



# **SWAZILAND:**

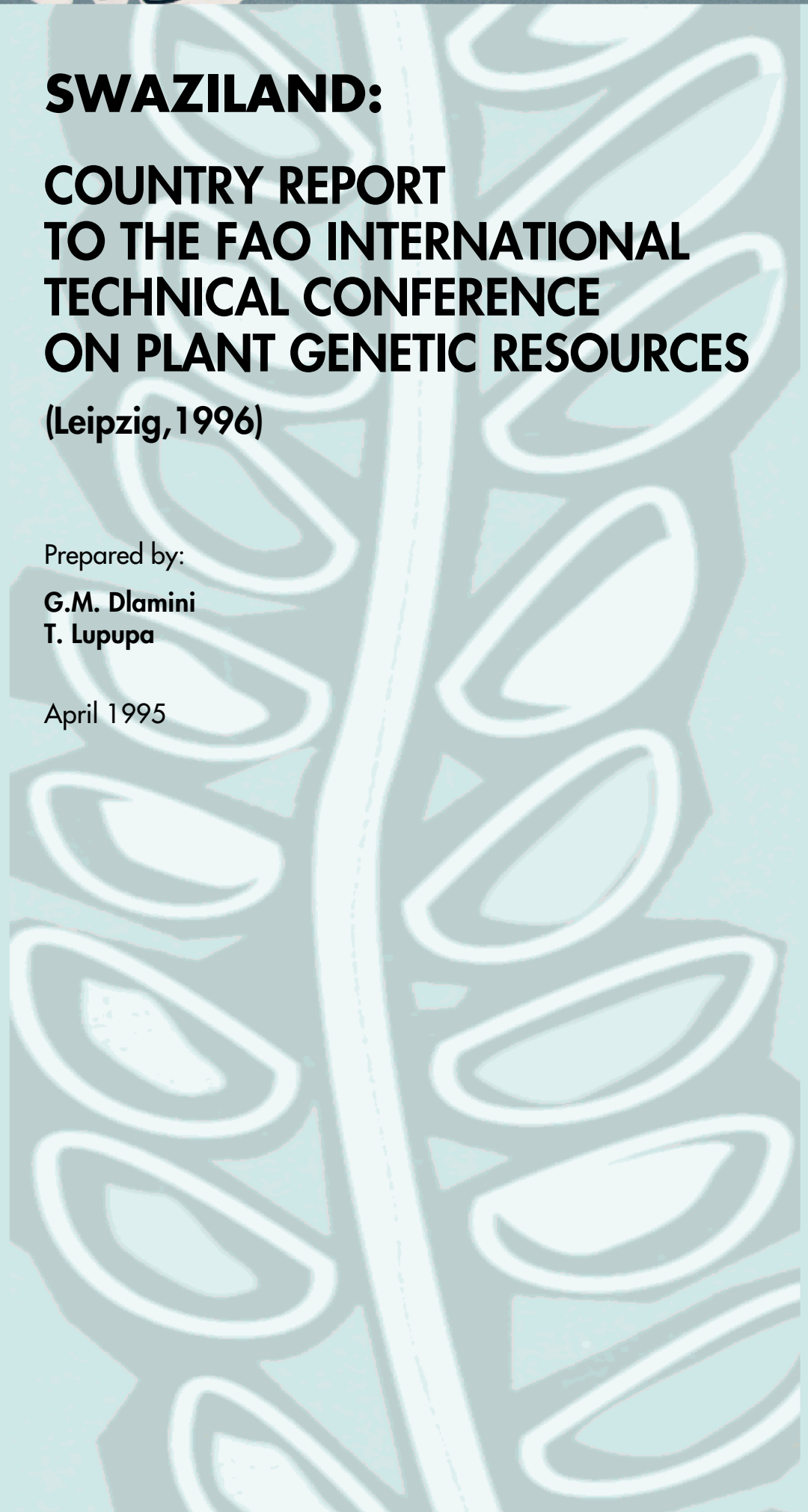
## **COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES**

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# CHAPTER 1

## Introduction and Agriculture Sector

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The Kingdom of Swaziland, with a land area of (17,400 km<sup>2</sup>) is located between 25 degrees 19' and 25 degrees 43' South; 32 degrees 08' and 32 degrees 44' east, entirely surrounded by the Republic of South Africa (North, Western and Southern Borders) and the peoples Republic of Mozambique on the east.

The population of Swaziland was estimated to be 850,000 in the 1986 census, growing at a rate of 3.3%. It is projected to reach 1.5 million people by the year 2010.

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### 1.1 PHYSIOGRAPHIC AND CLIMATE FEATURES

Despite her size, Swaziland has great climatic and scenic variety. Geographers divide the Country into four district belts running from West to East - the Highveld, Middleveld, Lowveld and Lubombo Plateau.

The Western most belt, the Highveld, is a mountainous area with an average altitude of 1,300 meters, split by many rivers, valleys and gorges. Only 10% of this land has potential and commercial forestry is for crops, and the rest is used for sheep and cattle grazing practised. The soils are heavily weathered and Climate is near-temperate but humid, with the annual rain-fall ranging from 1,016 to 2,286 mm. There is occasional frost. Temperatures vary between

33/ C and 4.5/ C. There is also a well protected and managed nature reserve, Malolotsha, which occupies a substantial portion of the Highveld zone, and provides the man protection to this veld type.

The undulating Middleveld, with an average elevation of 700 meters, good soils and suitable slopes that favour intensive farming, has a warmer and drier climate. Temperatures vary between 37.2/ C and 2.5/ C and the annual rainfall ranges from 762 to 1,143 mm. A relatively high portion of the land is Swazi Nation Land (SNL). This region is agriculturally the most highly developed: Maize is the main crop cultivated on SNL, but tobacco, sorghum, beans, cotton, groundnuts and vegetables are also grown. On the privately owned Tittle Deed Land and farms, Citrus and Pineapple are the main crops.



These are commercially grown on a large scale. Due to the favourable climate and relatively fertile soils, this is the most heavily populated area of Swaziland (38%).

The Lowveld climate, like that of the Middleveld, is subtropical, although it is hotter and drier. Temperatures range from 41.8° C to 2.6° C and the annual rainfall from 508 to 590 mm. Since the region suffers from periods of protracted drought, crops are grown under irrigation - sugar predominates but cotton, rice, groundnuts, sorghum and citrus are also grown.

About 20,000 hectares are under irrigation. There are also protected areas called Mlawula and Hlane Nature Reserves that provide protection to a portion of the Lowveld. The elevation averages 200 meters.

The easternmost region, the Lubombo Plateau, with an average altitude of 600 meters, has a climate very similar to that of the Middleveld. There is crop agriculture on only one-eighth of the land. Much of the land is used for cattle ranching and grazing, with maize and beans being cultivated in the small areas of deep arable soils.

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## 1.2 THE AGRICULTURAL SECTOR

### 1.2.1 Land Tenure

Swaziland operates a dual land tenure system comprising the Swazi Nation Land (SNL) and The Teittle Deed Land (TDL). The former is held by monarch in trust for the Nation while the latter is privately owned.

Agriculture has contributed significantly to the growth of the economy. In 1988/89, the total contribution of the agricultural sector amounted to E135,5 million or 15.2% of the gross domestic product (GDP) at Factory prices. Of this total 23.3% was accounted for maize and cotton production on SNL. It is estimated that the agricultural sector's contribution to the national accounts has been increasing, at an uneven rate. In overall, agriculture's performance since 1989 has been good, mainly because of the comparative strength of the modern sector, such as improved technology and husbandry practices.

Cotton production was, for two consecutive years, inhibited by late rains, while Citrus production in 1991 was affected by winds which reduced the volume of the fruit suitable for export. Export earnings from sugar, citrus,



pineapples and woodpulp have been greatly influenced by financial factors including changes in world market prices, which have not been favourable for several commodities, and the exchange rate of the US dollar, which has continued to appreciate against the Lilangeni.

Maize, cotton, sugar, woodpulp, citrus and forestry products are the traditional agricultural products of the country. Maize is the staple food of the Swazi Nation and approximately two-thirds of utilized arable land is under maize. As little of this land is irrigated, the crop is constantly subjected to varying amounts of rainfall, and Swaziland must still import a percentage of the maize it needs.

## 1.2.2 Agricultural Products and Their Degree of Reliance

### Maize

There has been a steady increase in maize products and the substantial increase is mainly due to increased use of high-yielding varieties and fertilizer by farmers and the improved system of making inputs available to farmers within the vicinity.

Historically, Swaziland has always had a deficit in maize which has been satisfied by imports. Total national cereal requirements are estimated at 180,000 metric tonnes of which 157,000 metric tonnes is assumed to be maize. The results of the harvest for 1990/91 show an improvement in the food security situation of the country, which is close to being self-sufficient. Increased domestic production means a significant reduction in the value of imports required with only 10,800 metric tonnes purchased in 1990/91.

According to the National Early Warning Unit of the Ministry of Agriculture and Cooperatives, the 1989/90 maize crop was around 135,000 metric tonnes while the 1990/91 maize crop was 153,000 metric tonnes, an increase of 13%. The 1992 crop was adversely affected by the drought, and as a result only 35,000 tons were produced. Without this setback the crop would have been in excess of 25,000 tons. The situation is now such that in years of good rainfall, Swaziland will come close to the goal of self-sufficiency.



## **Cotton**

Cotton is the Country's dry land crop. Over 120,000 small farmers produce cotton. Estimates indicate that in a good year, 26,000 tonnes could be raised while in a year of drought conditions prevailing, this figure should drop to 9,000 tonnes or less. Most cotton is subject to the mercy of the weather.

## **Citrus**

In each year, the Citrus industry in Swaziland produces approximately 4,000,000 cartons of citrus fruit, namely grapefruit, oranges, soft citrus, lemons and limes of which 60 to 70% is exported.

## **Seed production**

The domestic production of high-quality maize, beans, sorghum seeds is being encouraged through the activities of the Seed Multiplication Project. An agreement between the Government of Swaziland and Pioneer-Hi-breed International (PHI) was signed to facilitate the creation of a Seed joint venture enterprise. In 1991 a Seed company was established, which is responsible for the commercial production of Seeds. Vegetable seed is obtained from the Republic of South Africa through Selling Agents.



## CHAPTER 2

# Indigenous Plant Genetic Resources

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### 2.1 FOREST GENETIC RESOURCES

Kemp (1983) listed four hundred and sixty four (464) species of trees and shrubs in Swaziland. Their distribution is such that one hundred and ninety seven (197), one hundred and thirty four (134), two hundred and seventy five (275) and two hundred and thirteen (213) occur in the highveld, middleveld, lowveld and Lubombo plateau respectively. Opportunities exist in certain Northerly parts of the country, in the Grand valley and the lubombo plateau for more species to be discovered.

Following a forest inventory which was carried out in 1990 with the assistance of the German Government, the Forestry section of the Ministry of Agriculture and Cooperatives is developing a management plan for the indigenous forest and woodland of Swaziland with the aim of maintaining these resources sustainable.

Among the woody species, *Greyia*, *Burchelia*, *Kigelia*, *Encephalartos*, *Erythrina* and *Anthocleista* are ornamental; others, *Strycnos*, *Bequartiodendron*, *Vangueria*, *Canthium*, *Cephalanthus*, *Sclerocarya* and *Syzigium* have edible fruit. Species of *Grewia*, *Brachyleana*, *Tarchonanthus*, *Breonardia*, and *Bauhinia* are important in traditional home constructions including Royal residences and cattle kraals. Priced timber species include *Olea africana*, *Pterocarpus angolensis*, *Spirostachys africana*, *Androstachys johnsonii*. Species of *Zizyphus*, *Lippia*, *Ficus* and others are very important in traditional ceremonies such as burial and cleansing activities. It is important, however, to note that one or the other of the species may be used for more than one purpose.

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### 2.2 OTHER WILD SPECIES AND CROP PLANTS

The greatest concentration of species other than woody ones, occurs in the highveld. Taxa such as Pteridophyta, Orchidaceae, Amarylidaceae and Liliaceae are not restricted but especially prominent in the Highveld. Herbarium records indicate a total of 2,352 species, 651 species, 835 species





and 115 species occurring in the Highveld, Middleveld, Lowveld and Lubombo plateau, respectively. They feature thatch grasses (*Themeda triandra*, *Hyperthelia dissoluta*, *Hyparrhenia* spp., *Cymbopogon excavatus*), pasture species (*Lotononis*, *Eleusine indica*, *Leersia hexandra*, *Aeschynomene*, *Alysicarpus*, *Sesbania*, *Desmodium*, *Brachiara*), ornamental species (*Gerberia*, *Stretocarpus*, *Scadoxus*, *Agapanthus*, *Boophane*, *Kniphofia*), traditional vegetables (*Tulbaghia*, *Annesorrhiza*, *Mormodica*, *Aloe cooperi*), Medicinal species (*siphonochilus etheli*, *Rappanea melanophloes*, *Helichrysum* spp., *Ochna* spp., *Rhynchosia angulosa*)<sup>1</sup>.

Crop relatives and landraces include (*Sesamum*, *Cerototheca*, *Sorghum*, *Cucurbitacea*, *Vigna*, *Arachis hypogea*, *zea mays*, *Phaseolus*, *Ipomea batatas*, *Manihot esculentus*, *Colocasia esculantus*, *Gossypium*, *Physalis*). The traditional farmer remains the sole keeper of landraces while some of the cultivated sorghum is well kept by the Royal residences.

Government has not regulated against landraces but the extension message is generally in favour of the hybrids. In times of drought, as these are, this message tends to be well received at the expense of landraces. We hope, however, that with the establishment of the National Plant Genetic Resources Centre some of the established traditional varieties will be saved. Much pressure is exerted on the natural environment resulting in reduction or complete displacement of indigenous plant material. The pressure comes in the form of increased homesteads, population, livestock and poorly managed pasture as well as development in general.

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<sup>1</sup> Some Herbarium records combine the Lubombo Plateau with the Middleveld hence the discrepancy in the total number of species 115 and the total number of trees and shrubs 134.



# CHAPTER 3

## National Conservation Strategies

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Plant conservation strategies in Swaziland are carried out through traditional systems, legislation and education, and the government and non-governmental organisations concerned with nature or plant conservation.

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### 3.1 TRADITIONAL SYSTEMS

The traditional leader at community level, the chief, has powers to allocate land for building and farming, has powers to stop restrict or promote activities related to plant genetic resources. Certain plant may be locally and nationally important.

The chief is charged with ensuring their security. Traditional graveyards such as the caves where chiefs and members of the royal family are buried are generally respected and entry to their surroundings is restricted. Here the vegetation is quite undisturbed and in truth little studied. Tradition restricts the cutting of certain plants except during certain parts of the year. Generally, when that time comes the plant would have long dispersed their seeds. Many members of the family *Cyperaceae*, *Phragmites* and *Xerphyta* have restricted times of cutting. Some plants (*Spirostachys*, *Dyospyros*, *Euclea*) may not be used as firewood. This restriction applies even to edible fruit trees. However, economic pressure and general breakdown of respect is gradually threatening the traditional system.

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### 3.2 LEGISLATION

Various pieces of legislation are in favour of land conservation. The flora protection Act of 1952 (now being amended) provides for protection of species included in the schedule of protected flora against exploitation for financial gain or for export. The forest preservation Act, 1910, places restriction on cutting indigenous and government timber while the Grass Fires Act 1955 intends restricting uncontrolled burning or its bad timing. The cited legislations are representative not all. It must be emphasised that all



these legislations have shortcomings. They may be outdated, sometimes overlapping or contradictory, administered by different or poorly consulting institutions or may not have the necessary man-power to ensure this enforcement. "Wild" fires are a great concern both to the exotic plantations and to the natural environment. In most cases the culprits have not been caught.

Another aspect of legislation is that of protected areas. These are administered under the Swaziland National Trust Commission (SNTC) Act which established the SNTC as a parastatal body and empowered it to locate and manage parks, monuments and protected areas declared as such by a government gazette. However, not all protected areas are run by the SNTC as some are private. The current situation regarding protected areas is as follows:

#### **Royal owned**

1. Hlane Royal Nature Reserve

#### **Government nature reserves**

1. Malolotja Nature Reserve -18,000 ha
2. Mlawula Nature Reserve -16,500 ha
3. Mantenga Falls-750 ha
4. Hawane -230 - 300 ha

#### **Private nature reserves**

1. Mlilwane Wild Life Sanctuary
2. Mkhaya Game Reserve
3. Mbuluzi
4. Simunye
5. Phophonyane Lodge and Nature Reserve
6. Mhlosinga
7. Sibetsamoya nature reserve

In general, the main purpose of these protected areas is to protect game but on a secondary level the plants are conserved *in situ*.

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### **3.3 ORGANISATIONS CONCERNED WITH PGR**

Prominent non-governmental organisations concerned with PGR are Yonge Nawe (Literally Conserve it too) an organisation that promotes self-improvement through vegetable garden schemes, promotes tree planting through school clubs and promotes community and national tree plantings in association with community leaders and government relevant departments.



The Natural History Society promotes excursions to selected areas to study the plants and animals both for recreational and educational purposes.

Within government, two ministries, that of Natural Resources & Energy and that of Agriculture & Cooperatives feature prominently in Plant Genetic Resources conservation. The involvement of the Ministry of Natural Resources and Energy has been discussed through the Swaziland Environmental Authority and the Swaziland National Trust Commission.

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### **3.4 EX SITU CONSERVATION**

Plant collecting activities for PGR conservation have been few and very recent. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) made collections focusing on groundnuts, sorghum and millet. These were kept in India as storage facilities were not locally available at the time. The International Board for Plant Genetic Resources (IBPGR) made several missions in which they were interested in Cucurbits, forage and fodder species and rescue type collections. In addition, KEW Gene Bank sent a collector for grasses, legumes and other taxa.

These were kept in the KEW Gene Bank. The international Institute of Tropical Agriculture (IITA) CAME WITH SPECIFIC interests in wild and cultivated Vigna. This collection included maize, peanuts and other crops.

As part of the SADC plant Genetic Resources Programme, Swaziland has acquired storage facilities in the form of 510 Litre freezers. These are kept in - a building designated as the Plant Genetic Resource Centre and currently run by an Assistant Gene Bank Curator, with the help of a seven member committee for Plant Genetic Resources. Membership of the committee is as follows:

**Mr Gideon Mehluli Dlamini**

Chairman, Plant Taxonomist with National Herbarium at Malkerns

**Mr Ephraem Mathikithi Ngwenya**

Secretary, Assistant Gene Bank Curator at Malkerns

**Ms Zodwa Mamba**

Member (former chairperson), Legume Agronomist, Malkerns Research Stn.

**Ms Kate Braun**

Member, Ecologist with Swaziland National Trust Commission

**Dr Bonga Nkosi**

Member, Plant Physiologist, Biology Department, University of Swaziland

**Dr Milton Mkhabela**

Member, Plant Breeder, Agricultural campus, University of Swaziland

**Dr Roger Kuhn**

Member, Plant Breeder, replaced by Dr Mkhabela, Agricultural Campus, University of Swaziland

**Mr Solomon Khumalo**

Member, Range Management Officer, Dept. of Veterinary Science, Ministry of Agriculture & Cooperatives

**Mr Siphso Simclane**

Member, Seed Technologist, Malkerns Seed Testing Unit

Field Gene Banks are available at the Malkerns Research Station and its sub-stations. These are equipped with irrigation facility should the need arise. However, these have not yet been used.

Intentions to establish a National Botanic Garden were started in 1987. Possible sites were identified and familiarization missions were made to National Botanic Gardens in Pretoria to study the requirements for undertaking the task. However, money has to be sought to enable the start and functioning of the Botanic Garden. The Herbarium is pursuing this project further.

**Documentation**

Though the SADC Plant Genetic Resources Programme, a computer was supplied to the National programme and in February, 1995 Dr Ruredzo from the SADC Regional Plant Genetic Resources Centre came to install a documentation programme and available data was recorded therein. Mrs Lupupa, a Horticulturist, a graduate in Plant Genetic Resources studies is to assist with documentation from time to time and many work full time in the Plant Genetic Resources Centre.



### **Evaluation and characterization**

Except for work which was done on Sorghum no evaluation and characterization work has been done. But, the intention is to use International descriptions, Plant Breeders at the University of Swaziland or from regional and International organizations.

### **Regeneration and multiplication**

Some samples are small and need to be increased while others will need a viability boost after their being tested with the Seed Testing laboratory.



## CHAPTER 4

# In-Country Uses of Plant Genetic Resources

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Since collecting for conservation and utilization purposes is a new venture in Swaziland, and since breeding programmes are not well established, use of our genetic resources is very small. Part of the problem is accelerated because information about the Plant Genetic Resources Centre has not reached would be users. The existing breeding programme is for cotton (*Gossypium*) and aims to improve the quality of lint, to increase yield and to breed resistance to pests and diseases. A breeding programme for maize and other crops is expected to start soon in the country but arrangements have not been finalized. Farmers are involved through on-farm trials, field days organized by the agricultural Research Division, and through the extension staff.



## CHAPTER 5

# Government Policies, Programmes and Legislation

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Government is very concerned about environmental degradation including reduction or complete disappearance of species. Consequently, Parliament has established the Swaziland Environment Authority to attend to problems relating to the environment. In addition, A National Plant Genetic Resources Committee is in place to advise government on issues affecting PGR and to develop a plan of action in favour of our Plant Genetic Resources. The head of the National Plant Genetic Resources Centre is at Grade 11 and equals Senior Extension Officers. He reports temporarily to the Herbarium Curator who reports to the Senior forestry Officer. Arrangements are underway to have him affiliated with the Agricultural Research Division in which case he will report to the Chief Research Officer who in turn reports to the Principal Secretary. Negotiations are underway to recruit an M.Sc. degree holder in Plant Genetic Resources and at least a technician.

Within the country, the University of Swaziland Agricultural Campus offers only diploma to first degree training in Plant and Soil Sciences. These include introduction to Plant Breeding but external Universities must be sought to complete the training.

The main suppliers of seed are Swazi-American Pioneer Seed Company and Pioneer Company of South Africa. A variety release committee overseas that released varieties meet minimum set standards.

There are no quarantine facilities in the country, however, the Plant Control Act 1981 seeks to control the importation and exportation of plant material without phytosanitary certification. In addition, this act and other are intended to prevent indigenous or protected flora from being exported as whole plants, seeds or parts thereof without permits from relevant authorities.





## CHAPTER 6

# International and Regional Collaboration

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Swaziland signed the International Convention on Biological Diversity in June, 1992. Some of the follow-up measures to the signing will be introduced by the Newly formed Swaziland Environment Authority (SEA) whose intentions are, amongst others, to call together all parties concerned with. Plant Genetic Resources Conservation and environment protection together to discuss and come up with a national strategy for implementing various aspects of the convention.

At the regional level, Swaziland is a member of the SADC Plant Genetic Resources Centre (SPGRC). This is a network of Plant Genetic Resources Centres comprising the Regional Centre based in Chalimbana, Zambia which will serve as a medium to long term storage facility of material from each of the ten member states. The ten SADC states (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, South Africa, Tanzania, Zambia, Zimbabwe) will keep short term storage facilities, nature and botanic gardens and other *ex situ* conservation methods.

In addition, the regional office for the International Plant Genetic Resources Institute (IPGRI) based in Kenya serves Eastern and Southern African countries in offering technical know how, training etc. in Plant Genetic Resources activities.

The Agricultural Research Division collaborates with several organisations and institutions in its research efforts. These organisation include:

**CIAT** - Centro Internacional de Agricultural Tropical which coordinates bean research and is based in Tanzania;

**CIMMYT** - International Maize and Wheat Improvement Center whose regional office is Zimbabwe;

**CONVERDS** - Collaborative Network for Vegetable Research and Development in the SADC region which is based in Tanzania;

**ICRISAT** - The International Crops Research Institute for the Semi-Arid Tropics based in Malawi and promoting Sorghum & Millet as well as groundnut Research;



**IITA** - International Institute for Tropical Agriculture based in Mozambique and focusing on cow pea and root crops Research;

**ISNAR** - International Service for National Agricultural Research which is based in Tanzania and promotes dissemination of information and knowledge through seminars and workshops.

In addition, there is a network of the SADC Tree Seed Centre Network which will focus on genetic resources activities of trees and it will be based in Zimbabwe.



# CHAPTER 7

## Proposals for a Global Plan of Action

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### National level

The following will have to be undertaken in order to improve the status of Plant Genetic Resources in Swaziland:

- Policies and legislation will need to be formulated or improved and all bodies concerned with plant conservation and utilization will have to be harmonized.
- Country wide surveys will be undertaken to assess the status of landraces, overutilized indigenous species and habitats needing special attention and accordingly measures will be done to conserve such plants both *in situ* and *ex situ*.
- Training, awareness and information exchange activities involving the news media, training centres and community meeting places will be carried out with the aim of raising awareness among government officers and rural community of the status, importance and conservation needs with regard to plant biodiversity.
- Strengthening and establishment of both *in situ* and *ex situ* methods of conservation including the establishment of botanic gardens and reserves as well as field gene banks will have to be undertaken.
- Establishment of linkages with plant users i.e. woodcarvers and Traditional Healers Associations in order to establish sustainable methods of utilizing the plant resources.
- Train adequate manpower in Plant Genetic Resources Management, Plant Ecology, Plant Taxonomy and Ethnobotany to carry out the above activities.
- An integrated approach to community based activities combining for instance Forestry, Agriculture, Pasture Management, NGOs will have to be undertaken by all concerned in order to minimise the inherent conflicts and make better use of human and land resources.



## International level

- Governments and the Scientific Community should strengthen International Scientific Organizations so that they can play a more central role in global conservation efforts. The purpose being to increase international scientific collaboration and input into global and national conservation efforts. Scientists and Breeders may form organizations starting from regional levels to worldwide levels and share ideas, interchange breeding material etc.
- Another common strand is the need for economic assistance to the developing countries in order to take steps which they may be willing to take except for the lack of essential resources. This is particularly relevant in the biodiversity context, since those countries with the greatest biodiversity are relatively poor in financial and technical resources.
- Regional Centres associated with germplasm banks which will also screen diversity should be established. These will monitor patterns of genetic diversity in order to strengthen conservation efforts. There should be access to the genetic resources of all participating countries.



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