

Groundnut in Southern Africa -
Its Status and Research Requirements

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The region covered by the Southern African Development Coordination Conference (SADCC) member countries, Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe, is very large and diverse. It lies between the Atlantic (11°E) and Indian Oceans (41°E) and stretches from near the equator to about 30°S, and has total area of 4.9 million km². In elevation, it ranges from sea level to mountains of over 3,500 metres with the major part of the region being on a plateau with an elevation of between 900 and 3,000 meters. Although 95% of the region is in the tropics, the whole of Lesotho and Swaziland, one third of Botswana and a small portion of Mozambique lie outside the tropics. These differences in location and physiography are reflected in the wide range of climates, soils and photoperiods found within the region. Well over 75% of the region is semi-arid as defined under ICRISAT's mandate.

Groundnut is an important cash and food crop in Southern Africa. Table 1 shows the FAO estimates of area and production of groundnuts in the SADCC countries.

Malawi and Zimbabwe are the biggest producers among the SADCC countries while the crop is not grown in Lesotho. Mozambique also has a substantial area under groundnuts but its total production is low.

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Table 1: Area and production figures for groundnuts in SADCC countries. (FAO Monthly Bulletin of Statistics, 1983:6(1))

Country ^a	Area (1000 ha)		Production (1000 Mt)	
	1981	1982	1981	1982
Malawi	250F	250F	180F	180F
Mozambique	170F	170F	80F	80F
Tanzania	94F	96F	56F	58F
Zambia	50F	50F	30F	30F
Zimbabwe	240F	240F	239	115 ^b

^a Figures not available for Angola, Botswana, and Swaziland.

^b Unofficial figure

The next table gives the average yield of groundnuts in SADCC countries.

Table 2: Average yield of groundnut (kg/ha) in SADCC countries. (FAO Monthly Bulletin of Statistics, 1983:6(1))

Countries	1981	1982
Angola	N/A	N/A
Botswana	N/A	N/A
Malawi	720	720
Mozambique	471	471
Swaziland	N/A	N/A
Tanzania	596	604
Zambia	600	600
Zimbabwe	995	479
Africa	797	738
North Central America	2573	2630

Average groundnut yields in the region are very low compared to North Central America where average yields are over 2.5 tons/ha. Groundnuts are grown mainly by small-scale farmers, who obtain very low yields. Yields of over 4 tons/ha have been obtained on research stations and large scale farms in the region. As a matter of fact, the record yield of groundnut (10 tons/ha) was reported from Zimbabwe from the cultivar Makulu Red grown on a large farm.

The potential for increasing yields and hence total production in the region is great provided the existing constraints are removed.

Constraints

Constraints to groundnut production in the region have been identified at all stages from sowing through to marketing:

1. Poor cultural practices.
2. Damage from diseases and insect pests.
3. Low soil fertility.
4. Lack of suitable varieties for different agroecological areas.
5. Drought stress.
6. Shortage of labour and draught power.
7. Poor market prices.
8. Non-availability of good quality seed.

In certain areas post-harvest drying problems and aflatoxin contamination can reduce groundnut production and quality.

Staple grain crops and more remunerative cash crops get priority in planting, groundnut commonly being sown 2-3 weeks after the onset of the planting rains. Insufficient seed, failure to use good quality seed, and seed and seedling diseases result in low plant stands. In some areas groundnuts are still grown at much wider spacings than is recommended by extension services. Late planting and low populations result in increased incidence of groundnut rosette virus (GRV) and in weed control problems. Sometimes GRV completely wipes out the crop. However, under good cultural practices, a different set of constraints applies, and drought and leaf disease usually become of much greater significance.

Disease spectrum varies not only from country to country, but also within countries. Of the fungal diseases, leaf spot (*Cercospora arachidicola*, *Cercosporidium personatum*), rust (*Puccinia arachidis*) web blotch (*Phoma arachidicola*), pepper spot and leaf scorch (*Leptosphaerulina trifolii*), pod rots and *Aspergillus flavus* are important on a regional basis. Recent studies in Tanzania have shown 36% yield loss caused jointly by rust and leaf spot (Simons, Unpublished data). Rust has become so serious in Southern Mozambique that it has almost destroyed the groundnut crop there.

Among the virus diseases, GRV is most important and is capable of causing almost 100 percent loss in crops planted late and at wide spacing. Peanut Mottle Virus (PMV) is another common disease; however, the extent of losses caused by it is not known.

Among the insect pests, Hilda (*Hilda petruelis*), aphids (*Aphis craccivora*) and termites are frequently encountered and sometimes they cause serious damage to the crop. Aphids also act as vectors of GRV and PMV. Other insect pests such as thrips and jassids can also occur in serious proportions in the field. No effort has been made to quantify yield losses caused by insect pests.

Generally, groundnut in the region is grown without any nutrient input. During the surveys in Malawi, Mozambique, Tanzania and Zimbabwe, with few exceptions nodulation was invariably found to be inadequate. Low soil pH further accentuates the problem and can induce "pops" and poor seed growth.

With the exception of Malawi and Zimbabwe, the varietal picture in the region is not very encouraging. Even in these two programs, development of short season varieties has received little attention. In Zambia and Tanzania, previously released varieties have largely become mixed. In Mozambique no recognized improved varieties exist. In Botswana and Swaziland, varieties are of South African origin and perform well only under good management.

The importance of drought as a factor limiting groundnut production varies within the region. In Malawi and Zambia, it is less important than in other countries where rainfall distribution is uneven. Mid-season droughts of 2-3 weeks are common in the region.

Labour and draught power also affect groundnut production in the region. Where hand tillage is practiced, land preparation and planting are done after the first rains. Even with draught power, earlier operations are precluded due to poor state of health of animals after a long dry season.

Weeding and harvesting are other labour intensive operations in groundnuts which, if not done on time, lead to decreased quality and yields. Labour priority goes to staple grain crops

Groundnut prices in official markets are much lower than those prevailing in the local unofficial village markets. Low prices offered by the government make groundnut an unattractive crop in terms of priority and labour and other inputs.

Due to lack of a seed production infrastructure, farmers are not able to get good quality seed of improved varieties. In some places, virtually no groundnut seed is available.

Status of Groundnut Research

With the exception of Swaziland, research programs in the SADCC countries are active to varying degree.

Currently, the largest program is in Malawi, where the crop is of greater significance to the economy than in any of the other countries. This program and that of Zimbabwe have been maintained for a long time and have successfully contributed to the improvement of the crop. Although Zambia and Tanzania have a history of groundnut research, the programs were allowed to lapse and have only recently been restarted with external assistance (Zambia, FAO and World Bank; Tanzania, ODA + IDRC). The program in Mozambique has been started with IDRC assistance. There is no groundnut research worker in Swaziland.

Limited availability of skilled and trained manpower, discontinuity in research and personnel changes have contributed to slowing down of progress.

Most of the programs have breeding, pathology and agronomy components. In addition Malawi covers physiological, microbiological and seed quality aspects. The Zimbabwe program has the best research infrastructure and facilities in the region and at one time was the strongest. However, due to movement of personnel, its impact has been reduced.

Most of the major programs in the region had a sizeable germplasm collection in the past, but much has been lost. Presently, the largest collection in the region is available with the program in Zambia.

Breeding programs in Zimbabwe and Malawi have been most active and have released 7 and 6 varieties respectively for cultivation. Breeding activities in the region have relied heavily on "introduction" and "selection". This has paid rich dividends in Zimbabwe and Malawi where five and four varieties have resulted from the introduced material. However, in the longer run further improvements can only be achieved through hybridization. There is no hybridization activity in Botswana + Mozambique. Zambia has recently undertaken a moderate program. As Malawi has temporarily suspended hybridization, Zimbabwe is the only program continuously making new crosses. Resistance breeding has only recently received the attention it merits.

Since groundnut sales are most remunerative in the confectionery grades, the breeding programs in general place considerable emphasis on seed size and other quality characters. This has resulted in less attention being paid to the requirements of the small farmers who grow the bulk of the crop under rainfed conditions and with limited resources.

Increasing cooperation with ICRISAT has resulted in the supply of useful germplasm and breeding material to the national programs in the region and the availability of more research information is slowly bringing greater awareness and a shift in research priorities and activities.

ICRISAT Regional Groundnut Program

Realising the inadequacy of research on groundnuts in the region and the urgent need to coordinate existing research efforts and to build up effective groundnut research organizations where these are at present lacking, the ICRISAT Regional Groundnut Program was established at Chitedze Agricultural Research Station, Malawi, in July 1982 with IDRC financed assistance. This action was taken by ICRISAT in response to a 1980 request by heads of state of nine SADCC countries for such regional assistance.

The major objectives of the program are:

1. To develop high yielding breeding lines/populations adapted to the region's different agroecological zones and with resistance to the main factors presently limiting production at the small farmers level.
2. To cooperate with national groundnut research and development programs in the SADCC countries in both regional and local research projects.
3. To train groundnut research workers from SADCC countries in various aspects of groundnut research at the regional centre in Lilongwe and at ICRISAT Centre in India.
4. To organize workshops/symposia to evolve regional research strategies and disseminate up-to-date research information in the region.

As it is in the initial phase, the program has only breeding and pathology components. The following research priorities have been identified:

1. Breeding for disease resistance - Breeding for disease resistance will receive the utmost attention of the team. Among the fungal diseases, early leaf spot, late leaf spot and rust will get the maximum attention. At a later date, work could be initiated on *Phoma arachidicola*, *Aspergillus flavus* and pod rots. Among the virus diseases, GRV will get the top priority. Limited work will be done on PMV.
2. Breeding for increased yield and quality - This project will primarily generate the base materials for the disease resistance breeding project besides producing useful material for situations where the usual constraints may not occur or can be controlled.
3. Breeding for earliness - Development of short season varieties will be of prime importance particularly for the small scale farmers.

The strategy is:

1. Breeding for disease resistance - Excellent sources of resistance to leaf spot, rust and GRV are available. Advanced breeding populations have been developed at ICRISAT Centre using leaf-spot- and rust-resistant sources. This material has been successfully screened in India and elsewhere for late leaf-spot and rust resistance. Lilongwe provides an ideal site for early leaf spot resistance screening. After ICRISAT's late leaf spot and rust-resistant lines have been screened for early leaf-spot resistance, promising lines will be evaluated for yield under different agroecological conditions in the region in cooperation with the national programs. Breeding for GRV will be initiated in the regional program as this virus apparently does not occur outside Africa. Major emphasis will be placed on incorporation of GRV resistance into short season varieties. Efforts will be made to incorporate multiple disease resistance in high yielding lines.
2. Breeding for increased yield and quality - High yielding breeding material obtained from the ICRISAT Centre in India will be yield tested in regional trials after preliminary evaluation at Lilongwe.

Since cultivars with bold seed size command premium prices in the confectionery trade, seed size and quality will be important selection criteria in this project.

3. Breeding for earliness - Development of high yielding short season varieties have not received adequate attention in the past. Considerable resources will be devoted to identifying short season varieties in both fastigiata and hypogaea groups.

Results

1. Germplasm - Six hundred germplasm lines, primarily of South American origin, were field evaluated for disease resistance, yield and adaptability. Some 40 lines were identified as having high yield and earliness. These lines are being multiplied in the off-season nursery in the Lower Shire Valley in Malawi. A preliminary yield trial will be conducted in the coming season. None of these germplasm lines showed any useful resistance to the major diseases in the region.

Malawi germplasm was field evaluated for rosette resistance and 12 highly promising lines were identified. Some of these lines include earlier reported resistant sources in their ancestry.

Reported sources of resistance for early leaf spot in the USA did not show any marked resistance to this disease at Lilongwe. Efforts will continue to find better sources of resistance to early leaf spot. More germplasm from the Bolivian and other regions will be introduced and the material will be screened against major diseases.

2. Breeding for disease resistance - GRV - About 100 crosses have successfully been completed involving promising sources of rosette resistance. The F₁s will be planted in the field in the coming season. Some of the crosses attempted involved late leaf-spot and rust-resistant parents.

Rust/Leaf spot - About 1,000 early and advanced generation rust- and late leaf-spot resistant populations were screened for early leaf-spot resistance. Some promising selections have been made for early leaf-spot resistance, and it is hoped that these selections will carry good levels of resistance against the three pathogens. This material will be yield tested in the coming season. Some more promising material will be obtained from the ICRISAT Centre.

3. Breeding for increased yield, quality and earliness - One thousand early and advanced breeding lines were planted in the field for yield evaluation and further selection under Lilongwe conditions. Some 80 promising lines were identified based on high yield, seed size and earliness. These lines are being multiplied in the off-season nursery in Malawi. These lines will be included in the regional yield trial in the coming season. New breeding material is also being obtained from the ICRISAT Centre. A hundred crosses have successfully been completed involving high yielding varieties of the region.

During the past year, several surveys have been conducted in the region and a clearer perspective of the groundnut situation in the region is now available. As the team expands further, other research projects will be undertaken and the program will evolve on multidisciplinary lines. To strengthen the program and develop more active cooperation in the region, a workshop on groundnut research problems and research priorities in southern Africa will be organized early next year.