast as they can get hold of it from town.

Many communal farmers buy maize seed in two tempi. First, immediately after the first rains. They then wait to see how the season proceeds and only then decide what variety to buy in their second and final purchase of seed. This is simply a choice between R201, R215 and SC501. In case of an early season drought, farmers may choose to plant more drought tolerant crops such as sunflower, sorghum or pearl millet instead of maize.

None of the rural retailers interviewed had ever received credit or any price discounts from the wholesaler when purchasing seed. Given the absence of private ownership to land in the communal areas, the retailers cannot use their shop as guarantee to obtain credit from commercial banks. This brings them in a tight financial situation, where cash flow problems limit them from pre-season stocking of seed. Beside the cash flow problem, pre-season stocking would entail that the retailers would have to bear the storage cost and the risk or carry-overs if the season alters the projected seed demand. The businessmen are not willing to take such risks and costs.

The consequence of the tight financial situation of the rural retailers is that seed is rapidly out of stock with the onset of the first rains. It typically takes one to two weeks for the rural retailers to restock their shops with seeds, with a subsequent delay in planting for many farmers. The retailers interviewed reported several incidences where they had gone to town to buy seed only to find that the wholesaler was out of stock.

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[3] Friis-Hansen. 1990. *Seed use and farming systems in Zimbabwe - two case studies.* Paper presented at ZIDS Extension Workshop, 4 April 1990, Monematapa Hotel, Harare.

The shop never runs out of maize seed stocks for longer periods, although specific varieties may be out of stock either from the wholesaler or retailer for periods of a few weeks.

Rural retailers moreover tend to stock conservatively and make sure that they have no carry-over of unsold seed in the winter season. The effect of this is that maize seed is not available in rural shops for farmers who are late in planting or have to replant. Silobela communal area experienced an early season dry-spell in the 1989/90 season, and therefore a considerable amount of replanting took place in late December/early January, but no seed was available in the rural shops and the Farmers Co-op in Kwekwe was likewise sold out. The farmers had to travel the extra 50 km to Gweru to buy seed or plant retained seed.

The businessmen all claimed that they had sufficient storage space and were able to pre-stock seed for the whole season if they were allowed seed on credit or as appointed stockists and were allowed to return unsold seed.

Farmer groups

The proportion of seed purchased by groups varies greatly from area to area. In Silobela, approximately a quarter of the seed was bought through groups, while no groups exist in Chiduku communal area.

There exist two forms of farmer groups:

* groups organized by Agritex or other formal authorities, e.i. AFC, NGOs.
* local autonomous marketing self-help groups.

There are 31 Agritex extension groups in Silobela communal area. Each of these groups consists of between 18 to 50 farmers, a total of approximately 1000 farmers.

The farmers in Agritex extension groups hold regular meetings on extension issues. The group interviewed in Silobela held a meeting in September to arrange purchase of hybrid maize. During this meeting, it was decided where, how and when they should buy seed. One or two persons were chosen to organize the purchase. All farmers stated their seed requirements and when the seed prices and transport rates were calculated, money was collected among the farmers in the group and the seed was bought. The group interviewed bought seed from Zimba wholesalers in Gweru and did not obtain any discount. Transport was hired from a local contractor.

The self-help group has recently been established (after the civil war ended in 1987) and has been functioning for the 1988/89 and 1989/90 seasons only. It has not been officially registered by any authority, and the local Agritex staff is apparently unaware of its existence. Only approximate half of the farmers were members, in the two kraals which it covered.

The group, consisting of 45 households, organizes sale of surplus production and purchase of inputs, i.e. seeds and mineral fertilizer, for its members. The self-help group has elected a chairman who leads the meetings and a secretary who records decisions and activities in a book. This work is done on a voluntary basis and the self-help group has no assets.

The self-help group moreover cultivates a common field and uses the proceeds from this to cover smaller expenses. An example of such an expense, is renting a grain weight from businessmen to weigh the crops post-harvest and pre-marketing. If the money for such small expenses should be collected among members it would cause a lot of problems, as some farmers would not have cash at the given time.

In September farmers hold a meeting and assess their seed requirements, much the same way as the Agritex extension groups. Orders, varying from 25 to 150 kg hybrid maize seed, are issued from each of the households and money collected on the spot. Two to three members are elected to handle the seed purchase.

During the 1989/90 season, seed were bought twice as all members did not have sufficient cash for early purchase. They were lucky to find seeds at the Farmers Co-op in Kwekwe for the first purchase and paid Z$50/50 kg hybrid maize seed and only Z$1/bag for transport, i.e. a final price of Z$51/50 kg. The low transport price was achieved because three local self-help groups joined together in hiring a lorry. At the time of the second purchase, no seed was available in Kwekwe and they bought for Z$50/50 kg and Z$8/bag for transport, i.e. a final price of Z$58/50 kg.

The local self-help group undertakes other activities than marketing crops and buying inputs. The group holds regular meetings where current agricultural activities are discussed. The group has selected four men and two women, who inspect each member's field and make comments. They are part of the Seed Co-op competition to be the best communal farmer of the year.

Individual purchase
The third option is for individual farmers to buy seed directly form the Farmers Co-op or private shop in town. It is estimated that a quarter of the seed in Silobela and two-thirds of the seed in Chiduku communal area are bought this way.

Transport takes place on the daily busses. Such farmers may typically buy 2 x 50 kg bags of seed and will have to hire transport from the Farmers Co-op to the bus station. The cost is 1-2$/bag. Loading on to the bus costs 50 cents-1$ per bag. Transport on the bus costs 2$ per bag. The capacity of the bus to transport seed is very limited and often farmers who have bought seed will have to wait a day or two to get their seed on the bus. The bus fare is 6$ one-way. It he/she has no relatives or friends in Kwekwe and no money, he/she will have to sleep outdoors.

3.0 SUPPLY AND DEMAND OF IMPROVED SEED AND CROP SPECIFIC POLICY OPTIONS

The supply and demand situation for improved seeds varies greatly from crop to crop. For one crop, maize, the seed supply is excellent and the adoption rate for hybrid seed close to 100%. The other crop with 100% seed adoption rate, cotton, has in recent years experienced quality problems. Seed supply for purely commercial crops such as winter cereals, wheat and barley, functions very well. The low seed adoption rate for the remaining crops has its root causes in crop specific problems, including

crop production constraints, crop and seed pricing policy, seed production capacity, market cartels, inadequate seed marketing, forex allocation policies and more.

The chapter will, crop by crop, analyze production and price trends, the role of the crop in communal farming systems, supply and demand of improved seeds and outline policy options for solving the problems.

3.1 Maize seed

Production and pricing trends for maize.
As is well-known, maize is the dominant crop in Zimbabwe and represents the success story of small holder involvement in agricultural marketing.[4] The maize production in the communal areas more than doubled between 1979 and 1981, primarily because of increases in the area planted. Between 1981 and 1985 production increased by two-thirds as a result of increased yields, despite three years of successive droughts. The average yields in the communal areas are today approximately twice the pre-independence level, primarily because of increased adaptation of hybrid maize seed and increased use of mineral fertilizers. In 1981, communal sales of maize rose by factor 10, and by 1985 it had doubled again. The communal sector market today covers more than half the total maize supply.

The role of maize in the communal farming systems.
All farmers buy hybrid seed annually and more than 90% of the maize planted is hybrid seed. Maize is the most important food as well as cash crop. Hybrid maize cultivation has spread into marginal areas, where from an agronomic point of view, maize should not be grown. There are several reasons for this dramatic success, including:

* Farmers have a food preference for maize.
* Maize is the only crop where an appropriate high yielding seed is available to farmers.
* The government, during the early years of independence, launched an effective campaign for increased cultivation of maize in the communal areas, supported by AFC and Agritex.
* Maize is an easy crop to handle, with no major production problems, and is not very demanding in terms of labour, compared with small grains.
* All food aid is given with maize, i.e. no small grains are introduced this way.

Not all maize planted, though, is hybrid seed. Local composite maize varieties exist and are cultivated on a small scale. Moreover, farmers do not always buy sufficient hybrid seed and may then add retention 2nd generation hybrid seed to their bought seed. This is typically done for the maize cultivated in the gardens, but may also be the case for parts of the fields.

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[4] See as an example, D. Rohrbach. 1989. *The Economics of Smallholder Maize Production in Zimbabwe: Implications for Food Security.* MSU International Development Paper N. 11. Michigan: Michigan State University.

Supply and demand for hybrid maize seed.
An excellent range of hybrid maize is offered to farmers in Zimbabwe and the seed adoption rate is today more than 90% of all farmers. The share of seed bought by communal and small scale commercial farmers has gone up since independence from 60% to 90% of the total sales. The market share of small packs has remained stable at around one-third of the total sales.

Table 1 shows the trend in seed sales by variety. The dominant market share, around three quarters of all seed sales, of the two short season varieties R201 and R215 is consistent throughout the period. In future the newly released SC501 may slowly increase its market share at tne expense of R215. It is remarkable that no replacement has been developed for R201, released 17 years ago. The market share of the 30-year-old SR52 has been declining by two-thirds over the last decade.

Table 1
Seed Co-op maize seed sales in Zimbabwe by variety.

	PROJ 1989	1988	1987	1986	1985	1984	1983
R201	45.5	46.0	50.0	48.0	44.7	37.4	55.5
R215	34.6	39.3	37.1	37.1	38.0	40.9	18.8
SC501	8.4	2.0	0.2	-	-	-	-
SR52	3.9	3.9	3.9	5.5	6.8	6.4	10.8
ZS206	3.6	3.6	2.9	2.4	1.5	0.8	0.1
R200	1.4	1.3	2.8	3.6	3.4	8.0	9.5
ZS107	0.7	0.7	1.0	1.3	2.1	1.6	2.3
ZS233	0.7	0.7	0.7	0.9	1.2	0.3	-
ZS225	0.6	0.6	0.7	1.0	1.7	0.2	2.0
Other	0.6	1.9	2.8	0.1	0.2	1.1	0.3
Total	559 595	570 036	512 793	497 927	586 468	492 052	460 988

Source: Seed Co-op 1990

One can conclude by and large that the demand for hybrid maize seed has been adequately supplied by the Seed Co-op and that the market share of Savanna Seed is less that 5%. Problems of availability in the rural areas are mainly caused by constraints within the distribution system.

One outstanding feature in Zimbabwean seed industry, is the deliberate ban on the sale of open-pollinated maize. Open-pollinated maize varieties have been discouraged since 1960 and no breeding effort has gone into developing high yielding composites. The only composite available is a South African variety, Kalahari Early Pearl (KEP), which for a number of years has been produced by seed companies for export only.

One seed company began to market KEP in marginal areas during the 1988/89 season. This has caused heated condemnations from DR&SS and the seed and the seed distributors have in 1990 received direct instructions from DR&SS that they are not allowed to sell KEP in Zimbabwe. The arguments are:

* Trial results show that hybrid maize significantly outyields KEP.
* It is very difficult to determine whether the seed sold is KEP or not, as it is a composite with a broad genetic frequency.
* From a national food security point of view, the highest yielding variety should be preferred.

To directly forbid composite maize to be sold is a very patronizing approach and it is not impossible that an improved composite maize would be the best choice for some poor farmers. The reasons for these farmers to buy KEP could possibly be:

* Farmers can retain seed, which saves them the trouble of getting hold of seed every year. Late access to seed in some marginal areas results in late planting, while retained seed can be planted on time.
* Although hybrid maize seed is cheap, the difference in price between hybrid seed and retained seed is between 20 and 30$ for the 25 kg required to plant one ha. The money saved by using retained seed buys from 100-200 kg maize, depending on the local price. In marginal areas and under low-input conditions, the yield for hybrid maize is lower than one ton/ha. The hybrid thus has to out-yield the retained seed by 10-20% before it is economically viable for the farmer to buy hybrid seed annually.

Policy options maize seed

The tripartite agreement has functioned excellently for production of seed maize, while improvements could be made in the distribution system. Since the present system is functioning well, the government should be very cautious when and if changes are implemented. The Seed Co-op has generally done a good job of producing cheap hybrid maize seed and securing their distribution to communal farmers over the last decade.

3.2 Sunflower

Trends in production and prices

As shown in table 2, the communal farmers are the major producers of sunflower in Zimbabwe with a market share of about 75%. Sunflower is in all sectors primar ily grown as a commercial crop and local consumption is very limited. The recommended seed rate is 5-7 kg/ha. Most improved seed is sold to commercial farmers, while sunflower production in communal areas is primarily from retained seed.

Sunflower production has increased steadily since 1983. The increase is almost entirely from the communal sector and stems from an expansion of the cultivated acreage rather than an increase in productivity.

If producer prices were a bid higher, sunflower would be an excellent commercial alternative to maize for large scale farmers. The current price of Z$505 per ton does

not compete commercially with the other summer crops such as cotton. Sunflower can be a risky crop to grow commercially, as it is susceptible to too much rain. If planted early, it may flower before the end of the rainy season. If planted late, there may be need for supplementary irrigation which can not be paid for at the current price. Communal farmers have been more responsive to the increased producer prices.

Table 2
Sunflower production, sale and area by segment, 1988.

	Area planted	Yield	Production	Retention	Sales
LSCF	5,000	1.200	6,000	500	5,500
SSCF	8,440	0.500	4,220	720	3,500
Communal	102,000	0.450	45,900	5,300	40,600
Resettlement	9,000	0.500	4,500	500	4,000
Total	124,440	0.87	60,620	7,020	53,600

Source: Seed Co-op Marketing Strategy report 1989/90.

Role of sunflower in the communal farming system
Economically, maize pays better than sunflower in most years, but sunflower is more drought tolerant and may be planted as late as mid-January as an alternative/supplement to maize. Sunflower is a drought tolerant crop which can be grown under marginal conditions and is used by communal farmers as a security crop which is planted in case of an early season drought. Sunflower is moreover a crop which communal farmers plant if they have time and land available after planting maize, and it can be planted as late as January and still yield reasonably. If planted early, the sunflower will mature during the rainy season while the farmers are occupied with other tasks resulting in late harvesting. When harvested late, the sunflower seeds may dry out and fall of on the ground.

Weeding is often done with an inter-row cultivator, followed by manual uprooting of intra-row weeds. Sunflower is good at competing with weeds and tolerates high levels of weeds without suffering greatly. It can germinate while its height is still low, in case a spell of drought sets in.

Hybrid varieties are easier to handle for the farmers than the locally retained seed which is commonly used. The hybrids mature at the same time, have the same height and have a single large flower. The locally retained, open-pollinated varieties are of mixed origin and therefore have variation in maturity of up to several weeks, have two or more smaller flowers at different location on the stem and differ in height. This makes harvesting more laborious.

As a residual crop, sunflower is most commonly cultivated with minimum use of inputs in the communal areas. Mineral fertilizer is not commonly applied and the

crop often has to grow on residual effect of organic manure application. Sunflower is moreover some times cultivated in intercropping with maize.

Two local varieties are dominant in the communal areas. The most common variety used is an open-pollinated black land race, originating from the improved variety Peridovic which was first introduced in the communal area in the fifties. It has an oil content below 20%. The second popular variety is a white striped land race, in the western world used as bird feed. It yields a higher volume, but its density is lower and the oil content below 10%. For comparison, the content of hybrid sorghum is 45%.

Seed is retained from last year's harvest through mass selection. Selection of seed takes place after harvest but before threshing. Selection criteria are:

1. only large shells
2. only from mature plants
3. choose the heaviest seeds

Supply and demand of improved sunflower seed to communal farmers

The Seed Co-op claims rightly that the low sunflower seed production is not a question of limitation in production of seed and that they supply according to the demand. Sunflower seed sales from the Seed Co-op had in 1988 a market share of about 65% in the commercial sector and 70% in the communal sector. The potential demand for sunflower seed was 620 tons in 1988, or more than 5 times higher than the actual seed sale.

The marketing of sunflower seed is unsatisfactory. Improved sunflower seed is seldom found in rural retail shops, and communal farmers who want to buy them have to go to town to get them. The Seed Co-op distributors do not take sunflower seed seriously and advertising and marketing are limited. The wholesalers and retailers claim that the demand is low and it is therefore not worth the effort to sell sunflower.

Three factors are limiting the demand for improved sunflower seed:

1. The hybrid sunflower seed is more than four times more expensive than retained seed (the producer price). In 1989, the retail price for Msasa seed was Z$95/50 kg, while 50 kg local seed cost Z$22.5 or Z$450/ton. The reason behind the high seed cost is that it is expensive to produce male sterile inbreed lines for the hybrid.

2. Msasa is moreover demanding in terms of water and management level, if high yields are to be achieved. Under the existing conditions of cultivation, i.e. low spacing and no fertilizer application, the communal farmers interviewed unanimously claim that no significant yield improvements are achieved from using the hybrid sunflower. No scientific proof for this exists, as no evaluation trials have ever been carried out under realistic farming conditions.

3. No grading for oil content at GMB depots, and the communal farmers have thus no incentive to adopt the improved varieties because of their higher oil content. Communal farmers harvest sunflower when it has the highest moisture content.

It is stored while still on the husk and threshed when dry, in order to keep the moisture content as high as possible when it is to be sold.

Options for increased adoption of improved sunflower seed
Expanded cultivation of sunflower coupled with more efficient marketing and processing could alleviate the present national deficit production of edible oil.

GMB mixes all the sunflower they buy, whether it is Russian White (oil content ca 9%), local retained Peridovic (oil content ca 15%), improved Peridovic (oil content ca 40%) or Msasa (oil content ca 45%). The oil extracted from sunflower is used in the food processing industry by companies such as Olivine, Lever Brothers and Blue Ribbon. When the oil extractors buy sunflower, they do not know which quality they get. The oil extractors have to set their machinery to handle sunflower with an oil content of 20-25%. This is necessary because some of the sunflowers cultivated by communal farmers have such low oil content. From a macro economic point of view this is clearly a waste. In a situation where Zimbabwe has a deficit production of vegetable oils, only half of the potential oil is extracted from the hybrid sunflower varieties with high oil content.

In order to solve the problem facing the seed industry for sunflower, a number of options are open, none of which are mutually exclusive alternatives, so any combination would be possible:

Option 1. Grading for oil content at GMB depots and pay a premium price for sunflower with high oil content.
The equipment required to grade sunflower for oil content is expensive and needs qualified technicians to operate it. At present such equipment can not be installed at the GMB depots, but may well be established by the private oil extracting companies. More simple ways of grading could be thought of. A simple grading by variety could easily be undertaken. GMB rejects this idea as impossible in practice, as they should then keep in store and handle the different varieties separately.

Option 2. To deregulate marketing of sunflower.
COPA is arguing for this solution. Deregulation of sunflower marketing would probably result in a situation where the private oil extractors would contract large scale commercial farmers to produce hybrid sunflower. It is likely that this would boost the commercial sunflower production considerably, solve the problem of under-utilization for the oil extractors and maybe even alleviate the national shortage of vegetable oils. But GMB would get a huge problem with selling the sunflower varieties bought from the communal areas. This solution would not increase adoption of improved varieties in the communal areas. GMB has rejected this proposal and maintained that all sunflower has to be sold through GMB.

Option 3. Change in breeding objectives.
Make improved varieties available to communal farmers which have a yielding advantage over the existing, local open-pollinated cultivars under the existing low-input conditions of cultivation. Plant breeding has possibly concentrated too much on breeding for higher oil content under optimal agronomic conditions.

Option 4. Make related inputs available on credit.
Agritex has in recent years encouraged communal farmers in Natural Region III, IV and V to grow sunflower as a cash crop. AFC has not been pushing sunflower and very few short-term seasonal loans have been given to other crops than maize and cotton. If the hybrid sunflower available today is to be adopted by communal farmers, a deliberate campaign by the government has to be undertaken, including granting seasonal loans to hybrid sunflower and fertilizer packages.

Option 5. Improve the marketing of sunflower seed.
Presently, sunflower seed is only available in the district and provisional towns. Selected support to wholesalers and retailers who actively market sunflower may increase sales.

3.3 Groundnut

Production and price trends
The area cultivated with groundnuts in the communal area expanded and production reached a peak in 1981/82 but has declined since then. Most groundnuts grown by communal farmers is not sold to GMB. Groundnuts are grown primarily as a subsistence food crop, with harvested surplus sold on the local market. The parallel market prices are at least twice as high as the official GMB prices, which is obviously the reason why communal farmers prefer to sell their groundnuts to the local market. The nuts are either sold unshelled by the bucket (20 litre tin) or processed to peanut butter. The sales of industrially manufactured peanut butter have risen 10 fold and it is clear that the farmers are not growing enough groundnuts to satisfy the local demand.

Even though the prices of groundnuts are much higher on the parallel market, the communal farmers can not be sure to sell their products right away. On a vender type of market, it may take some time to sell the product, even if this may not be more than a few bags. Prices may be high, but the volume sold is limited.

The factors limiting production and deliveries in the communal sector are mainly:
a. Availability and distribution of seed
b. Groundnut is a labour-intensive crop and the producer price offered by GMB is not high enough to ensure an adequate return.

The size of the future production of groundnut in the communal areas depends on the availability of labour and the provision of seed.

The area of groundnut planted by the small scale commercial farmers has decreased from 1980/81 to 1984/85, and increased thereafter. The latter increase in deliveries is attributable to producer price increases from Z$500/t shelled to Z$1000/t shelled, between 1984/85 and 1988/89.

Possible factors limiting the future groundnut production and deliveries by small scale commercial farmers to GMB are:
a. Shortage of draft power

b. Shortage of labour during critical periods
c. Low yields achieved by farmers possibly due to poor seed and inappropriate seed make groundnut unattractive as a cash crop when compared to maize, cotton and sunflowers.
d. The difference between the black market price and the official price is also a possible factor limiting deliveries to the GMB.

Most of the groundnuts currently grown by the small scale sector are of unknown varieties and this makes them unsuitable for the export market. Hence, it is vital that the multiplication of suitable short season varieties be increased so that they are easily available to the small scale sector.

It is quite evident that groundnut production and deliveries to the GMB by the LSCS are directly related to the producer price. Production peaked in 1981/82 and decreased steadily until 1985/86 when only 2,970 tons were delivered. During this period, the producer price only increased by Z$80/ton. When the producer price was increased by 50% from Z$500/t to Z$750/t, the LSC producers responded by more than doubling their production and deliveries to the GMB.

In the 1988/89 marketing year, 18,200 tons of unshelled groundnut were delivered by the LSCS, and this represented a 15% increase. Given a good season, deliveries to the GMB in the 1989/90 marketing year could be over 22,000 tons unshelled.

Factors likely to limit production and deliveries in future are the following:

1. The producer price will have to increase to a more satisfactory rate if new growers are to be attracted and existing growers are to continue in the production.

2. Availability of harvesting equipment: of the 40 harvesters in the country, 15 are in poor condition and were imported in the early 1970s. The remaining 25 were imported in 1981. Thus, the availability of new harvesting equipment is limiting expansion by both established and new growers. It should be noted that if farmers are to expand to more than 20 hectares of groundnut, hand harvesting becomes uneconomical; hence, there is a need for harvesting equipment. Availability of spares becomes essential to maintain existing and new harvesters that may be imported.

3. The methods of sampling and grading presently used at the GMB depots need to be improved if the present number of producers are to continue. The present grading system is complicated and time consuming. Furthermore, it is impossible to obtain a representative sample from 500 bags on a truck.

World trade in edible groundnut runs at about half a million tons annually. Some seventy percent of this quantity is imported by Europe and more than 90% of all supplies comes from 3 countries, USA, China and Argentina. The market has a number of sub-sectors but the bulk of trade is in nuts for processing (roasting and salting or coating) for which runner varieties are by far the most important. Zimbabwe's groundnut production is unimportant in global terms and cannot influence international prices. Furthermore, the main variety, Flamingo, is not a

runner, nor does it look like Virginia, the other main process variety, although it has strong Virginia antecedents. Because of the smallness of the crop, the marketing effort has been directed to establishing Flamingo with certain major processors as a variety in its own right, to establish a solid base from which to launch expansion.

Problems of excessive aflatoxin development have been experienced during shipment of the long season variety Flamingo, recommended for large scale commercial farmers. Thus, it is thought that this variety is generally prone to field invasion by the fungus *Aspergillus flavus* which produces aflatoxin when it invades groundnut seeds. The export market now requires minimum levels of oleic and linoleic acids (O/L ratio) in groundnut varieties and these affect the beefing quality of confectionery groundnut. Hence, the groundnut breeding programme now has to screen more carefully before arriving at a potential release. It is envisaged that a long season variety of comparable or better yield than Flamingo with satisfactory seed quality, shelving characteristics and a minimum problem with aflatoxin will be released in the next 2 seasons.

An expansion of exports is restricted by the damage caused by the incidence of aflatoxin in the crop. Brazil, which sold small quantities to many buyers, was vitally wiped out as an exporter because of continuing high levels of aflatoxin in their deliveries. Although there have been, and are, major problems with aflatoxin in both Flamingo and Swallow, buyers have so far been willing to give Zimbabwe a little breathing space in which to overcome them.

Assuming that the aflatoxin problem can be overcome and present standards of physical presentation maintained, it should be possible to expand export market off-take to 20,000 HPS kernels at or near to current premiums relative to competing origins. Under the circumstances a single export channel is most likely to provide the stability which the emerging industry requires.

The role of groundnut in the communal farming system
Communal farmers use retention seed only. The local varieties are medium-season groundnuts and have to be planted early to achieve a reasonable yields. If the farmers plant late because of labour or draught-power bottlenecks, groundnut production becomes a high risk venture because of the mid-seasons drought-spells. Harvesting takes place in February/March.

No mineral fertilizer is commonly applied on groundnuts, which are cultivated in rotation with maize. The planting rate is commonly not more than 50kg seed/ha or half the rate recommended by DR&SS and Agritex.

The two most common retained varieties are Natal Common and Valencia R2, both out-dated open pollinated varieties originally released by DR&SS. The retained seed is generally tolerant to insect attacks, while problems with pests (Apghids, Leaf spot and Rosette) occur in some seasons. No pesticides or sprayers are available or used.

Supply and demand for improved groundnut seed.
While the availability of seed of long season groundnut varieties presents no problems, the availability of good quality short season groundnut seed has been a

problem for the past decade. Various schemes for seed multiplication anc distribution have been tried with little success.

Given that over 90% of groundnut growers are communal area farmers many reports and surveys have documented a shortage of short season groundnut seed resulting in reduced plantings and consequent reductions in deliveries to the GMB. With groundnut seed currently being handled by the GMB for the season 1988/89, only standard grade Spanish (Natal Common) and a very limited amount of plover have been available. Spanish generally has a lower yield potential than other recommended varieties.

Communal farmers in all parts of the country report acute shortages of seed. This shortage is both caused by the non-availability of improved seeds over the last decade and by the recurrent drought which has wiped out the groundnut crops in several areas, e.g. Midlands. The potential demand for improved short-season groundnut seeds is 1,800 tons for the communal sector alone (calculated with the optimal planting rate).

Only a few hundred tons of standard groundnut seeds have been produced and not of the varieties appropriate for the communal areas. It is the biggest scandal of the seed industry that the short season variety Plover, which was released from DR&SS in 1982, is still not available to communal farmers, who demand it desperately.

At the root of the present shortage of short season groundnut seed, is that it is not economically viable to produce them for the seed growers. The yield potential of short season groundnut varieties is only 50% of that of the long season varieties and currently the producer price is the same for both types. The result of this is that it is unattractive for seed growers, who all have irrigation facilities, to grow short season groundnut seed when the same price is paid for short and long season groundnut seed.

Groundnut is part of the bipartite agreement, and the Seed Co-op formally has the responsibility for producing sufficient seed to meet the demand. To keep down production cost of groundnut seed, the Seed Co-op went into an agreement with GMB, that processing of groundnut was undertaken by GMB, who bought an advanced groundnut processing plant in the early seventies.

For some reason, groundnut seed production was by decree from the Minister for Agriculture, transferred from the Seed Co-op to GMB in 1983. As groundnut seed production is not with the existing prices an economically viable venture, the Seed Co-op was not very sad about the decision. What was overlooked was that GMB is not, according to the Seed Act, a legal seed certifying agency and as such cannot produce certified seed. GMB, moreover, does not have the staff to ensure the proper handling of breeder seed and foundation seed.

During the first years, GMB organized seed production through a system of out-growers set up with the help of COPA. For clearly economic reasons, the out-growers have only wanted to grow Flamingo (long season variety), while no one has been interested in multiplying Plover seed. Instead of solving the problem, GMB gave up

and has in recent years simply processed and cleaned the groundnut purchased from the communal areas and offered it for sale as standard seed. The GMB marketing of standard groundnut seed has been far from successful. One reason may be that they have not offered better seed than what the communal farmers already had, but depots have not shown to be effective marketing outlets either.

The illegal certification of seed by GMB was not stopped before 1988. Since then, the Seed Services spent half a year hand sorting the breeder seed for Plover, which GMB had mixed up with other varieties. The responsibility for multiplying groundnut was returned to the Seed Co-op in 1989, when the Co-op was given 90 kg cleaned breeder seed of Plover by the Seed Services. The expected production of Plover in 1989/90 is 20 tons. If all 20 tons pass the gemination test and are all planted for further seed multiplication, up to 300 tons should be available for sale for the 1991/92 season.

The basic problem of the same seed grower prices for short and long season groundnut has not yet been addressed, and the Seed Co-op intends to solve the problem by linking seed production of Flamingo with seed production of Plover. The Seed Co-op is in a better position to "force" a less profitable venture (Plover seed production) on the seed grower when combining it with a more profitable venture (Flamingo seed production). GMB still handles the shelling of groundnut for the Seed Co-op. Their processing plant is too big and not very appropriate for shelling a seed crop, as the groundnut easily tends to split.

Options for solving the groundnut seed problem
To ensure that short season groundnut seed is produced in a proper manner, the responsibility of groundnut seed production should rest with the seed houses which have the necessary expertise to handle parent seed stocks and the infrastructure for marketing and distribution. The seed houses could ensure that seed would reach the communal areas, as is the case for maize, thus overcoming the distribution nature of GMB depots.

Option 1. Continuing the present system in a modified form.
A Groundnut Review Committee was established by AMA in 1988 at the request of COPA and with the participation of NFAZ, ZNFU, COPA and GMB. They came up with the following recommendation:

> GMB has the capacity to shell and handle large quantities of seed. They suggest that the responsibility of groundnut seed production remains within the GMB, but the actual seed multiplication is done by the Seed Co-op, which is the certifying agency for groundnut. Certified seed growers should deliver to the GMB, which would then sell on the seed to the seed houses in 50 kg pockets for repacking in various sizes and marketing.
>
> The pricing should be negotiated by the seed house with MLARR and should allow at least an acceptable profit to ensure viability of the groundnut seed industry.

Option 2. Liberalizing groundnut seed multiplication.
Caution must be used to avoid the granting of monopoly to a single seed house, which in the past has shown not to work properly.

Option 3. Small hold seed bulking.
There is a need for a major boost of short seasoned seed to the communal farmers. To maximize the spread of the first commercial release of Plover seed produced for sale in 1991/92 could be given to different communal areas for farmers own bulking up. Local self-help groups could multiply the certified Plover variety to supply their community.

3.4 Cotton

Trends in cotton production
Cotton is marketed through a single channel. All cotton is sold to CMB, which process the cotton and export the end-products. This system was designed at the time of sanctions against Rhodesia, when the UDI government exerted state control over production.

The CMB has had success in extending the controlled system of cotton cultivation to include communal farmers. The number of registered cotton producers increased from the 800 large scale commercial cotton growers before independence to 150,000 cotton growers in 1986 and further to 200,000 growers in 1989. The area cultivated with cotton has increased three fold for the communal sector (figures including SSCF, RF and ARDA). The area with commercial cotton growers has declined since 1984 because of low non-viable producer prices. The commercial cotton area has kept dropping and was in 1989/90 down to 40,600 ha. The yields level has not increased over the last decade. Yields of the communal sector are less than half those of commercial cotton growers. Production of cotton is roughly shared with 45% to commercial farmers, 45% to communal farmers and 10% to ARDA and SSCF.

Supply and demand for cotton seed.
Cotton Marketing Board, CMB, is a parastatal financed partly by government and partly by the commercial cotton growers. CMB has monopoly on research, seed multiplication and marketing, processing and export of the cotton sold by farmers. the CMB moreover dictates to the farmers which varieties to plant!

CMB has thus complete control over the entire production chain from research to production and sale of the lint. CMB was established during the period of sanctions against Rhodesia to target the cotton production to fit the niches open on the world market, f.ex. lint for Switzerland. The markets developed during this period are still the major markets for Zimbabwean cotton exports. Important bi-products are vegetable oil and livestock feed. Approximately 60% of all vegetable oil consumed in Zimbabwe is extracted from cotton seed.

There is no difference in the quality used for cotton grown by communal, resettlement, small Seed Co-op commercial or large Seed Co-op commercial farmers. Alba K 603 is cultivated in the South Eastern part of Zimbabwe, while Alba K 502 is

grown in the North. The long stable cotton variety Delmac demands high levels of management and is cultivated by 70 - 80 farmers. It is a variety which yields lower, but which yields a special long and high quality lint. There is a premium for growing this variety.

CMB has over the years kept strict variety control and ensured a high quality of seed. The seed have been sold at low prices.

CMB administers a Seed Multiplication scheme. It is policed by a Seed Multiplication Committee consisting entirely of large scale commercial cotton growers. The seed are multiplied by a small group of about 20 large scale commercial cotton growers. These are all among the best managed farms. The seed growers get a 12.5% premium for the seed crop. The seed crop is processed at the Greendale plant. The plant has a numbering system and send sample from all growers for gemination tests at Seed Services.

CMB is a seed certifying agency, while the seed certifying authority lies with the Seed Services. In 1989, samples of seed came back from Seed Services showing too low gemination rates for the seed to be certified. CMB went ahead to certify and sell the seeds to the farmers. Seed Services has threatened to withdraw the status of certifying agency from the CMB if something is not done to ensure that this will not happen again. CCGA is preparing to take CMB to court and claim compensation from CMB on behalf of its members. CCGA is also demanding that the production manager of CMB be held responsible.

The cotton research station has until now functioned to farmers' satisfaction. CCGA is worried about the future status of cotton research. The government has cut the budget of cotton research to a level where the standards are deteriorating. The cotton research station cannot offer conditions which can attract highly qualified researchers. CCGA therefore suggests that cotton research be privatized. CCGA has set up their own research unit to conduct research complementary to what is done at the cotton research station. The CCGA research unit today runs many trials of the cotton research station.

The CMB monopoly has been functioning to the satisfaction of the farmers until the 1987/88 and 1988/89 season, when CMB certified and released seeds of low quality.

The problems of recent years with certified seed has centered around the long stable variety Delmac. Probably other varieties have the same problems although to a lesser degree. The gemination rate for the Delmac variety was well below the 70% required for certification. The problem was created by the acid delete treatment. Either too much acid was used, or the seed was left in the acid for too long, or the seed was not neutralized sufficiently after treatment. Despite the fact that some of the seed did not meet the requirements for certification, the Delmac variety was sold to 70 to 80 large scale cotton growers. Many of these growers suffered severe losses.

Albar K502 was introduced prematurely in 1988/89 to replace Albar G501. This was done after pressure from CMB customers, who had problems with the old variety,

although G501 was preferred by the cotton growers. Because of weather conditions, the crop had to be replanted, but because of their rush to release K502, CMB was out of stock of quality seed. Old stock of G501 seed was used to replant.

Options for solving the cotton seed problem
A recent commission of inquiry suggested privatization of the acid delete plant in Greendale. CCGA foresees problems with privatizing the acid delete plant only, as it is attached to a ginneri.

The Seed Services emphasizes that the root cause of low quality seed has not been established with certainty. More investigations are required. The World Bank is financing a study of cotton marketing and prizing, to be conducted by an independent consultant. CCGA hopes that this study will include the whole structure of CMB, including the seed production which is an integral part of the industry. The study will start by July 1990.

CCGA would in principle welcome a total liberalization of the cotton market, but this will not be possible without free foreign exchange control - which is not likely to come about for some time. For the time being, CCGA therefore prefers that the existing single channel market structure is continued.

3.5 Small grains

Production and price trends for small grains
Small grains comprise red and white sorghum, pearl millet and finger millet. Small grains are almost entirely grown by communal farmers, although some 20% of the marketed red sorghum are produced by commercial farmers.

Government policy towards small grains has been ambiguous. It has encouraged production of small grains by communal farmers as ecological suitable crops for the drought prone areas in Natural Region 3, 4 and 5. Pearl millet and white sorghum are drought tolerant and may secure a crop in dry years where maize fail. To be weighed against this objective are considerations of economic efficiency, which discourage a widely cultivation of small grains. GMB has experienced high costs of storage and since 1984 supply has exceeded demand.

Only a small proportion of sorghum produced by communal farmers is sold to GMB and the crops primary serve as subsistence crops. One exception was in 1985 when sale increased to a quarter of the production, largely due to the establishment of 135 temporary collection points that year. Two-thirds of these collections points were redrawn the following year. The pricing level has had less influence on the level of deliveries from the communal farmers to GMB.

The sale pattern of millet drastically changed in 1984 with the government decision to include it as a controlled crop. Millet deliveries to GMB in 1985 was close to three times the sorghum deliveries and more than a third of the total pearl millet production was marketed. The deliveries were reduced by 40% in 1986 as a consequence of the reduced number of collection points.

Commercial farmers responded to the increased prices on sorghum in 1985 and sales were more than twice the level of the sales from the communal sector. The 1986 sale was even higher, where after it declined. Even though sorghum is a relatively minor commercial crop, the market was flooded during these two years and GMB has had considerable volumes of small grains in stocks since then.

The market for small grains has been limited by high selling prices e.g. GMB and by low quality grains. Moreover little research has been done in the area of industrial utilization. To bring down the increased cost of storing small grains, the market for red sorghum was deregulated in 1989, with GMB securing a flour price of 180$/ton. A large part of red sorghum is consumed by Chibuku breweries and given the free market they are now in a strong position to set demands. Chibuku has over the last season changed its sorghum buying policy. Instead of buying unspecified sorghum from GMB, it is now contracting commercial farmers to produce hybrid sorghum DC75, a red sorghum with good brewing characteristics, at higher prices than the GMB flour price. If the contract growers produce sufficient quantities, Chibuku is likely to buy all their red sorghum requirements from this source, and GMB will find it difficult to sell the red sorghum varieties bought from communal farmers to the industry.

The role of small grains in the communal farming system
Small grains are principally cultivated in the more marginal parts of the communal areas. White sorghum and pearl millet are cultivated as subsistence and food security crops. Their storageability is very good and the small grains can store well in the household for several years without any use of chemicals. Red sorghum and finger millet are used for brewing traditional beer.

Farm management and productivity have not changed much over the last decade. Most planting takes place through broadcasting, although some farmers have started planting in straight lines to facilitate mechanized weeding.The vast majority of the area cultivated is planted with retained seed of local open pollinated varieties. Mineral fertilizers or organic manure are seldom used for cultivation of small grains and yields are low. Communal farmers are faced with a number of problems related to cultivation of small grains:

1. The palatability of the existing local variety is not always good. Farmers in some areas state that they have reduced the cultivation of small grains because of taste preference for maize. They therefore only eat sadza during drought years. Taste preferences will though vary depending on the location.

2. Because of the traditional farm management techniques used, labour requirements for especially weeding and harvesting are high. As small grains are broadcasted weeding is done by hand picking and is very laborious. Harvesting is commonly done by hand with the use of a knife.

3. Bird guarding for white sorghum and pearl millet is a very demanding labour task. Quelea birds will seriously damage the crops if the fields are not constantly guarded while the grins are still soft in January and February. The problem of bird damage has increased over the last decade as the cultivated fields have become more scattered. If the small grains are dry-planted well before the first

rains in October, the plants may be more mature at the time the quelea birds arrive. So-called bird-proof varieties exist locally with characteristical stiff straws preventing the birds from eating the soft grains and alleviating the need for bird guarding.

4. Processing of small grain represent a major problem and the crop is therefore not popular among women, who are responsible for this tedious task. The small grains are traditionally first mall by beating a pile the harvested plants with a wooden stick. Thereafter the small grains are commonly hand grained to flour between two stones. To solve this processing problem and increase local consumption, MLARR contracted in 1988 ENDA-Zimbabwe to undertake a Small Grain Milling Project. An appropriate de-hulling machine was developed and produced locally and already by April 1990, some 18 de-hullers were operating in communal areas.[5] Judging after one year of operation, the de-hullers seems to have become a success being utilized at a high rate and with reasonable economic returns for the private owners.

A number of local varieties of small grains are used and maintained by communal farmers. ENDA has since 1985 implemented an Indigenous Small Grains Project, aiming at conservating, multiplying and distributing local varieties of sorghum and millet. They have during the last five years collected more than 100 local varieties and generated awareness about the process of genetic erosion.

Supply and demand for improved seed of small grains.
Seed sales have experienced an overall decline after a peak sale in 1984. Hybrid seed sales show a clear correlation with the areas cultivated by commercial farmers, indicating that the seed used by communal farmers is very limited. Also the majority of sorghum sales from Savanna Seed, which is very limited, is sold to commercial farmers. Part of the explanation why the adoption of improved sorghum seeds are not higher is that no high yielding open-pollinated variety has been produced by the seed industry until now.

Despite the fact that three new varieties were released in the eighties for white sorghum and pearl millet, these have not yet been made available to communal farmers.

The improved white sorghum varieties SV1 and SV2 were released by the breeder at DR&SS in 1985. Due to production problems the SV2 has not been available in any quantities before the 1989 season, while the SV1 is still not available.

Two years passed before the Seed Co-op received breeder seed from DR&SS and could start the initial bulking of 50 kg of each SV1 and SV2. Because of unavoidable circumstances, SV1 was never planted in 1987 and germination was below standard when it was planted in 1988. New release of SV1 breeder seed was given to the Seed Co-op in 1989, which because of too much rain was never planted. SV2 has been bulked up and was commercially available during the 1988/89 season. Very little was

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[5] The progress of the Small Grains Milling Project was discussed at a Small Grains Workshop organized by ENDA and MLARR held at the Harare Sheraton hotel on 5, 6 & 7 March 1990.

offered for sale at village level and the seed remained at distributor level, resulting in a carry-over stock 1989/90 of about 5000x50 kg equivalents. The majority of the Seed Co-op's sale of SV2 went for the export market, which is ironical given the fact that there most certainly is a huge demand for the seed if made available at community level.

Table 3
Delay from release by DR&SS to commercial availability, for open-pollinated sorghum and millet seed.

Variety	Year of Release from DR&SS	Commercially available
SV2	1985	From 1988/89 season
SV1	1985	Initial bulking planed 1990/91
PMV1	1987	Initial bulking planed 1990/91

Source: Interview with Mr. Fenner, Director DR&SS and Mr. Young, Production manager Seed Co-op.

The improved pearl millet variety PMR1 was released in 1987 to ARDA. After three years of little or no activity, bulking of the variety was rejected by ARDA for commercial reasons. The Seed Co-op has now agreed to multiply PMR1, but seed will not be available in commercial quantities before 1993.

To summarize, the problems facing the production and distribution of improved open pollinated varieties of small grains are complex and include:

* Slow release procedures by DR&S.
* Little interest in open pollinated crops by the seed industry.
* No great interest by public institutions in promoting improved varieties of small grains, as the no industrial market has been identified and storage costs at GMB has been great. The crops are by Agritex workers moreover regarded as a traditional crop of little commercial interest.
* Little interest in open pollinated crops from seed distributors.
* No knowledge about the new varieties of sorghum and millet among communal farmers.

Options for increasing the adoption of improved seeds of small grains.
Communal farmers do not have any tradition of purchasing improved open pollinated sorghum and millet seed, and an awareness of their existence and benefits has to be build up in the communal areas. Communal areas trials conducted by DR&S show 70% yield advantage for the SV1 and SV2 over local varieties and a 25% advantage for the PMR1. If these results are applicable under real conditions, the seed industry should have no problems in selling the seed it they were made available to farmers in rural retail shops and supported by information about their existence by Agritex.

Option 1.
Agritex and other local authorities should organize a campaign for increasing the knowledge about improved sorghum and millet seed.

Option 2.
Seed production constraints should be seriously addressed by MLARR. Although multiplication of the new varieties now seems in place, the ministry should monitor the production levels, as the past record is far from impressing. Alternatively sorghum should by released from the bipartite agreements and given free to open competition. Small holder seed bulking is moreover an real alternative for improved small grain seed.

Option 3.
Seed marketing is not functioning satisfactory for small grains as a firm demand for the new varieties has to be build up before distributors find it economically viable to push small grain seed. Selective economic support to private distributors during the introduction of the new seeds could solve this problem.

Option 4.
Presently only maize seed is given to farmers as part of the food relief program, but there is no reason why they could not be expanded to include improved white sorghum and pearl millet seed. The major recipients of food relief are already situated in traditional small grain growing areas and the suggestion of distributing improved small grain seed free of charge as part of a food relief program, is not to expand the cultivated areas but rather to replace inferior varieties with improved and thereby increase productivity.

3.6 Legumes

Trends in production of legumes
Soyabeans are the only legumes for which an improved seed is available and moreover the only legume of commercial importance. Other legumes grown in Zimbabwe are cowpeas, field beans and bambaranuts, which are primary grown by communal farmers for subsistence.

Soyabean deliveries to GMB have been more or less stable from the commercial sector in the early eighties, with an increase to around 100,000 tons in 1988. According to COPA, commercial soyabean production would increase another 50% if producer prices were increased to around Z$480/ton. Soyabeans are grown on heavy soils only, and is an excellent rotation crop for maize, cotton and winter wheat. The open-pollinated soyabean varieties offered by the seed industry can survive mid-season droughts and yield about 2 tons/ha.

The role of legumes in the communal farming system.
Soyabeans.
A number of legumes is grown in communal areas, including cowpea, bambaranut, field beans and soyabeans. As discussed in chapter 4, DR&S is conducting research programs for the first three crops, while seed is still not produced by the seed industry. The fourth crop, soyabeans, seeds are available at the urban wholesaler level only and a number of production constraints is limiting its expansion.

Following an initial decline in the early eighties, delivery of soyabeans from communal farmers to GMB has been at a low level, i.e. 6-800 tons. As existing varieties of soyabeans are appropriate for parts of the communal areas, a considerable potential exist for expanding cultivation. Soyabeans can provide an important source of nutritious food for household consumption, it could moreover become a good commercial alternative/supplement to continuous maize production, and is finally from a ecological point of view an excellent crop for rotation with maize. There is need to select the area with a high potential for soyabean production within the communal sector and back the introduction of seed with extension advice and credit.

Production level of soyabeans in the communal areas is today limited by a number of constraints. These include:

* sufficient rainfall (soyabean requires not less than 800mm)
* reasonable Ph level
* absence of seed at village level
* absence of rhizobium inoculant at village level

Availability of cowpea seed in communal areas is clearly limiting its area of cultivation. The absence of seed supply and recurrent droughts have caused seeds of cowpeas to disappear in many parts of the communal areas. A few varieties are still common in some parts. Cowpeas are primary used as part of the diet for subsistence consumption.

Cowpea.

Communal farmers cultivate a creeping variety of cowpeas, grown as much for its leafs as for grain. Leafs are eaten from ultimo-January to primo-March. Part of the leafs are eaten fresh as spinate, while the rest is harvested, cooked, dried and stored for the dry season. Although cultivation of cowpeas is often limited to a few lines intercopped with the maize, it is an important crop for the household diet and may be eaten three times a week during the rainy season.[6]

Babaranut.

Bambaranut (roundnut) is a common legume throughout communal areas of Zimbabwe and is eaten as a supplement to maize in the diet. Bambaranuts are planted with the first rains in October and harvested in March/April. Most retained seed is planted and seed is sold between neighbors. The recurrent droughts in the early eighties caused considerable genetic erosion and many farmers are today planting seeds obtained from different sources, including markets in town. Farmers interviewed in Silobela communal area complained that because they have mixed the seed, part of the field was early maturing while the remaining part was late season maturing. The result was that some plants matured long before others and as the crop is harvested at the same time, part of the crop may not yet be ripe when harvested.

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[6] A comprehensive study of the role of cowpea in communal areas was done by D.M.Naik 1988. *Production and uses of cowpea (Vigna unguiculata) in Zimbabwe.* Mimeo. Agronomy Institute, DR&S.

Supply and demand for improved legume seed
The vast majority of seed is sold to commercial farmers and the level of seed sales are directly dependent on the price difference between maize and soyabeans. Approximately half of the area planted by commercial farmers is retained seed, while seed is purchased for the other half.

A major effort was made in 1986, by DR&S in cooperation with the Seed Co-op to promote cultivation of soyabeans communal areas. The area chosen was Hurungwe communal area, and the campaign was relatively successful.[7] The Hurungwe experience showed that it is possible to grow soyabeans in the communal areas, but it requires serious support and extension advice to expand the cultivation of soyabeans to smallholders. Soyabean is not an easy crop to grow and it is more suited to larger areas, which are combine harvested, because there is limited time to harvest the crop. Moreover, a lot of the communal soils are unsuitable because they are too sandy.

A precondition for achieving full potential of soyabeans is to apply rhizobium.[8] Rhizobium inoculant exists in farmers co-op sales outlets and is produced in sufficient quantities on Marondera research station, but is today seldom used in the communal areas. The rhizobium can be applied on the soyabean seed by mixing bottle of the bacteria and apply sugar to the liquid to make it stick onto the seeds. The seeds then have to stay in the shadow and should be planted the same day. Little research has gone into use of rhizobium in communal areas and it is questionable whether the rhizobium bacteria can work in communal area soils, which often are:

* hotter soils, i.e. high temperatures
* acid soils, i.e. continuous cultivation of maize without liming
* better drained soils, i.e. almost pure sand soils with little organic matter content for the rhizobium bacteria to hold on.

Promiscuous varieties exist, which fixate nitrogen without application of rhizobium, but are presently not promoted as they have slightly lower commercial yield potentials. Commercial farmers are getting 2-2.5 tons/ha on average for soyabeans, while communal farmers get around one ton/ha.

DR&S is engaged in new legume plant breeding programmes for cowpea, field beans and bambaranuts, and in a not too distant future, improved varieties will be released. Several companies are interested in multiplying and marketing these varieties, including the Seed Co-op, National Tested Seed and ARDA.

Options for increasing the availability of legume seed
There is a potential for expanding soyabeans into the better parts of the communal areas, but it requires support from Agritex and other local authorities. While there

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7 Dr. Whingwiri, at that time head of Agronomy Institute, DR&S, was the driving force behind the campaign. Since his departure from DR&S, the campaign has come to an end.

8 Rhizobium bacteria acts as an inoculant in the soil and drastically increases the fixation of nitrogen from the soyabeans.

is no production capacity problems for soyabean seed, marketing of seed is a constraint and seeds are today only available in district and provincional towns.

Multiplication of improved seed of cowpea, bambaranut and field beans should not automatically be given to the Seed Co-op as an extension of the Tripartite and bipartite agreements. Other serious producers such as National Tested Seed and ARDA could possibly compete in producing seeds for these crops.

3.7 Vegetable seeds

Production trends
Zimbabwe has in recent years experienced a horticultural revolution under which vegetables, flowers and fruits have become significant export items. Commercial horticulturists yearly export in the range of 3000 tons of vegetables and similar volume of cut flowers. The vegetable exporting producers are commercial farmers who successfully have managed to adjust the changing market conditions and transform from grain producers to production of high value crops. The typical commercial vegetable farm is above 30 ha irrigated land and located within a few hours driving distance from the market. The vegetables cultivated by commercial growers are largely specialized varieties, as demanded by the consumers.

The commercial markets for vegetables are:
- Export to Europe (Harare airport).
- Urban consumption (hotels, restaurants, supermarkets).
- Food processing industry.

Availability of transport is crucial for marketing of vegetables. The consumers demand fresh high quality vegetables and most commercial vegetable growers have their own lorries. Vegetables are transported to the market the same day they are harvested and ready for sale/export the following day.

The role of vegetables in the communal farming system.
Vegetables are cultivated by communal farmers in intensively managed watered gardens. The majority of communal farmers cultivate small vegetable gardens varying in size from a few square meters to more than one ha. The gardens are commonly located either close to the household well or in the vicinity of rivers. Local by-law set limits to how close to river banks cultivation can take place, often 30 meters. Despite considerable efforts on part of agritex, gardens are often cultivated closer to or directly on the river banks, resulting in severe soil loss through erosion. Vegetables are cultivated over two seasons, August to December and December to March. During the first season the vegetables are watered, while the second is rain-fed.

Vegetables play an important role in the farming system as an important nutritious supplement to the diet. For some resource-poor farmers, the produce from the gardens make a food bridge from when grain run dry from the household storage to the maize can be eaten green on the fields.

The major vegetables grown by communal farmers are cabbage, rape, onion, and tomato. Retention of seed are done only if no improved seed are available. Continuous cultivation of retained seed encourages accumulation of bacterial diseases. Especially during the summer season, it becomes difficult to control diseases in vegetables planted from retained seed.

Vegetable production in communal areas are primarily for subsistence. Commercialization of vegetables in communal areas is limited by:

* transport constraints
* absence of local markets
* severe shortage of improved seed

An increasing number of town residents have in recent years taken up cultivation of vegetables, perhaps as a response to increased unemployment and high prices.

Supply and demand for improved seed

Seed for some vegetables are produced in Zimbabwe, while seed production is not economically viable for a most vegetables. There is generally sufficient supply of domestically produced vegetable seed. These include cauliflower, pumpkin, cucumber, squash, water mellon and certain varieties of tomato.

The problem with domestically producing other vegetables seed is that the varieties available are low seed yielders under Zimbabwean conditions and prices internationally are relatively low as the vegetable seed are produced on very large scale by European seed houses. Marondera research station under DR&S is responsible by horticultural research, but has kept a low profile and not much have come out from their program. Research efforts to explore the possibilities of increasing the seed yield of vegetables which are presently imported, have in the past been insufficient. In the light of the commercialization of vegetable production, i.e. export potential of commercial growers, two posts as vegetable breeders have been established and filled with expatriates.

If the seed yield of onion for example could be increased to 1000 kg/ha, it would become very profitable to start a local seed production. The price of imported onion seed today is Z$50/50kg. Sold at this price and the above stated seed yield, the returns would be Z$50,000/ha.

Seeds for vegetables which are in great demand in communal areas, such as tomatoes, legumes, lettuce, cabbage, cauliflower, onions, have to be imported. Also specialized seeds varieties for a specific export market, such as asparagus, sweet corn, etc. are imported.

Foreign currency restrictions are seriously limiting the availability of vegetable seeds. The Export Promotion Program, EPP, make foreign exchange available for commercial horticulturists who produce for the lucrative export market. These farmers can apply for foreign exchange allocation to import their vegetable and flower seed requirements. Processing of allocations takes up to 2-3 month, but with early planing the system functions smoothly. Some of the commercial horticultural farmers import their own seed directly, while others let commercial seed houses handle the import.

The seed houses interviewed, criticized the system of individual-farmer-import of seeds, as this did not allow for accumulation of experience regarding new varieties.

Foreign exchange allocations for import of vegetable seeds for the communal sector and for commercial farmers who produce for the domestic market are extremely inadequate. The estimated level of foreign exchange allocations, calculated in Z$, is today around 30% of what it was at independence. During the same period the demand for vegetable seed has increased dramatically in the communal sector.

The two major importers of vegetable seed are Farmers Co-op and National Tested S, who each receive foreign exchange allocation amounting to about Z$10,000 each, which is far from the demand which conservatively estimated exceeds Z$500,000 annually. The reasons why the supply situation been less serious in recent years are partly ad-hoc allocation by donors, i.e. USAID, and foreign exchange available from the export incentive scheme. The seed houses has benefitted from this scheme, under which they can retain 25% of the increase in export earnings in foreign exchange. The situation is clearly not sustainable and it is far from certain that the increase in vegetable exports will continue.

Zimbabwe imported a wide range of vegetable seed from European seed houses until the boycott of Rhodesia in the late sixties, after which about 80% of the import shifted to South African seed houses. Most vegetable seed is today imported from seed houses in Denmark and Holland, but the level of import is much lower than in the sixties. A Danish seed house, Vikima Seed, which is the most important seed exporter to Zimbabwe, states that the vegetable seed export to Zimbabwe today is approximately 10% of the export level to Zambia and Mozambique. The reason for this large regional difference is that seed import in the neighboring countries have received highest priority in the last decade, while seed import is given low priority by the Ministry of Trade and Commerce, with exception of seed for commercial vegetable exporters.

Options for increased availability of improved vegetable seed

Option 1.

The long term solution to satisfy the demand for vegetable seed should be based on domestic production of vegetable seed. The pre-condition for this is the development of appropriate varieties with sufficiently high seed yield to make domestic seed production economically viable. The first step to achieve this has been taken by the appointment of two vegetable breeder posts by DR&S in 1989. Still, there is a long time perspective for achieving the goal of self-sufficiency in respect of vegetable seeds with the present research budget level.

ARDA has proposed to increase their vegetable seed production and claim that they economically viable already with the existing varieties can produce vegetable seed. This claim is contradictory to statements from DR&S and persons interviewed with in the seed industry.

Option 2.

The short to medium term solution is to give high priority to import of vegetable seeds. In the present situation, foreign exchange allocations are in practice only

allocated to satisfy the seed requirement for commercial farmers, while the majority of communal farmers do not have access to improved seeds. There are very good arguments for MT&C to allocate sufficient foreign exchange to meet the demand for seeds to the communal sector, as the benefits are high compared with costs. A small 50g pack of onions at a cost of 44 cents, is sufficient to meet the needs for a typical communal farmer.

3.8 Tuber seed and planting material

Production and pricing trends for tubers
Irish potato is the only tuber which is cultivated and marketed commercially in Zimbabwe. Nearly all marketed potatoes are cultivated by a small number of commercial farmers situated in the vicinity of the towns. All producers with more than one ha of potatoes are obliged to be registered as potato growers. The total registered area cultivated with potatoes is about 3000 ha. All of this is under irrigation and potatoes are produced three seasons yearly. Yields are up to 17 tons/ha, but average is closer to 10 tons/ha.

The Harare market is covered by four potato wholesalers who form a monopoly cartel. The four wholesalers are said to meet once a week to fix the price of table potatoes on the market. This leads to non-season fluctuations in prices, where potatoes are held back from the market in order to keep prices high. As a perishable commodity, potatoes cannot be held back for too long and the market is occasionally flooded. Prices of potatoes vary over the year, from Z$5-15 per 15 kg, mainly depending on seasonal variations.

The role of tubers in the communal farming system
Very little is known about cultivation of Irish potatoes in communal areas. An estimated 2000 to 3000 ha may be cultivated without being registered.[9] Cultivation is to some extend taking place in Nyanga, in the vicinity to the potato seed growers. No survey has even been carried out to establish the role of potatoes in the communal farming system.

Sweet potatoes are widely used by communal farmers. The crop plays an important role for household food security and as an important staple. At least four locally retained varieties are used by communal farmers. Yields are not above 10 tons/ha.[10] Red, white and yellow varieties with different period maturity and different characteristics are cultivated and maintained locally.

Cassava is not commonly cultivated in Zimbabwe, except in Manicaland Province bordering Mozambique - where cassava is a major staple food.

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[9] Interview with Mr. Mike Joyce, Potato breeder, DR&S.

[10] As sweet potatoes in communal areas are cultivated in one meter high and three quarter of a meter broad ridges of varying length, it is very difficult to estimate the yield per ha.

Supply and demand for improved seed
No formal agreement exists for seed production of Irish potatoes. All seed are presently produced by little more than a handful growers located in Nyanga.

Production of potato seed is a four years process, including first year virus tested seed, breeder seed, foundation seed and commercial seed (AA1). The AA1 seed potatoes are today limited to be cultivated by commercial farmers, although potatoes could potentially be cultivated to a large extend in the communal areas. The fact that commercial potato cultivation can be undertaken by peasant farmers under rained conditions has clearly been demonstrated by the developments in Tanzania and Kenya.[11]

New varieties of sweet potatoes have been developed by the Crop Science Institute with a yield potential of 40 tons per ha. No one is presently involved in or planing multiplication and distribution of these improved sweet potato varieties.

Cassava is a new crop in Zimbabwe with a potential both as a food and as a fodder crop in Zimbabwe. High yielding varieties have been developed at the Crop Science Institute which have yielded more than 40 tons per ha. No seed industry support of sweet potatoes exist.

Options for increased availability of improved seeds of tubers for communal farmers
There is much to gain from introducing competition in the multiplication of Irish potatoes. The potato seed growers have effectfully had monopoly on production of potato seed, since Nyanga is the only area in Zimbabwe where potato seeds can be grown free of diseases.

Option 1.
Multiplication of Irish potatoes, sweet potatoes and cassava is now possible through tissue culture techniques available at the Crop Science Institute, University of Zimbabwe. The foundation seed could be supplied from a centralized tissue culture laboratory and the actual multiplication could take place either in decentralized nurseries or decentralized tissue culture laboratories. To be sustainable nurseries they would have to be kept free from aphids. This can be done by using UV protective plastic with holes too small for the aphids to come through (aphids netting). Establishment of such nurseries requires small amounts of foreign exchange, which is presently the constraint for their expansion.

Such nurseries could be run locally on commercial basis by for example:
- Local school teachers
- Agritex workers
- Private innovative farmers or businessmen

The establishment of such nurseries would imply financial support in the form of start-up funds of approximately Z$50,000. Production of tubes may not prove to be

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[11] See a recent study by Linda McArthur Crissman 1989. *Evaluation, choice and use of potato varieties in Kenya.* International Potato Centre, Social Science Department. Working Paper 1989-1. Peru.

economically viable and may need some kind of subsidy. The start-up fund could thus be partly a grant, and partly a soft-loan.

One commercial farmer, Mr. L. Edwards, recently set up a potato seed nursery successfully, using tissue culture tubes as planting material and vegetative propagation as means of multiplying.

Another example is a small decentralized tissue cultivation project recently implemented in a cooperation between the Crop Science Institute and Agritex and financed by Danida. Eight Agritex officers and workers have been trained in tissue culture techniques and been allocated sufficient laboratory equipment to undertake tissue culture multiplication of Sweet potatoes, Cassava and Irish potatoes on location where they are based.[12]

DR&S has not responded positively to informal suggestions by the university to multiply Irish potatoes through tissue culture and is apparently in favour of continuing the existing cartel of potato seed growers. According to the law, plant breeders' rights can only be granted to varieties before they are made public, and the potato varieties have been on the market for years. The seed legislation does not allow DR&S legal powers instituted to prevent their varieties from being multiplied by tissue culture techniques. In addition, DR&S does not have moral justification for doing so, as government planting material should be made available for the benefit of the wider public, including communal farmers.

Option 2.
It is now possible to transfer genes to existing potato varieties. Three genes, PVY, PVX, PLRV, constructed for the purpose of creating resistance to pests in Irish potatoes, today exist in refrigerators in American and European universities. These can practically be transferred to Zimbabwean potato varieties at the Crop Science Institute. As Zimbabwe by no standards is an important potato producing country, the companies owning patent rights to the genes may possibly be willing to license their use in Zimbabwe for a relatively limited payment. As foreign exchange is not readily available at the university, this has not yet taken place.

12 See E.Friis-Hansen 1990. *Tissue-culture multiplication of cassava - a project proposal to Danida.* Mimeo. Harare.