HOUSEHOLD AND NATIONAL FOOD SECURITY IN SOUTHERN AFRICA

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FOREWORD

In 1985 the University of Zimbabwe and Michigan State University initiated a Food Security Research Network for Southern Africa. The objectives of the network are to conduct research that informs policymakers about food security issues and to help strengthen the regional capacity for food policy analyis. The underlying premise of the network is that building excellence in research capacity for national policy analysis comes through experience. In practice, this requires a long-term commitment to analytical capacity building, consistency in funding, and constant interaction between researchers and policymakers.

The network has sponsored four annual conferences for network researchers, policymakers, SADCC officials, and representative of international and donor agencies. The aim of the conference is to share research findings, identify new research themes, and provide an opportunity for policy dialogue between regional researchers, policymakers, and government officials.

The 1988 conference brought together 110 participants who deliberated on 28 papers. In the Official Opening, Vice-Chancellor W.J. Kamba of the Univesity of Zimbbawe highlighted the importance of including health related-issues as a component of food security; and Zimbabwe's Senior Minister of Finance, Economic Planning, and Development B.T.G. Chidzero outlined policy reform priorities for Southern Africa. Subsequent sessions focused on *SADCC's Food Security Programme, the Impact of Market Reform on Food Security, Food Security Policy Options, New Technology to Improve Food Security, Family Food Security Options in Low-Rainfall Areas, Expanding Agricultural Trade in the SADCC Region, Nutrition and Food Security, the Contribution of Small-Scale Rural Enterprises to Employment Generation and Food Security, and the Impact of Irrigation on Food Security.*

A highlight of the 1988 conference was the participation of five nutritionists from Zambia, Zimbabwe, Sweden, and the United States. The presence of the nutritionists stimulated formal and informal discussions on the food access side of the food security equation and drew attention to the need to initiate more research in this area.

A second highlight of the 1988 conference was the attention given to reducing barriers to expanded intraregional trade in the SADCC region. Results presented suggest that there appear to be substantial price and nonprice barriers to expanded trade. Nevertheless, there exist significant opportunities for expanding intraregional trade that can be realized through appropriate government initiatives.

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RESEARCH ON GRAIN LEGUMES IN SADCC COUNTRIES

D.M. Naik[1]

INTRODUCTION

Agriculture forms the mainstay of the economy of the SADCC region. At present food production is largely in the hands of smallholders who depend on agriculture for their livelihood and who comprise just over 70% of the region's population (Devres, 1985). The agriculture sector in the SADCC region has performed poorly for the last three decades. The equivalent of about 20% of food availability in the region is obtained from grain imports. Cereal supply from within the region following the 1986 harvest was a nominal 179 kg per annum per person which is comparable to FAO estimates for the region of 175 kg per person during 1979-81 (SADCC, 1988).

Against this background, lagging food production is a concern for balancing cereal-based diets with protein, as well as carbohydrate rich grain legumes. This urgency is heightened by sporadic reports of malnutrition affecting up to 35-50% of young children in the drought-prone areas of the midlands of Zimbabwe during 1987-88 (*The Herald*, 1988), an occurrence which is all too common in other SADCC countries as well.

In the context of the overall food production situation in SADCC, usually measured in terms of staple cereals, this paper describes the situation *vis-a-vis* grain legumes and the role of the SADCC Grain Legume Improvement Programme (SADCC-GLIP). The paper examines the potential impact of the research programme on the improvement of groundnuts, beans and cowpeas, and considers other grain legumes that could be included as the programme develops. The paper concludes by assessing some factors that could influence the quantities of grain legumes that become available for daily consumption and trade.

MAJOR GRAIN LEGUMES IN THE SADCC REGION

The grain legumes discussed here include groundnuts (*Arachis hypogaea L.*), beans (*Phaseolus vulgaris L.*) and cowpeas (*Vigna Unguiculata (L) Walp.*)., which presently comprise the SADCC Grain Legume Development Programme (GLIP). Legumes are regarded as contributing only a minor portion of the total daily caloric intake and a relatively small percentage of the protein intake of diets. But, statistics do not accurately describe the importance of grain legumes in the region. Most small-scale, rural farmers produce grain legumes for household use and local as well as urban markets. For instance, a survey on production and utilization of cowpeas conducted

[1]International Institute of Tropical Agriculture and Department of Research and Specialist Services, Harare, Zimbabwe.

in Zimbabwe, revealed that almost 90% of 145 farm families from 13 districts of six provinces grew and used cowpeas. Furthermore, one-half of them indicated that their total production was usually insufficient for their household needs (Naik *et al.*, 1987).

Reliable data on production and yield of grain legumes in SADCC countries, as elsewhere, are difficult to compile. Several different legumes may be grouped together under a general term such as pulses, or dry beans. Furthermore, grain legume crops are often not only cultivated for their seeds, but also for their pods and leaves as is with cowpeas. Another factor contributing to the inaccessibility of accurate production figures is that grain legumes are commonly intercropped with one or more other crops (Summerfield and Lawn, 1987).

The total amount of grain legumes (pulses) produced in the SADCC countries in 1986 was estimated by FAO (1987a) to be 740,000 mt (1.2 million mt with groundnuts), a figure not much higher than an estimated 678,000 mt (1.1 million with groundnuts) in 1981. Malawi and Tanzania accounted for 76% of the total production. Between 1981 and 1986, the hectarage planted was static and the average yield was about 0.5 mt/ha (Table 1).

Table 1. Total production of grain legumes, SADCC countries, 1986[a].

Location	Area ('000 ha)		Yield (kg/ha)		Production ('000 mt)	
	1979-81	1986	1979-81	1986	1979-81	1986
Country						
Angola	110	110 F	385	364	42	40 F
Botswana	30	30 F	622	467	19	14 F
Lesotho	16	15 F	536	411	8	6 F
Malawi	335	329 F	609	603	204	198
Mozambique	124	125 F	459	480	57	60 F
Swaziland	5	5 F	576	609	3	3 F
Tanzania	693	672 F	454	539	315	362 F
Zambia	19	9 F	340	622	7	6 F
Zimbabwe	41	69	566	734	23	51
SADCC						
Totals	1,373	1,364	na	na	678	740
Means	153	152	505	537	75	82
Africa	9,112	10,872	588	646	5,359	7,026
World	60,515	68,403	676	807	40,882	55,200

[a]Crops harvested for dry grain only. F = FAO estimates. na indicates data not available.
Source: FAO (1987).

Groundnut production
Total groundnut production in the region, equivalent to one-tenth of Africa's production, has remained static during this decade at about 400,000 mt annually. Similarly, average yields have remained unchanged at a little above 0.5 mt/ha. In 1986, Malawi contributed 44% of regional groundnut production (FAO, 1987a).

Dry bean production
The SADCC region produced about 450,000 mt of dry beans in 1986, about a quarter of Africa's production. While there was no increase in the hectarage planted to beans during the 1980s, there was a small increase in total production, possibly explained by the improvement of average yields in Tanzania and Zimbabwe by 20% and 30%, respectively (FAO; 1987a).

Cowpea production
Production of cowpeas is difficult to estimate as it does not enter into market statistics. However, an area of approximately 500,000 ha is believed to be planted to cowpeas. Considering the widely held view that cowpea yields average 240-300 kg/ha, total production of cowpea grain would be in the region of 120-150,000 mt annually. Mozambique and Tanzania are reputed as having the largest hectarage under cowpea (SADCC, 1984).

Productivity constraint
The productivity of the already disadvantaged grain legumes is severely curtailed by a host of insect pests and diseases (SADCC, 1984). The extremely poor seed supply situation further reduces their potential productivity. Breeding advances in disease and pest resistance and a supply of healthy seed will undoubtedly deliver more of the largely unrealized potential of existing cultivars.

Other grain legumes in SADCC
In addition to groundnuts, beans, and cowpeas which currently form the SADCC/GLIP, the *Grain Legume Feasibility Study* (1983) also recommended consideration of other legumes less widely grown in the region:

- Bambarra groundnut, *Vigna subterranea* (L.) Verdo.;
- Pigeon pea, *Cajanus cajan* (L.) Millsp.;
- Chick pea, *Cicer arietinum* L.;
- Mung bean, *Vigna radiata* (L.) Wilczek; and
- Pea, *Pisum sativum* (L.).

Bambarra groundnut
Bambarra groundnut (*Nyimo* in Zimbabwe) is ubiquitous in the region, primarily grown for consumption of its grain by rural farmers. It has an enviable reputation as a hardy crop because of its tolerance of drought conditions and its ability to yield a reasonable crop when grown on poor soils. The bambarra groundnut is indigenous to Africa, where total annual production is estimated to be about 330,000 mt (Kay, 1979), mostly from West Africa. Some research on this crop is being conducted in

Mozambique, Swaziland, Zambia, and Zimbabwe. Mozambique and Zambia have a modest collection of local germplasm (SADCC, 1984).

Chick pea and dry pea

In 1986, Malawi and Tanzania produced a combined total of about 30,000 mt of chick peas on 60,000 ha. Tanzania and Lesotho are the major producers of dry peas with Tanzania producing twice as much of the total 12,000 mt (FAO, 1987a). Most of the chick pea and dry pea production is exported.

Pigeon peas and mung beans

Pigeon peas and mung beans are grown on a very limited scale in Malawi, Tanzania, and Zambia. Introduced varieties of mung beans have been evaluated and released for production in Tanzania, while minimal research restricted to evaluation of introductions of pigeon peas is conducted in Malawi and Zambia (SADCC, 1984).

TRADE IN GRAIN LEGUMES

A total of 66,000 mt of grain legumes, including groundnuts, was exported from the SADCC region between 1984 and 1986. Groundnuts accounted for about one-half of this total. Malawi exported 83% of the groundnuts, and together with Tanzania, the two countries were responsible for 87% of the exports of legumes (Tables 2 and 3). Among these, chick peas are an important export commodity from Malawi and Tanzania, while dry peas are exported primarily by Lesotho and Tanzania. Relative to Africa, groundnut and other legumes were 13% and 26%, respectively, of total exports but these figures represented less than 1% of worldwide trade in grain legumes (Tables 2 and 3).

GRAIN AND LEGUME CONSUMPTION

While statistical summaries tend to underestimate the role of grain legumes in people's diets, there is little doubt about their widespread use and popularity in SADCC countries. Groundnuts, beans, cowpeas, and bambarra groundnuts were ranked among the top four most important legumes in SADCC by the *Grain Legume Feasibility Study* (SADCC, 1984). However, the frequency of use of these legumes may be limited by supply.

Respondents to the 1985 cowpea survey in Zimbabwe indicated that they consumed cowpeas at least twice and sometimes thrice a week in various forms: green leaves as a vegetable relish (*munyemba*), dried, stored leaves (*mufushwa*), green peas (*mukove*), dry grain boiled with maize (*mutakura/inkobe*), and cowpea paste (*nupiza/bhiza*) (Naik, *et al.*, 1987). Similar, diverse uses are prevalent in other SADCC countries.

Table 2. Trade in pulses, SADCC countries, 1984-1986[a]

Location	Imports		Exports	
	mt	US$ ('000)	mt	US$ ('000)
Country				
Angola	30,000 [b]	14,000 F	na	na
Botswana	5,000 F	3,000 F	na	na
Lesotho	5,000 F	1,700 F	700	210
Malawi	na	na	17,798	4,859
Mozambique	5,400 [b]	3,100 [b]	na	na
Tanzania	1,000 F	600 F	10,000 [b]	5,500 F
Zimbabwe	402	166	3,538	2,099
Totals	46,802	22,816	32,036	12,668
Africa	289,855	162,414	123,713	56,319
World	4,412,831	1,903,150	4,627,560	1,867,539

[a]The word pulse is used here to be consistent with FAO usage which would normally exclude groundnuts. [b]unofficial figure. F = FAO estimates. na indicates data not available.
Source: FAO (1987a).

Table 3. Trade in groundnuts (shelled), SADCC countries, 1984-1986.

Location	Imports		Exports	
	mt	US$ ('000)	mt	US$ ('000)
Country				
Angola	6,600	5,050	na	na
Botswana	246	315	132	80
Malawi	na	na	28,420	13,409
Mozambique	na	na	3,400	2,150
Zimbabwe	235	136	2,421	1,666
Totals	7,081	5,501	34,373	17,305
Africa	109,272	60,909	260,745	151,107
World	2,470,949	1,857,689	2,511,364	1,711,332

na indicates data not available.
Source: FAO (1987a).

Beans are grown primarily for their dry seeds which are cooked after soaking and usually served whole. The preferred seed colours are red, white, yellow, and speckled types. Immature pods and seeds, as well as tender green leaves, are also utilised. Leaves are often cooked together with mashed groundnuts. In addition, pea beans are canned as baked beans, which are popular in the urban areas.

Groundnuts are the most popular food legume. Almost mature pods are boiled and the cooked seed is then consumed whole, while dry seed is either eaten raw or roasted. A very popular use of dry groundnut seeds is to pound them and use the mashed seeds to prepare vegetable dishes. Industrially, groundnuts are used in the production of cooking oil, cake meal, and peanut butter, while processed confectionery nuts are important in local and export trade.

THE SADCC GRAIN LEGUME IMPROVEMENT PROGRAMME

Cooperation for Development in Africa (CDA), an informal association of seven donor nations: Belgium, Canada, France, Italy, United Kingdom, Unites States of America, and the Republic of Germany; launched a reconnaissance visit to all SADCC countries in March, 1983. In their report, CDA members recommended the expansion of the Regional Groundnut Programme, based in Malawi, to include other important grain legume crops in the region. The Consultative Technical Committee (CTC) of SADCC, comprising national directors of research (which now forms the Board of SACCAR), agreed with the recommendation and proposed a comprehensive feasibility study for a Grain Legume Improvement Programme for SADCC.

Following the report of the feasibility study which was conducted during late 1983, the CTC chose to implement one of three alternatives which would include groundnuts, beans, and cowpeas in a SADCC-GLIP, with headquarters for each component to be based in Malawi, Tanzania, and Mozambique, respectively.

Programme goal

The goal of the programme is to increase grain legume production within the region and thus reduce food shortages and incidence of malnutrition due to low productivity caused by constraints to production such as diseases, insect pests, drought, and low-yielding varieties. To achieve this goal, the programme envisages the improvement of germplasm through breeding, introductions, and adaptive testing, as well as the strengthening of national grain legume improvement programmes through training.

Programme strategy

The SADCC-GLIP is a single, multicomponent programme whose strategy for achieving the goals of the programme is largely similar for the three component crops which is described in general terms below.

Germplasm improvement
The three international agricultural research centres which are individually responsible for the groundnut, bean, and cowpea improvement programmes, respectively--each holds a world germplasm collection of the respective legumes. Thus, the centres are a primary source of diverse germplasm for the programmes. Indigenous germplasm collections add to the introductions, and this pool of germplasm is further augmented through the breeding activities of the national and regional programmes. In addition, national programmes are assisted with breeding crosses made at their request for specific requirements.

Adaptive testing
Varieties developed in both national and regional programmes are formulated into test nurseries for evaluation of yield potential, resistance to diseases and/or pests, tolerance to drought, and other agronomically desirable attributes. The nurseries are widely-tested by national programmes in collaboration with the regional programmes for adaptation to various agroecological zones.

Training
Training plans encompass both long-term training at the MSc and PhD levels, as well as regional training and monitoring workshops designed to sharpen the skills of technical and professional staff. The international centres also offer short research and production courses which are attended by staff from both research and extension services of the national programmes.

Planning
Each of the components of the SADCC-GLIP has a steering committee composed of national grain legume scientists, regional scientists, a SACCAR representative, and a donor agency representative who meet annually. The steering committee reviews the overall programme of activities as well as the annual plan of work related to each commodity of the GLIP. These annual meetings are aided by the monitoring workshops which provide national scientists with an opportunity to assess the performance of germplasm in the field. The meetings also serve as a forum to address the needs of national programmes for training, germplasm, and research facilities.

PRESENT STATUS OF SADCC-GLIP

The first five-year phase of the groundnut programme was established in July, 1982, under the ICRISAT Regional Groundnut Programme for Southern Africa near Lilongwe (Malawi) with funding from the International Development Research Centre of Canada. This programme is now funded by the Federal Republic of Germany.

The bean programme, funded by Canada, was established in July, 1986, when the regional coordinator was posted to Arusha, Tanzania. Recruitment of the full team

of four scientists at Arusha was only completed this year, while a further team member to be based at Lilongwe has still to be recruited.

The cowpea programme has yet to be established in Maputo, Mozambique, but funding is anticipated from the European Economic Community.

As these programmes are quite young, the impact of the SADCC-GLIP can only be stated in terms of its potential.

Groundnut improvement programme

Several factors affect the productivity of groundnuts. The most important of these in the region include: soil fertility, cultural practices, availability of good quality seed, suitability of cultivars for different agroecological areas, labour and draft power, diseases and insect pests, drought stress, and prices.

Major constraints

Leaf diseases of groundnuts, caused by fungi and viruses, are a major constraint to increased production in the region. Yield losses ranging from 26-75% from rust and leafspot infections have been estimated through crop loss trials in Tanzania and Malawi. Among the virus diseases, groundnut rosette virus is the most important and is capable of causing almost 100% loss in late-planted crops grown with wide spacing (Nigam and Bock, 1985).

Programme objectives

The regional programme focuses on three areas: diseases, identifying suitable cultivars, and drought stress. In order to do so, present activities are concentrated on:

- o breeding for resistance to the diseases of regional importance; and
- o breeding for increased yields, seed quality, and earliness (Nigam and Bock, 1985).

Ongoing research

The search for resistance to early leafspot (ELS) caused by *Cercospora arachidicola,* a widespread foliar disease in the region, continues to be elusive. During the 1987-88 season, over 20,000 second generation plants, derived from crosses between several lines which had exhibited leaf retention for significantly longer periods, were screened for tolerance or resistance to ELS. None of these was resistant, but many were selected for other desirable trains.

Natural incidence of the rosette virus disease is usually patchy in the field, a situation unsuitable for screening breeding material for resistance. Epidemiological studies conducted to discern the pattern in which the disease is spread in the field by its aphid vector, have contributed to perfecting a rosette screening technique that can generate a 99% incidence of rosette. This has enabled the programme to screen over 15,000 second and third generation plants in the field during the 1987-88 season (Bock, 1988). Using this screening technique, prospects are very good for identifying resistant cultivars.

The regional programme supplied material to the national programmes in Botswana, Mozambique, Swaziland, Zambia, and Zimbabwe for regional trials, consisting of promising spanish, valencia, and virginia germplasm for assessment against locally recommended varieties. One of the regional selections, ICGMS 42--which yielded about 30% higher than the locally recommended variety, Makulu Red, in Zambia--is now in the pre-release testing stage in that country.

Observations from the spanish and virginia types regional trials in four countries indicated that regional selections are promising and show approximately 15% gain in yield over locally recommended varieties. There were no yield increases in the spanish types over local cultivars in Botswana and Zimbabwe, but an impressive 30% increase was recorded in Malawi (Table 4). Virginia types showed an average 16% improved yield over local cultivars in Malawi, Zambia, and Zimbabwe (Table 5). Yields in Zimbabwe were the highest among all locations, which may reflect better and perhaps ideal management practices at this location.

Support to national programmes

First, the regional programme has organized three regional groundnut research workshops and offered specialist training in breeding and pathology methodology to technicians from the national programmes. Funds have also been made available to national programmes to manage regional trials. Second, the programme continues to respond to specific requests for assistance with hybridizations. Third, the programme has increased its ongoing efforts to select high yield and quality types in response to the European market's requirements for uniformity, blanchability, and shelf life. Finally, the programme is considering establishing a quality assessment facility at Chitedze near Lilongwe as a regional service.

Bean improvement programme

Bean production in the region is largely in the hands of small-scale farmers who grow the crop with a low level of inputs.

Major constraints

Insect pests, especially bean fly (*Ophiomyia* spp.), diseases, soil infertility, and periodic water deficits are considered the principal agronomic yield constraints. The most important diseases include anthracnose (*Colletotrichum lindemuthianum*), angular leaf (*Phaeiosariopsis griseola*), rust (*Uromyces uppendiculatus*), scab (*Elsinoe phaseoli*), common (*Xanthomonas phaseoli*) and halo (*Pseudomonas phaseolicola*) bacterial blights, and bean common mosaic (Bean Common Mosaic Virus). As most of these diseases are also common in Latin America where CIAT is based, control measures developed there could be usefully transferred to the region. Nevertheless, the transfer of improved technology is a stop-gap measure and not a substitute for strengthening local research capability (Allen, 1987).

Programme objectives

Three broad objectives of the bean programme have been identified as:

Table 4. Comparative performance of two high-yielding spanish type groundnut varieties from the regional programme to recommended varieties in four SADCC countries, 1985-87[a].

Country	Recommended varieties[b] (kg/ha)	Regional varieties (kg/ha)	Difference (%)
Botswana	380	380	0
Malawi	1,650	1,280	30
Zambia	1,390	1,210	15
Zimbabwe	2,470	2,370	4
Means	1,480	1,310	13

[a]Figures are means of shelled nuts for all varieties considered for 2 sites and 2 seasons, except the following: Botswana, 1 site; Malawi, 3 sites in 1985-86; Zimbabwe, 1 site, 1 season, 1986-87.
[b]Recommended variety, by country: Botswana, Sellie and 55-437; Malawi, Malimba, Spancross and JL 24; Zambia, Natal Common and Comet; Zimbabwe, Valencia R2.
Source: Bock (1988).

Table 5. Comparison of two high-yielding virginia type groundnut varieties from the regional programme with control varieties in three SADCC countries, 1985-87[a].

Country	Recommended varieties (kg/ha)	Control[b] (kg/ha)	Difference (%)
Malawi	2,000	1,700	18
Zambia	1,390	1,180	18
Zimbabwe	4,280	3,730	15
Means	2,560	2,200	16

[a]Figures are means of shelled nuts for all varieties considered for 2 sites and 2 seasons, except the following: Malawi, 1 site in 1985-86; Zimbabwe, 1 site, 1 season, 1986-87.
[b]Control varieties by country: Malawi, Mani Pintar, Chitembana, Mawanga; Zambia, Makulu Red, Egret, MGS 2; Zimbabwe, Egret, Flamingo.
Source: Bock (1988).

- o increasing the productivity and production of food beans by breeding and selecting higher-yielding genotypes that are acceptable to consumers;
- o developing more productive systems of cropping, utilizing new varieties, and varietal mixtures when appropriate, while ensuring that such innovations do not adversely disrupt existing farming systems; and
- o assisting to strengthen national research programmes through training.

Research progress

Some progress in bean improvement has been achieved by the national programmes. Significant increases in yields of new test varieties, over locally recommended ones, have been recorded in the different countries. Yields in excess of 2 mt/ha are being achieved, which is indicative of the potential of the improved bean germplasm being evaluated. Even under current farmer management practices and low inputs, trials on farmers' fields in Tanzania and Zambia showed yield improvement of about 60% (Table 6).

Identification of genotypes resistant to important diseases and the major insect pest, bean fly, augurs well for the development of higher-yielding bean varieties. Among lines with resistance to common mosaic, ZPV292, G5066, G10357, and G13595 were especially promising in Zambia. Twenty-one lines selected from CIAT's disease nurseries were found to possess combined resistance to angular leaf spot, aschochyta blight, and anthracnose; and also exhibited good yield potential. Sources of resistance to scab were identified, as well as partial resistance to bean fly was confirmed in two CIAT lines, A62 and A74 (Allen, 1987).

Table 6. Research plot and on-farm performance of new bean varieties compared to locally popular varieties in some SADCC countries, 1986-87.

Country	New variety (kg/ha)	Local variety (kg/ha)	Reference
Research plot			
Lesotho	(1) 1,074 (2) 1,039	497	Allen (1987b)
Swaziland	2,174	747	Allen (1987b)
Tanzania	1,813[a]	(1) 1,703 (2) 1,439	Allen (1987b)
Zambia	1,282	694	Zambia (1986-87)
Zimbabwe	2,324[b]	1,480	O.Z. Venge (1987-88)[c]
On-farm			
Tanzania	300	178	Mbiha *et al.* (1987)
Zambia	450	279	Waterworth (1988)

[a]Mean of 7 test varieties. [b]Mean of 3 test varieties at 2 sites for 3 seasons. [c]Pulse Breeder, Crop Breeding Institute, Department of Research and Specialist Services, Harare.

Support to national programmes
The regional programme convened a bean fly workshop in 1986 at Arusha which provided an opportunity to national scientists to pool information, learn about the identification of bean fly species, and consider strategies to control this intractable pest of beans. In addition, a training course on methodologies for bean and cowpea research for technical assistants was held in Lilongwe, Malawi during March, 1987, by CIAT and IITA in collaboration with SACCAR.

Cowpea improvement programme
Cowpea is one of four most important grain legumes in the region (SADCC, 1984). The oldest archeological evidence for cowpeas comes from Ghana (1450-1400 BC) while the second oldest (100AD) is from Malawi. Thus, part of the SADCC region is considered a centre of diversity of wild subspecies and related species of cowpea (Mithen, 1987). The indeterminate form with a spreading growth habit is the predominant type grown in the region.

Major constraints
Grain yields of cowpeas are not only low, but also very susceptible to damage in storage by the ubiquitous cowpea weevil (*Callosobruchus* spp.) (Giga *et al.*, 1988). Cowpeas are subject to attack from several insect pests from seedling to harvest and, when not controlled, they can often cause a complete loss of grain yield (Singh and Jackai, 1985). Important diseases of cowpea in the region are virus mosaic (Cowpea Aphid-borne Mosaic Virus), bacterial blight (*Xamthomonas vignicola*), aschochyta blight (*Aschochyta phaseolorum*), and root knot (*Meloidogyne* spp.). The witchweed, *Alectra bogelii* and *Striga* spp., is an important problem in some places (SADCC, 1984).

In addition to such biological factors which constrain cowpea production in spite of its indigenous reputation, other limiting factors include a lack of suitable disease and pest resistant cultivars, periodic moisture stress, unavailability of good quality seed, and an absence of market incentives.

Programme objectives
The basic objectives of the proposed cowpea improvement programme are similar to those of the other two SADCC-GLIP components. An important consideration in varietal improvement will be the regional preference for cowpea leaf as a vegetable, which will require developing a dual purpose cowpeas for both leaf and grain.

Research progress
Although the programme is yet to be implemented, the potential for improving farm-level cowpea yields is indicated by the results achieved by three national programmes in the region. Usually, cowpea research trials are conducted under a minimum level of inputs to simulate farmers' actual production practices. New varieties yield significantly higher than local varieties under similar testing conditions, and are considerably better than farmers' estimated yields (Table 7).

Table 7. Grain yields of new cowpea varieties compared to the local variety and average farmer yields in three SADCC countries.

Country	Research plot yield (kg/ha)		Farm yield	Reference
	New variety	Local variety	(kg/ha)	
Botswana	56[a]	94	107-125	Botswana (1987-88)
Zambia	1,280[b]	677	250-300	J. Kannaiyan *et al.* (1986)
Zimbabwe	1,750[c]	608	300-400	O.Z. Venge[d] (1987-88)

[a]Mean of 4 varieties being considered for release to farmers. [b]Mean of 3 highest-yielding varieties over 2 sites in 1983 and 3 sites in 1984 under low levels of inputs. [c]Mean of 3 highest-yielding, early-maturing varieties which received 60 kg/ha P_2O_5. [d]Pulse Breeder, Crop Breeding Institute, Department of Research and Specialist Services, Harare.

CONCLUSION

Grain legumes not only contribute protein to cereals-based diets, but they are also important in regional and international trade. While production levels and average yields of these crops have remained low and static, national research programmes have clearly demonstrated the potential for improvement. The SADCC-GLIP promises to further the development of yield-increasing technologies and to eventually lead to self-sustaining national research systems in grain legumes.

However, several factors contribute to the low rate of improvement in grain legume productivity (Summerfield and Lawn, 1987):

- o National grain legume improvement programmes receive limited funding, compared with resources devoted to staple cereals, industrial, and export crops. While this is certainly understandable, the implicit neglect of legumes is not. Perhaps with the exception of Tanzania, in most national programmes individual scientists are responsible for several legume crops, and there are very few grain legume specialists in the extension services.
- o Farmers generally considered grain legumes as secondary crops and give them less attention with regards to management. The secondary label attached to these crops is not surprising, in the absence of any coherent pricing and marketing policy for them. While women usually cultivate legumes, they are not specifically targeted by the extension services. Generally, systems to supply good quality seed do not exist for crops not featured in the marketing infrastructure. Until grain legumes command a place in official markets, it will be necessary to devise alternative means to disseminate the new varieties. On-farm demonstration trials--in collaboration with extension services, nutrition, and community development groups, as well as non-governmental organizations involved in rural development--could be the starting point for seed multiplication and distribution.

- o Cultivar development in several species of grain legumes has been based on an extremely narrow range of germplasm. In SADCC countries, researchers have made minimal effort to collect, preserve, and evaluate indigenous germplasm for characteristics that could contribute to grain legume improvement. Varietal improvement has generally depended on introductions of materials from elsewhere, with minimal use of local germplasm. However, the inception of a SADCC Gene Bank project promises to alleviate this serious shortcoming in the region.
- o Legumes require more energy than cereals. In spite of this, grain legumes are invariably gown under conditions of low or zero level of fertilizer inputs. In view of the already overburdened budget of small-scale growers, it behoves the researchers to investigate systems of production that optimize yields with minimum inputs. Grain legumes have an important role to play in the beneficial agronomic practice of crop rotation which is largely unexploited in the region. Yet, it is ironic that the potential contribution of legumes to the amelioration of soil fertility cannot be exploited unless they are themselves gown on a well-managed basis.

SADCC development initiatives have an inherent commitment to eventual self-sufficiency and continued growth on an independent basis. Not only does the potential for improving plant species exist at both national and regional level, but also the infrastructural capacity is present to extend new technologies to the farmers. A concerted effort among research, extension, nutrition, community development, and marketing organizations will surely lead to an increased contribution to national economies through greater food legumes production, which should inevitably lead to a greater commitment of national and regional resources to these various but interrelated activities. Only in this way, can the long-term viability of grain legumes at both national and regional level be ensured.

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