ANGOLA:

COUNTRY REPORT TO THE INTERNATIONAL CONFERENCE AND PROGRAMME ON PLANT GENETIC RESOURCE

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Note by FAO

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CHAPTER 1
Introduction to Angola and its Agricultural Sector

Angola is the second largest country in Sub-Saharan Africa. It covers an area of 1,246,700 km^2 between latitudes 4°20′S and 18°S and between longitudes 11°4′E and 24°5′E. Angola's neighbours are the Republics of Congo and Zaire to the north, Zambia to the east and Namibia to the south; to the west Angola has 1,400 km of Atlantic ocean coastline.

1.1 POPULATION

The population of Angola is around 11 million. Overall population density is 8 inhabitants per km^2, but the annual growth rate is 2.8%. In 1990 UN figures estimated that half the population was under the age of 15 and one third under the age of 10 years. Population figures for 1991 (INE) showed that around 80% of the population lived in 8 provinces covering 34% of the country's area: Luanda (15.4%),Huambo (14.8%), Bié (10.9%), Malange (8.7%), Huila (8.6%), Uige (8.1%) Kwanza Sul (6.4%) and Benguela (6.3%). Largely as a result of migration from rural to urban areas, urban population growth is 7.58% while rural population growth rate is 0.6%. This trend has been greatly exacerbated in the last three years due to numbers of war displaced people (nearly 3 million) searching for safety in urban areas. It is now thought that as much as 35% of the total population live in and around Luanda.

In 1991 the provinces of Kuando Kubango, Bié, Cunene, Kwanza Sul, Kwanza Norte, Bengo, Lunda Norte and Moxico and all had over 80% of their populations classified as rural.

1.2 PHYSIO-CLIMATIC ZONES

The range and variety of Angola's plant diversity are due to its size, intertropical position and the variety of its physio-climatic zones. It has a coastal plain from the Atlantic to approximately 200 m, ranging in width from 12 to 200 km; a steep, narrow escarpment transition zone from 200 m to 1,000m running from North to South between the coastal plain and the interior plateau that occupies almost 73% of the country with altitudes between 1,000 and 1,600m. There is a mountainous belt in central western Angola rising to peaks above 2,600m.

Rainfall is the main climatic influence. The SW and littoral areas are strongly influenced by the cold Benguela current, with cool desertic conditions in the SW extreme. The entire coastal belt experiences arid to semi-arid climate; the escarpment mountains and interior plateau are much more humid with rainfall ranging between 900 and 1,700 cm per annum.

Based on these factors and the country's major soil and geological features Castanheira Diniz (1994) divided the country into seven major geo-climatic zones:

1. Hot, dry coastal plain. Height up to 300 m, high temperatures and relative humidity, low, poorly distributed rainfall; low light intensity in the dry season; no frostsoorly developed soils, with marine sediments and important alluvial basins.
2. Hot, dry transitional belt. Altitudes between 300 and 700 m; plain and escarpment areas; high temperatures and relative humidity; low to medium precipitation, poorly distributed rainfall; high levels light intensity, no frosts, developed clay soils generally with good productive capacity and poorly developed soils related to eruptive and metamorphic Pre-Cambrian rocks.
3. Northern, hot, wet sub-plateau. Average heights between 300 and 500 m, with some escarpments and higher relief; high temperatures and relative humidity; high precipitation and good rainfall distribution; low sunlight levels in overcast dry season; no frosts; developed clay soils with generally high productive capacity, related to the sedimentary rocks of the West Congolian system (Upper Pre-Cambrian).
4. Northern, hot, rainy sandy zone. Average altitudes from 600 to 1,000 m; weel-marked plains and valleys; high temperatures and relative humidity; high precipitation with good rainfall distribution; high levels of sunlight; no frosts; psamatic soils with low productive capacity related to continental (Kalahari) sand deposits.

5 Central, cool, rainy plateau. Average heights 1,200 to 1,500 m; plains, escarpments, and high plateaus from 1,700 to 1,850 m; moderate temperatures and relative humidity with a sharp fall in the dry season; high precipitation levels with good rainfall distribution; high levels of sunlight; occasional frosts in the valleys; well-developed clay soils, with medium to good productive levels related to igneous Pre-Cambrian rocks and various Quaternary deposits.

6 Eastern, cool, rainy, sandy zone. Average altitudes between 1,000 and 1,250 m; extensive plains; moderate temperatures and relative humidity with sharp decrease in the dry season; high levels of sunlight; occasional frosts in the valleys; psamatic soils with low productive capacity, related to continental sandy deposits.

7 Dry, sandy southern zone. Average altitudes of 1,000 to 1,250 m ;plains and important river plains; moderate temperatures and relative humidity in rainy season; very marked decrease in the dry season; very high levels of sunlight; frequent frosts; mainly psamatic soils from continental (Kalahari) sandy deposits, with some heavy clay soils.

1.3 MAJOR BIOMES AND VEGETATION TYPES

According to Huntley (1992) "the great range of biomes and ecosystems found in Angola is probably unequaled in any other African state."

The natural vegetation of Angola includes areas representative of six of White's (1983) *phytochoria* as shown in Map 3. Studies by Barbosa (1970) divided the natural vegetation into 32 major vegetation types and over 100 subordinate types. (Table 1.)

35% of Angola (53 million ha) is classified as "forest area". Of this area just 2% of the country (2.3 million ha.) is classified as "economically productive" (IDF 1994).

1.4 AGRICULTURE

Agriculture is a major economic activity in Angola. In spite of the war between 1990 and 1992 73% of the workforce was employed in agriculture.

Considering the variety of physio-climatic zones, with the ample water resources available in much of the country, Angola has one of the greatest agricultural potentials in sub-Saharan Africa (World Bank, 1991).

In colonial times there was a double farming structure, a commercial sector of some 800,000 ha mostly managed by the Portuguese, using both labour intensive and modern agricultural techniques, and a traditional sector, mainly of small farmers subsistence agriculture, covering 3.4 million ha.

At the time of independence (1975) Angola was self-sufficient in production of maize, sorghum, millet, beans, cassava, coffee, potatoes, sugar, bananas; it was also a significant exporter of coffee (fourth in the world), cotton, tobacco, sisal, palm-oil, bananas, rice and maize (World Bank, 1991). Main crop distribution areas for the 1970s are shown in Map 4.

At the time of independence the great majority of Portuguese run commercial farms were abandoned and the rural trading network began to disappear. To take up the vacuum left by these farmers and traders the government nationalized some abandoned properties and set up state enterprises to exploit them. Due to military and economic instability and poor management many state agricultural enterprises ceased to function in the 1980s and were abandoned or later passed over to private individuals or farmers' associations (IUCN,1992).

By 1991 the commercial sector was almost non-existent and the production of cash crops was less than 5% of its 1975 level. Estimates of the decline in subsistence crops production over this period were over 70%. (World Bank 1992)

The main causes of the decline stem from the continuing war situation, but some areas of the west and south of the country were also badly affected by drought at different times over the past decade.

Agricultural production has continued to fall over the past two years, more than ever due to rural insecurity and particularly to the presence of land-mines. A comparison of cereal production between the 1992/3 and 1993/4 harvests shows a drop of 27% in maize production, 33% in sorghum/millet and 14% in rice, an overall fall in cereal production of 19% (FAO Angola, 1995). Of the 1994 cereal deficit, estimated by FAO/WFP at 560,000 tons, over 80% needed to be covered by food aid. The Ministry of Agriculture and Rural Development estimated the total food deficit for 1994 as 1,300,000 tons, the worst food situation in the country's history (Minader, 1995).

In spite of the calamitous situation described above it is estimated that considering Angola's past agricultural history and the vast potential of the sector, and if agriculture were to be given the priority it deserves in the improvement of the economy, it could enter an accelerated growth cycle of 10% per year (FAO, 1995).

Agriculture in Angola today is overwhelmingly subsistence agriculture, with the average size of plot cultivated per family at around 2 ha. Over half the small farmers use some form of shifting agriculture, which to some extent by-passes the problems of lack of fertilisers and pesticides, etc. Post 1991 there has been a slight increase in the number of small (mainly horticultural) commercial enterprises near to major urban areas, but commercial farms still account for less than 5% of overall agricultural activity.

CHAPTER 2
Indigenous Plant Genetic Resources

2.1 FOREST TIMBER RESOURCES

2.1.1 The state of Forest Resources

Over the twenty years since independence very few forestry studies have been possible, due to lack of trained personnel, lack of financial resources and to travel and other restrictions imposed by the continuing war. Neither are there any recent clear aerial photos or satellite images with which to make to make an approximate evaluation the forest areas.

As a result very little information available on the present state of forests and woodland or on their economic potential. Information on stock growth and mean annual increment (MAI) is based on comparable environmental conditions in other countries in the Southern African region. This also applies to the stock growth and MAI for the 6 categories of biomass present. It is therefore impossible to accurately quantify the extent of forest and woodland degradation. The annual rate of deforestation was estimated at around 40,000 ha/year (Langley 1981) and present rates are of the order of 0.4% per year of existing vegetation cover, a relatively low figure compared with other countries in the region. The major causes of forest degradation are considered to be forest clearance for shifting agriculture, the extension of agricultural areas, destruction of forests and woodland to obtain firewood and charcoal, the burning of vegetation as part of rotation agriculture practice.

Most of the rural population uses wood and charcoal as main energy source. Recent statistics (IDFetc p94) on the use of fuelwood show that 6,000,000 m^3 are used per annum, an average of 1m^3 per person of the rural population. Where firewood is in short supply, especially in the drier areas of South Angola people have to walk great distances to obtain firewood. It is estimated that present needs result in the deforestation of 175,000 ha/p.a. and that this figure will rise to 235,000 ha/p.a. by the year 2,000. According to the IDF Report 53,600 ha of forest should be planted annually. As this is not possible under present circumstances it is recommended that 60% of the recovery should be obtained through the rehabilitation management of natural vegetation in systems of conservation and protection.

According to the Department for Rational Use of Energy Department (SEEA) the energy balance for 1992 shows that the main source of energy consumption is biomass, 58% of total national energy consumption, followed by oil products (41%), electricity (1.4%)and natural gas (0.1%). This is in complete contrast to the primary production of energy where crude oil accounts for 89.6% of the total and biomass 10%.

2.1.2 Forest Species at Risk of Extinction

Industrial exploitation of forests in the main timber province, Cabinda, began in 1935. Timber was initially used within Angola and exported to Portugal and by 1946 began to be exported to other countries. The most important timber species were *Rodendron calsamiferum, Terminalia superba* and mahogany. By 1948 total timber exports were 33,000 m^3 of which 21,000 m^3 were *R.calsamiferum* and 8,000 m^3 were *T.superba.* (Marçal 1972).

In 1970, in an attempt to prevent their extinction, the colonial authorities fixed annual quotas for the cutting of both these species in Cabinda and Cacongo. In 1992 the IDF, the government institution responsible for implementing the country's forestry policies, took new measures to fix national annual tree felling quotas. (IDF 1992).

Another species threatened with extinction is the palm *Hyphaena luandensis*, characteristic of the semi-arid littoral from Luanda to the river Kwanza estuary. The leaves are used for basket and mat weaving but the main extinction threat to the species result from its use as a source of palm wine. In many areas it has completely disappeared in the last few years. Considering the slow regeneration of the species IDF recently proposed a total ban on the cutting of *H. luandensis.*

In Bié province one of the most interesting species, *Pterocarpus angolensis,* and *Marquesia macronoa,* used for railway sleepers, are also threatened with extinction. Other species of interest to the timber industry, including *Guibourtia colcosperma, Periccopsis angolensis, Erythropheum africanum, Albizia antunesiana* and *Faurea speciosa*, are becoming rarer rarer and timber cutters must travel longer and longer distances to find them, until their exploitation becomes uneconomic.

Of the natural forest ecosystems the Afro-montane relic and the *Podocarpus* forests are among the most seriously threatened ecosystems in Angola and require most urgent protection.

Our lack of knowledge of the country's ecosystems, especially of the forests, is very marked and constitutes a major impediment to biodiversity conservation and the sustainable use of forest products by this and future generations (IUCN 1992).

2.2 OTHER WILD SPECIES

While little attention has been paid to the conservation of the timber producing potential of forests and woodlands, even less has been given to the conservation and sustainable development and utilization of non-timber forest products. It is clear from studies by Gossweiler (1970) that literally hundreds of plants are known to the rural population of Angola as having useful qualities as food plants, medicinals, for industrial products, insecticides, soaps, etc.

2.2.1 Under-utilised food plants

There have not been many rigourous studies of the significance of wild or under utilised crops in Angola; however, it is certainly the case that a wide range of these play a considerable role in the diet of the rural population. Some species are collected from their natural habitats, others are cultivated in kitchen gardens over a restricted area. They include plants with high nutritive value, rich in vitamins, sources of thimine, iron, calcium, etc. These species need to be protected, collected and multiplied as soon as possible. For example, *Hibiscus subdariffa* is used in salads and sauces in Kimbundu and Umbundu areas, in Moxico and the Lunda provinces, and its use should be promoted in other areas of the country.

Examples of some locally important vegetable species

Solanum aethiopicum
Solanum monteiroi
Solanum naumanii
Amaranthus spp.
Hibiscus subdariffa
Corchorus tridens
Corchorus olitorius
Pistia stratoides
Voandzeia subterranea
Abelmochus esculantus
Cajanus cajan
Dilochus lablab

Examples of some locally important fruit species

Anisophyllea buchneri
Balanites spp.
Anona cuneata
Strychnos spp.
Adansonia digitata

Examples of some locally important fruit species

Cucurbita maxima
Diospyros mespiliformis
Sclerocarya burrea
Ficus sycamorus
Hyphaene petersiana
Berchemia discolor
Uapaca gossweileri
Myrianthus arboreus
Spondias mombin
Pseudospondias microcarpa
Physalis angulata

Some species with actual or potential industrial uses

Burkea africana	Copal gum
Ceiba pentano	Boat-building timber
Guibourtia colcosperma	Railway sleepers
Daniella sp	Resin
Cesalpinnia sp	Flavenoids
Cassia sp	Saponins
Afzelia	Saponins
Swartzia	Saponins
Solanum albifolium	Saponins
Pteroxilum obliqum	Construction timber
Pterocarpus angolensis	Tannins
Canarium schweinfurthii	Resin, used in anticorrosive paint
Bombax angolense	Construction timber
Luffa cylindrica	Luffa
Droogmansia megalantha	Milk curdling agent

2.2.2 Medicinal Plants

Angola's diverse flora contains hundreds of plants with locally recognised therapeutic value (Gossweiler, 1970) of which a very few have been subject to pharmacological screening (Batalha). Over 95% of the population uses one or other of these therapeutic plants alone or together with manufactured drugs, and in most rural areas they are the only medicines available. A few examples from the

most widely known of over 80 families that contain active principles used in traditional medicine or of potential value to the pharmaceutical industry are mentioned in Table 3.

Table 3 Examples of a few of hundreds of known genera of Angolan medicinal plants

Family	Genus
Apocynaceae	*Shrophanthus*
	Thevetia
	Holarrhena
	Funtumia
	Rauwolfia
	Alstonia
	Catharanthus
	Iboga
Cesalpinaceae	*Cassia*
	Erythopheum
	Tamarindus
Rubiaceae	*Borreria*
	Mitracarpus
	Mitragyna
	Crossoptyx
	Gardenia
	Oldenlandia
	Coryanthe
Solanaceae	*Capiscum*
	Datura
	Solanum spp.
Cochlospermaceae	*Cochlospermum*
Sterculiaceae	*Sterculia*
Graminae	*Cymbopogon*
	Vetivera
	Imperata
Curcubitaceae	*Citrullus*
	Cucurbita
	Lagenaria
Euphorbiaceae	*Euphorbia*
Burseraceae	*Canarium schweinfurthii*

Family	Genus
Anacardiaceae	*Lonchocarpus sericeus*
Ebenaceae	*Diospyros mespiliformis*
Bombacaceae	*Bombax reflexum*
Combretaceae	*Combretum spp*
Tiliaceae	*Grewia cyclopetala*
Nyctaginaceae	*Boerhavia diffusa*
Myrothamnaceae	*Myrothamnus flabellifolius*
Anacardiaceae	*Dilochos dongaluta*
Oleaceae	*Jasminum angolense*
Anacardiaceae	*Brachystegia spp.*

Some widely used medicinal plants in danger of extinction

Species	Use
Cochlospermum angolensis	hepato-protector, malaria
Myrothamnus flabellifolius	diuretic
Lannea antiscorbutica	treatment for TB, drepanocytosis
Pteroxilum obliqum	hepatitis
Clerodendron	anti-asthmatic

The danger of extinction of these and other species is due to their completely uncontrolled use and in the wanton destruction of whole plants to obtain some particular organ. For example, it is just the root of *Cochlospermum angolensis* that is normally used as medicine. But those collecting the root usually uproot the plant completely, remove every single root. According to Batalha (1993) some control and regulation of the collection of medicinal plants even for use within the country is of the utmost urgency. Such control is also particularly required for species producing substances of economic value to industry in general and the pharmaceutical industry in particular.

2.2.3 Wild relatives of crop plants

There are wild relatives of several species of indigenous crops. These include wild relatives of sorghum (such as Johnson grass and Sudan grass) pearl millet, cowpea, rice, bambara groundnut and others. Taxonomic expertise is requires to correctly identify these wild relatives.

2.3 LANDRACES

Probably the most immediately useful (and certainly the most threatened) crop PGR in Angola are the wealth of landraces of all kinds of crops, including African indigenous crops such as sorghum, millet, cowpeas, etc., but also including species introduced into Angola over several centuries.

The country was a Portuguese colony for almost 500 years and formed part of the Angola-Portugal-Brazil triangle. Many of the crop species were introduced into the country from the Americas centuries ago, including maize, tree tomatoes, sunflowers, cassava, sweet potatoes, etc... They have had several centuries to adapt to Angolan conditions and now constitute a unique and highly variable collection of PGR.

The few short characterisation studies made on very limited collections of indigenous and long-time introduced crops (sorghum, cowpea, *Solanum aethiopicum*, beans, okra, papaya, cassava, sweet potato,) have all shown immense variability both within and between geographical landraces.

In the cases of sorghum and millet in S.W. Angola, to the unfamiliar eye every plant in a farmers field appears different from every other one. However, the farmer recognizes up to a dozen distinct major characteristic types in the field, each with its own local name.

In difficult or unpredictable growing conditions, e.g. no inputs, poor or erratic rainfall, very long or short growing season, etc., it is these landraces that provide the subsistence farmer with a guaranteed crop, albeit of low yield.

Where farmers have the choice between their own landraces and imported seed, they will usually sow a field of each. While recognizing some useful characteristics of exotic seed, principally its uniformity, farmers often prefer their own as being of better flavour, more resistant in local storage conditions, less susceptible to diseases, etc... In extreme cases, only the local landrace survives at all. There is an urgent need to multiply local landraces.

Some local landraces are highly prized and farmers go out of their way to introduce these seeds into new areas when they move. In general, however, relatively little selection is carried out by small farmers and variability is maintained from season to season.

CHAPTER 3
National Conservation Activities

3.1 CONSERVATION CROP PGR

3.1.1 Introduction

Although conventional plant breeding was carried out in Angola for some 40 years on commercially important crops, the importance of conservation of national PGR was not recognized until the last decade. Plant breeding programs geared to the requirements of commercial farmers were carried out at IIA agricultural research station, its sub-stations and at crop-specific institutions such as those for cotton and coffee. PGR used in, and generated by, these programs included breeders lines, exotic material and improved varieties; apparently "non-useful" material was discarded. The subsistence crops of small farmers, including many indigenous species, were not the object of plant breeding programs and practically no collections were made of the PGR of these species. This is the main reason why the PGR of these crops are not held in any national nor international *ex situ* collections.

An awareness of the importance of the conservation of PGR dates from the early 1980s and the development of organised PGR activities from 1987 and the first meetings of the SADC Regional Genebank Network Project. Angola has been a member of the SADC Regional PGR Board since then, but the slow development of conservation activities has been largely due to the continuing war situation. A National PGR Committee was set up in 1989 which now has 15 members including representatives of IIA, IDA, IDF, Agriculture and Science Faculties of Agostinho Neto University, SEA, SECafé, DNAF, ISCED, Angosementes and AAA. Considering the increasing role of national and international NGOs working in rural development it is important to coordinate with them in PGR conservation and utilization activities.

An extended national emergency collection, with the participation of government and non-government agencies is to begin in the 1995 harvest season.

3.1.2 *In Situ* Conservation Activities

There are as yet no formal programs or projects for *in situ* conservation of crop PGR. This is partly due to lack of awareness of the role of *in situ* in PGR conservation, and also to shortages of human and financial resources, and general difficulties in agriculture. On the other hand, many farmers' local landraces are being conserved as a result of obliged *in situ* conservation because farmers in war isolated areas have spent years without access to exotic seed. A few national and international NGOs are concerned with conserving local varieties and are beginning to encourage farmers to multiply their own seed. In response to requests from the NPGRC NGOs are beginning to send samples of local varieties to the Luanda Gene Bank.

In July 1995 the first Provincial Workshop on the Conservation and Utilization of Local Varieties was held in Huambo, organised by the International Committee of the Red Cross and the Angolan NPGRC, followed by a short collection in accessible areas in the province. In Ganda (Benguela Province), a pilot community seed bank of local varieties was established, with the support and willing cooperation of local administration and small farmers. The NPGRC plans to hold as many provincial workshops to promote local varieties as funds will permit.

3.1.3 *Ex Situ* Collections

Angola has a very small *ex situ* collection comprising just 599 accessions in conventional genebank; almost all collected since 1991.

Table 4 Total Accessions in the Luanda Gene Bank (July 1995)

Species	Number of Accessions	Province of Origin
Sorghum bicolor	121	Bengo, Benguela, Cunene, Huila, Huambo, Namibe
Pennisetum glaucum	54	Benguela, Cunene, Huila, Namibe
Vigna unguiculata	70	Bengo, Benguela, Cabinda, Cunene, Huila, Huambo, Kwanza Sul, Luanda.
Zea mays	171	Bengo, Benguela, Huila, Huambo, K.Sul, Luanda, Moxico
Phaseolus vulgaris	72	Bengo, Benguela, Huambo, Huila, Luanda, Namibe
Cucurbita spp	10	Benguela, Huambo, K.Sul
Abelmochus esculentus	3	Bengo

Species	Number of Accessions	Province of Origin
Lens esculenta	1	Huila
Helianthus annuus	29	Benguela, Bie, Huambo, Huila, Luanda
Arachis hypogea	28	Huambo, Luanda, Moxico
Cicer arietinum	1	Huila
Triticum vulgare	3	Huambo, Huila
Voandzeia subterranea	3	Huambo, Moxico
Amaranthus sp.	2	Luanda
Solanum aethiopicum	3	Benguela , Kwanza Sul
Solanum melongena	1	Benguela
Citrullus sp.	1	Cunene
Sesamum indicum	2	Huambo
Oryza sativa	1	Huambo
Glycine max	1	Huambo
"Halo" S. Drummondii	3 ?	Bengo, Huambo
Lupin	2	Huambo
Medicinal plants	7	Huila
Total	**599**	

Since independence the IIA was almost the only institution involved in conventional plant breeding. It housed working collections of maize, wheat, *Triticale*, barley, rye, sorghum, soya, beans, pigeon pea, chickpea, groundnuts, bambara groundnut, cowpea and various forage species. These were kept at ambient temperature/humidity conditions and regenerated every one to three years. In 1991, as part of the initiative of the SADC Genebank Network, a building at IIA was identified for rehabilitation as the future National Genebank. This did not proceed immediately because of lack of financial support and later because of the resurgence of war following the 1992 elections.

In the period between November 1992 and October 1994 the Chairman of the NPGRC and curator of the IIA seed collections, Eng. Fernando Marcelino, was assassinated, Unita occupied Huambo, almost all higher technical staff left the Institute and the IIA seed collection was completely destroyed.

The only conventional gene bank in Angola containing local PGR is in Luanda. It was started in 1984 from a breeder's collection of local and imported sunflower varieties. In 1989 it was agreed that because Angola is such a large country, with so much PGR to be conserved, there should be a division of the crops covered by the main National bank at IIA, Huambo, and the "satellite" bank in Luanda. The Luanda bank would take particular responsibility for local

subsistence crops of arid and semi-arid areas, including sorghum, millet, cowpea and wild relatives of these as first priories. With the closing of IIA in 1993 the Luanda bank has also taken on responsibility for conserving other crop species, including maize, beans and others. Table 4 shows the accessions held in the Luanda bank at June 1995.

With rare exceptions all the accessions are indigenous material collected in Angola since 1991. This tiny collection is unique and not replicated elsewhere. Angola is mentioned in many reports of collection priorities for its indigenous crops and for crops that were introduced into the country over 500 years of colonial rule.

Field banks

With the exception of old established coffee research stations, few accessions have been kept in field banks. The exceptions are collections of fruit trees (mangoes and bananas in the Cavaco research station in Benguela, citrus fruits in Cunene, etc) and the coffee and exotic fruits collection in IIA, Huambo.

An new field bank for cassava and sweet potato is being established at Mazozo, Bengo province. This will be the first collection of crops that are staples for almost a third of the country's area.

Prior to 1975 Angola was the world's fourth largest coffee producer and field banks were established in several coffee producing areas in the 1950s. Figures presently available list over 400 accessions, including pure *arabica* and *robusta* types as well as a multitude of various hybrids. The present state of the field banks is unknown, because they are in areas affected by the war.

There are small field banks of local and exotic fruits, forage species, exotic forest species, coffee and ornamentals at IIA in Huambo. Other collections of various fruit species exist in the provinces of Benguela, Huila, Kwanza Sul and Cunene.

One of the first objectives of the Angolan plant genetic resources program is to encourage the multiplication of esteemed local varieties for immediate use by farmers, and to have them evaluated for use in breeding programs with improved exotic material.

In all provinces where collections have been made farmers are well aware that the most reliable seeds for their needs in their agro-ecological conditions are their own local varieties and landraces. Time after time farmers express disappointment with apparently good-looking imported or donated seed that does not perform to expectation in Angolan conditions. Our collecting priorities are therefore, first and foremost, landraces of subsistence crops such as sorghum, maize, pearl millet, cowpea, common bean, cassava, sweet potato, rice, followed by groundnut, bambara groundnut, pigeon pea, local under-utilised fruits and vegetables and medicinal plants.

As can be seen in Table 4 the PGR collections made so far represent only a tiny fraction of the vast variability of germplasm in farmers fields. The collections are clearly not representative of the diversity that exists in the country nor are they adequate for Angola's proposed objectives. The main reasons why more has not been collected are all the limitations set by the war, the inaccessibility of large areas of the country to collectors and the lack of financial support for this exercise.

3.1.4 Financial support for PGR Conservation

Government support

Government capacity to support PGR conservation is extremely limited because of emergency commitments caused by the war (defense expenditure); emergency programs for war displaced populations (around 25% of the total population); emergency reconstruction of roads, bridges, homes, provision of skeletal health, education and transport services; galloping inflation (1,300% in 1994)). Within very limited means the Ministry of Agriculture and Rural Development has supported the NPGRC. In 1992 it provided a collecting vehicle and computer for PGR work, but by 1993/94 its support accounted for less than 10% of NPGRC conservation expenditure.

Considerable logistic support in several collecting missions has been provided by the IDA, Ministry of Agriculture extension service.

International support

It has proved difficult to get support from international agencies for PGR conservation activities in Angola. One reason for this is that they are already responding to Angola's requests for massive emergency aid programs to help deal with the problems mentioned above. Another reason is the attitude that PGR conservation should "wait until the war is over". The sad truth is that longer we wait the more crop PGR will have been eroded. Indeed, there are already less local landraces available in reasonably accessible areas than was the case 4 years ago when collecting missions began, as a result of substitutions with exotic seed donations.

Over the past 2 years support for PGR conservation has been received from some far-sighted international bodies working in Angola, one international agency (the European Union), an international NGO (Oxfam) and a private international company operating in Angola (British Petroleum). This support for the NPGRC has permitted the Bank to keep functioning, to organise a First National PGR

Workshop and to begin an Emergency National PGR Collection. However, this is clearly an unsatisfactory and insecure situation; the Gene Bank and the PGR it contains are national heritage and should be treated as such in a specific government supported institution.

The NPGRC requires a line in the national budget with sufficient funds to develop PGR conservation work, to be able to coordinate PGR evaluation and utilisation with agricultural research, the extension service, seed multiplication service and with NGOs working with small farmers. The NPGRC is presently preparing statutes that would allow it to become established as an independent national institution with its own line in the national budget.

Sources of support for the NPGRC and Gene Bank

Training: Post-graduates and short courses	SADC Regional Network
Running expenses: Salaries, collections, stationery, etc.	Oxfam / BP UAN / Minader
Premises, energy and water supply drying oven, small dessicators	Science Faculty, Agostinho Neto University.
1 collecting vehicle	MINADER
1 PC and printer	MINADER
1 collecting vehicle	SADC Regional Network
1 PC, printer,software	SADC Regional Network
1 Fax	SADC Regional Network
Aluminum foil seed storage bags	SADC Regional Network
1 Seed storage freezer	MINADER / European Union
1 Seed storage freezer	British Petroleum
1 Storage refrigerator	Oxfam
1 Heavy duty bag sealer	Kew Gene Bank
Cloth collecting bags	Kew Gene Bank
1 small bag sealer	Oxfam
1 Seed hygrometer	Angosementes
National Workshop	European Union

3.1.5 Storage facilities

The Luanda genebank operates in 3 small rooms in the Science Faculty of Agostinho Neto University. It is extremely overcrowded and urgently needs to move to larger premises. A project is in preparation for a purpose built bank in Luanda, but it requires financial support.

Seed is dried to 5-7% RH and sealed in aluminum foil seed packets and kept at 18°C in domestic freezers. The main bottle-neck in seed treatment is drying,

which is still done in 15 small silica-gel dessicators. Relative humidity in Luanda is very high (from 40 to over 85%) and the continuous regeneration of silica-gel in drying ovens is a tedious and time-consuming task.

When material is received into the bank it takes 3-5 weeks from the reception of the accession until it is processed and placed in cold store. Most of this time is required to dry the seed to appropriate RH. However, if, for example, over 60 accessions are received by the bank at one time, the last ones to be treated may be as much as 6 months after the first.

The bank urgently requires a larger automatic seed drier; its absence has been a major brake collecting activities for 1994 and 1995.

Maintenance of storage conditions is a problem when there are electricity cuts. These are usually of short duration and if under 24 hours long have relatively little effect on full closed freezers. However, longer cuts have been experienced and accessions have had to be moved to sites outside the normal bank area where there are back-up generators. (See August 1995 Update p.30).

3.1.6 Duplicates

The small Angolan PGR collection is not duplicated in another safer genebank, but duplicates of Angolan PGR are to be sent to the SADC Regional Gene Bank in Zambia.

Angola needs to develop its own genetic resources centre and national gene bank. If satisfactory conditions could be worked out Angola would be very pleased to place duplicates in other long term storage international facilities.

3.1.7 Documentation

The available passport data of all accessions in the Luanda gene bank is kept in a hand written Accession Register. The bank now has a computerised data base into which over half this data has been entered. The remainder is being entered at present.

The only characterization data in the computer is that of 15 accessions of sorghum. Samples of pearl millet sent to ICRISAT/SMIP were sent with passport data only.

3.1.8 Evaluation and Characterisation

Characterisation studies have been made of some accessions of sorghum, sunflower, groundnut. Shorter observations have also been made of cassava, *Abelmochus*, cowpea, sweet potato, papaya and *Phaseolus* bean. All of these studies have been carried out using IPGRI descriptors.

3.1.9 Regeneration

Some accessions in the Luanda bank will require regeneration in the near future, and this may be done in areas close to the bank. However, material support and personnel are required for this task.

3.2 CONSERVATION OF FOREST PGR

3.2.1 Management of Forests and Woodland

Although the conservation of Angola's forest ecosystems and PGR is recognized as a moral responsibility to future generations, at present there is almost no effective management of forests and woodland in Angola although it is recognized as a serious problem that needs to be tackled with the utmost urgency. All that is done at present is the granting of licenses to fell trees, mainly to industrial timber users and by firewood and charcoal producers.

Requests for licenses are required to include the following information: a map of the area to be licensed, a description of the vegetation cover, which should be verified by an appropriate local authority, an estimation of the annual stock growth and the permitted level of annual tree cutting, a description of the technical and financial resources of the individual or company making the request, including number and technical level of its employees, indicate the transport facilities available to the group and indicate the end users of the finished or unfinished end product.

As yet there is no management plan for the development an sustainable utilization of natural forests and woodland. There is no silviculture program in progress for natural or planted forests. This is due to lack of specialized personnel in this area and to lack of resources mainly caused by the war. There have been very few trees planted in Angola in recent years and there is also a very restricted number of species in the national program.

They include some fast-growing exotic species, such as *Eucalyptus saligna,*

E. tereticornis, Casuarina sp. (Angola has 150,000 ha of old eucalyptus plantations mainly planted by the Benguela Railway Company and the CCA papermill). A number of exotic and indigenous have been identified as promising but trials have not been carried out that might lead to their large-scale introduction.

The situations described above are due to a number of factors:

a) Lack of forestry research policy in general and in particular of species trials, provenance tests and growth curves.

b) Lack of systematic studies of equally promising species, based on the results of documentation from countries with similar agro-ecological conditions (e.g. *Terminalia superba*).

c) Low priority given to the forestry sector in terms of financial resources, transport and personnel.

d) Limited number of seeds available of species that are being used in reforestation programs.

3.2.2 Protected areas

Around 6% of the country's total area is included in designated conservation areas for the protection of fauna, flora, soil and water resources (at present these areas are almost abandoned and in many cases degraded, principally due to the war). Although 6% is considered internationally as a fairly high proportion of protected areas, many important vegetation types are not included in one of these areas. in fact they are Proposals have been made (Huntley 1974,1992) that would increase the existing network by 15.5% bringing the total area to 78,640 km^2 or 6.3% of total area, and including over 90% of major vegetation types (Map 5, Table 5). The IDF (1994) proposal would increase the protected areas to 10% of national territory.

The forestry sector does not have a clear policy for the management of protected areas. Neither does it have the financial and human resources for their maintenance and rehabilitation.

3.2.3 National Forestry Action Plan

In 1992-93 the Forestry Development Institute (IDF) of the MINADER and MinPlan, with support from the World Bank, organized a consultation mission for the forestry sector (IDF 1994). In the course of its work a National Forestry Action Plan was developed, which among other activities proposes to address the following objectives:

a) carry out a survey and evaluation of the present situation of existing conservation areas and the possibility of setting up new areas to include all the systems representative of Angola's biodiversity. This will require the development of a data system of geographical information.

b) develop guidelines for the management of the most important priority conservation areas;

c) prepare a code of conduct for the conservation and utilization of renewable natural resources.

3.2.4 SADC Regional Tree Seeds Project

Angola is integrated into the SADC Regional Tree Seeds Project that proposes to set up a national tree seed network. The main objective of this network is to provide national self-sufficiency in quality seeds, both exotic and indigenous. These seeds are to provide a secure basis for the success of future programs of reforestation, research and regional exchange. The activities to be developed in the framework of this project are:

a) Rehabilitation of the institutions responsible for tree seed production.

b) Obtaining of material and laboratory equipment for the treatment and production of tree seeds.

c) Setting up of an *ex situ* tree seed bank.

d) Setting up of a national forestry library and *herbarium.*

e) Training of specialized personnel.

f) Collecting, testing and selection of tree seeds at national level.

Recently specific preliminary studies have been made to set up a network of tree seed production centres.

CHAPTER 4
In-Country Uses of Plant Genetic Resources

4.1 USE OF PGR COLLECTIONS

Prior to 1992 the collections held at IIA were essentially working collections and used in national breeding programs.

Little use has so far been made of the PGR collections in the Luanda bank. Some samples of local varieties of maize have been supplied to NGOs for multiplication and use in new areas of the country and some accessions sent to SMIP, Zimbabwe.

The only other use that has been made of these PGR collections to date is the characterization of some sorghum, sunflower, and cowpea accessions. Some local maize accessions are to be evaluated shortly. The main reason why more use has not yet been made of PGR at the moment is the depressed state of agricultural research in general and plant breeding in particular.

4.2 CROP IMPROVEMENT PROGRAMS AND SEED DISTRIBUTION

The Government body responsible for plant breeding is the IIA. There are no private plant breeding institutions.

The main objectives of the national plant breeding program are: the development of higher yielding varieties that require minimum inputs; the improvement of local varieties, particularly developing resistance to drought, pests, diseases, salinity, etc.; finding the best crop associations for local agronomic conditions; the adaptation of imported varieties to local conditions.

At present plant breeding is almost at a standstill. Due to insecurity the Plant Breeding Department of IIA is unable to function in the Institute in Huambo. Some work is just beginning at a new experimental field at Mazozo (Bengo province), which will be the site of the roots and tubers field-bank. Ministry of Agriculture plans for 1995-7 include support for the research stations in Humpata

(Huila), Namibe, Cela (Kwanza Sul) N'gangassol (Malange) and as soon as possible for IIA itself.

Some national and international NGOs are involved in field trials alongside government scientists, but seed used is generally imported, often because no national material is available.

The amount of plant breeding currently undertaken, and possible in the short and medium term, is in no way adequate to meet national needs.

The main constraints are:

- lack of trained personnel; many of the staff formerly working in plant breeding have left (some for further training, others because of the security situation, others have left to join international agencies, NGOs or private companies because of the ludicrously low salaries and poor working conditions in government service);
- lack of physical conditions required for plant breeding (including buildings, equipment, laboratories, etc);
- lack of documentation and information;
- need to set up seed producing and seed multiplying agencies. Prior to 1992 there were seed multiplication centres in Malange and Huila provinces, to multiply basic seed produced in IIA plant breading programs;
- need for a widespread agricultural extension service.

National plant breeding needs to be started up again. This requires

1. A coordinated national agricultural research and plant breeding program.
2. Incentives for plant breeding staff and support for the few remaining plant breeding experts in the country.
3. Specialized technical training in breeding of all major crops.
4. Setting up of seed producing and seed multiplying enterprises.
5. Development of a wide-based agricultural extension service.

Seed Supply and Distribution

"Since independence all certified seed used in the country has been imported, although the country has possibilities for its production" (Minader 1995). Seed available to farmers today comes from one of four sources:

1. Emergency aid from international UN agencies and governments.
2. Other donations from national and international NGOs working in rural development programs.

Maize	1,428 MT
Beans	220 MT
Cowpea	200 MT
Groundnuts	100 MT
Sorghum	178 MT
Millet	178 MT
Horticulture	1,924 MT
Potatoes	230 MT

3. Angolan Government seed imports through the state's Angosementes enterprise.
4. Farmers' own seed from local landraces. These are particularly used in areas where access to improved seed is difficult.

Angosementes estimates of seed that should be imported in 1995 is:

It is has now been proposed that Angosementes become an independent seed company (with 60% state participation) and that other seed companies may be set up for importing, producing and distributing seed.

There is no national seeds service nor seed legislation, but the need for these is recognized by the Minader.

4.3 USE OF FOREST PGR

Angola has recently joined the SADC Regional Tree Seeds Project, which includes the multiplication of local and exotic tree seeds.

4.4 IMPROVING PGR UTILIZATION

We consider the very modest achievements of our PGR activities to be:

a) increasing awareness in the country of the value of its PGR;

b) increasing awareness of the importance of the conservation and utilization of PGR;

c) conservation of some unique Angolan landraces in gene bank;

d) provision of some accessions to local farmers via NGOs, and to the SADC/ICRISAT Regional Sorghum and Millet Improvement Program;

e) preparation of a proposal to regulate the collection and transfer of PGR, based on the FAO code of Conduct.

More use has not been made of our PGR because of the depressed state of plant breeding in Angola.

Angola considers that all of its PGR are potentially valuable. The most valuable in the short term are:

1 Locally adapted landraces.

2 Under-utilized food and fruit species.

3 Medicinal plants, and those containing substances of value to pharmaceutical companies and other industries.

The value of plants with pharmaceutical and industrial potential, and ornamentals, are expected to increase in the medium and long term.

CHAPTER 5
National Goals, Policies, Programmes, Legislation

5.1 NATIONAL PROGRAMMES

5.1.1 Introduction

The first responsibility of the Angolan national plant genetic resources programme is to contribute towards food security and the development of sustainable agriculture. It is considered that the national programme should take into account a cycle of events that start from and return to farmers' fields.

- Farmers fields *in situ* conservation of PGR.
- PGR Collection (1).
- Conservation of PGR *ex situ*, in banks and field banks (2).
- Characterization and evaluation.
- Plant breeding programmes (3).
- Multiplication (4).

5.1.2 Proposed National Programme

(1) Collection of Local Varieties

- Expansion of the National Emergency Collection

  The reasons for this expansion are:

  (a) Local PGR are the essential basis for breeding improved agricultural varieties, to contribute to food security for today and tomorrow.

  (b) Angola has an enormous variety of PGR, both of cultivated species and wild plants.

  (c) For historical reasons, with few exceptions, Angola's PGR are not already conserved in any national or international collections.

(d) For 20 years there has been no commercial seed multiplication and in many areas farmers have been obliged to use their own seed year after year.

(e) With the coming of peace exotic varieties are being introduced and distributed in the country, both by the Government and by international and national agencies and NGOs. These donations are substituting local varieties and causing their disappearance. The material that is lost is the result of decades, or centuries, of selection by farmers and adaptation to local farming conditions.

(f) Over the past two years around three million people have been displaced from their home areas, many of them small farmers. They may have eaten or left behind their own seed, and when they return again it is with donated exotic seed, once again contributing to the erosion of local PGR.

(g) To date, just 328 accessions of local varieties have been collected by the NPGRC. This represents a tiny fraction of the variability in the country.

(2) PGR Conservation

- Improve the conservation infrastructure in the country.
- Construction of a purpose-built gene bank in Luanda. A project proposal has been prepared for this bank, but it requires financial support.
- Establishment of a field bank for roots and tuber crops, especially for cassava and sweet potato (Mazozo, Bengo province)
- Rehabilitation of the existing field banks for coffee, for local and exotic fruits (Humpata, Cela, Cavaco, Chianga, Xangongo, N'gangassol).

(3) Plant Breeding. Specialized post-graduate training in the breeding of priority crops (maize, *sorghum*, millet, cassava, grain legumes, rice)

(4) Seed Multiplication

- Promotion of national seed production.
- Specialization for agriculture graduate in the area of seed production.
- Promotion of seed multiplication of local varieties by farmers. Setting up of community banks to store seed in the short term. Some national and international NGOs are involved in this work.

(5) Establishment of a PGR Centre as an independent entity with its own line in the national budget, and with a NPGR Committee that can coordinate PGR conservation and utilization

(6) Legislation

- Ratification of the Convention on Biodiversity by the National Assembly. Until specific national PGR legislation is passed ratification of the CBD will provide some protection for the environment in general and for the country's PGR.
- National PGR legislation. Drawing up of legislation to protect these resources; urgent adoption of a code of conduct for collection and transfer of PGR, based on the FAO International Code of Conduct.
- Urgent measures are required to conserve the rich variety of medicinal plants, both from excessive uncontrolled use within the country and from uncontrolled exportation for direct use or for pharmalogical screening.

(7) Training

- Specialist training in collection and *in situ* and *ex situ* conservation techniques.
- Training of middle level staff and extension workers in *in situ* conservation and the utilization of PGR.
- Participation in the Regional Project to train taxonomic botanists and *strengthen herbaria*.

5.2 TRAINING

Compared with the difficulties existing in other areas of PGR conservation (such as lack of funds and material support, and lack of trained plant breeders in the country), the Angolan national program is fairly adequately staffed with trained personnel. Lack of trained staff is not one of the main immediate limiting factors. Of the staff at the Luanda Gene Bank, 2 have attended the University of Birmingham MSc course in PGR conservation and utilization, 2 more are expected to take this course in 1995/6. Two staff have attended PGR short courses in Denmark and Sweden (NGB) and two have attended regional PGR short courses in Zimbabwe and 2 have attended a short PGR collecting course in Zambia in 1995.

Apart from 1 MSc student financed by the Angolan Government, and the Zambian collecting short course financed by IPGRI, *all other training has been financed through the SADC Regional PGR Network Project and principally by the Scandinavian countries.* In Angola's view this has been far and away the most useful component of this project to date.

Further training and technical expertise could help the expansion of PGR activities. Angola would prefer to obtain plant breeding assistance in the region, for example from South Africa and Zimbabwe. It would also be useful for Angola to develop ties with Brazil in PGR, as a Portuguese-speaking country with considerable experience in this field. Angola would like to think that the ties developed with the Scandinavian countries and particularly NGB will be maintained for the foreseeable future.

The skills required to make better use of Angolan PGR are:

- taxonomic expertise for identification purposes,
- specific crop expertise, for characterization and evaluation,
- pharmacological expertise.

Angola feels that there is now sufficient PGR knowledge in the country at UAN and Gene Bank to be able to run training course in Portuguese for technical and extension staff. The international input required is financial support. There would be enough demand in the country for such a course, and perhaps with help from Brazil, course could be run for all five Portuguese-speaking countries in Africa.

The Angolan PGR programme is also hampered at present by extremely poor national and international communications systems, though this situation should be overcome in the near future.

5.3 NATIONAL LEGISLATION

It will be clear from the previous chapters of this Report that Angola is in an extremely backward situation with regard to the conservation and utilization of its very considerable PGR. On the other hand, it is not in the situation of many other developing countries that now find that much of their PGR is in foreign countries' genebanks or in international institutions, and over which they have little or no rights.

Angola feels that it is important to get the legal status of its PGR right from the start and set in place legislation that will protect the country's PGR before

allowing this material to be exported. Angola is a member of the SADC Regional PGR Network, and wholly subscribes to its aims and MOU of regional PGR cooperation. It has signed the CBD and is most willing for its PGR to be used for the benefit of all nations. *However, it requires a fair return for the use of these resources, be they used for producing improved seed varieties, for industrial, pharmaceutical products or any other use.*

The form of compensation for such use could be in a variety of mutually agreed forms, such as:

- exchange for improved varieties;
- percentage of patent on improved material, pharmaceuticals, industrial products, etc.;
- support for conservation activities;
- training of Angolans in PGR and plant breeding, etc.;

The NPGRCom has prepared a draft proposal to regulate PGR collection and transfer, based on the FAO International Code of Conduct (FAO 1994).

CHAPTER 6
International Collaboration

UNCED

Angola has signed the Biodiversity Convention. The ratification of the CBD has been placed before competent Government entities, but it still needs to be put on the agenda for discussion first by the Council of Ministers and then by the National Assembly.

FAO Global System

Angola is a member of the FAO PGR Commission and signed the International Undertaking in 1992. Angola joined the Commission to be able to participate in discussions on the most appropriate ways to protect and utilize national and global PGR, and so as to obtain more information about the state of PGR conservation in the world.

The country has already benefited from its participation in the Commission in the following ways:

- receiving information available to members
- becoming aware of the situation of PGR conservation in other countries
- contacts and exchange of ideas

The information received has been extremely useful. For example the International Code of Conduct on Collection and Transfer of PGR is being used as a basis for drawing up a national code to protect the country's PGR.

Angola would like to see the International Undertaking revised so that it not only clearly recognizes Farmers Rights, but also is brought into line with the Biodiversity Convention. Angola would support the establishment of an International Fund for the conservation of PGR. There has been no collaboration with FAO at programme level in the area of PGR.

CGIAR

MINADER, and in particular IIA, have maintained contacts with several international centres (IARCS) for over 15 years. The main collaboration has been in the area of training in formal short courses at CIAT, ICRISAT, CIMMYT, and IITA). Angola has received samples of varieties from IARCS and from regional

and international breeding programs for use in national trials. More use has not been made of this material in the recent past due to the depressed state of agricultural research. Some finished varieties have also been received, such as two improved millet varieties from ICRISAT received via Namibia. While providing improved yield, these varieties presented storage problems in local farmers' storage conditions.

There are no IARCs staff working in Angola at present, but the country receives technical support from some regional programs, such as from SMIP staff in Zimbabwe and the SADC Tree Seeds Program in Malawi, as well as from IITA. It would be extremely useful if Angola could receive more technical support from IARCs, particularly in formal courses and in in-service training in plant breeding and seed production of principal crops.

There was one direct contribution to the PGR program from ICRISAT, which sent two scientists in 1992 to train national staff in the collection of grain legumes. In 1991 Angola sent millet samples to ICRISAT/SMIP for inclusion in regional trials.

Angola would be very pleased to send duplicates of its PGR collections to CGIAR crop specific and other international centres, both for its safe-keeping and so that it may be used in other countries' plant breeding programmes. This, however, would be dependent on the working out of an appropriate system of return of benefits to Angola, in the event of commercial advantage from the samples (for example, through an International PGR Fund, the training of national scientists, use of improved varieties, etc.).

IPGRI

IPGRI has made an important contribution to the development of the Angolan PGR programme through the SADC PGR Network project. This has included short courses at Matopos for 2 Angolans in 1991 and 2 in Zambia in 1995, as well as its contribution to the MSc course in Birmingham.

IPGRI's invaluable direct contribution to the Angolan PGR program has been the provision of indispensable reference documentation in all areas of PGR work (descriptors, *ex situ* conservation techniques, international directories, etc., as well as maintaining a useful PGR newsletter).

Angola believes that IPGRI has an important role to play in the future, both in training and documentation. It could, perhaps, be instrumental in setting up courses for the Portuguese speaking countries of Africa (PALOP), in cooperation with Brazil and Portugal.

The continued production of high quality reference documentation is of particular value to Angola. The documentation would have a wider audience in the

country if it could be sent both in English and in Spanish. This would be particularly useful for descriptors. Alternatively, perhaps IPGRI could support the translation into Portuguese of such essential references.

Kew Gene Bank

In 1991 the first PGR collections of local subsistence crops were made accompanied by a collector from Kew Gene Bank, and some wild species collected at that time are stored in the Bank. On several occasions since 1988 Angola has received technical support from Kew, including a short in-service training course, some essential conservation equipment, and technical advice.

Intergovernmental Regional Initiatives

Angola is a member of the SADC Regional PGR Network and it was the establishment of this project that gave the first impetus for a national PGR programme. Angola believes that this project has some excellent and unusual characteristics, that could be used as an example for other projects involving the coordination of 5 donor countries and 10 executing countries:

1. It is a very long term project 20 years which gives sufficient time for the establishment of the Regional Bank and for the implementation of national programmes.
2. The project contains a high proportion of specialized training, at technical and higher level, including short courses in the region, gene bank management courses and MSc in PGR conservation and utilization. This has been its most useful component to date.
3. Regional Board meetings provide the opportunity for Member States to exchange experiences, look for ways to overcome difficulties, and compare progress with other countries in the region.
4. Relations with the Scandinavian donor countries have been exceptionally good, both in Board Meetings and in training courses in Denmark and at NGB; always encouraging, concerned to help in a non-intrusive and fraternal way. Angola has received some essential equipment from the Regional project, as described in Chapter 3.

At this stage in the development of the Network, and now that the Regional Bank at Chalimbana is well established, Angola would like to see greater support for national programmes, since it is the success of these that will determine long term usefulness of the Regional PGR Network.

CHAPTER 7
National Needs and Opportunities

Considering the present weak state of agricultural research and of plant breeding in particular, the reduced agricultural extension service, the almost non-existent national seed production, and low level of support for PGR conservation, Angola urgently needs support to develop the national PGR programme set out in Chapter 5. It requires support in the following areas:

- Financial and material support to extend the National Emergency Collection of rapidly eroding local varieties, with priority for indigenous subsistence crops.
- Financial support for the expansion of storage facilities; construction of a gene bank capable of conserving the collections for the present and future.
- Financial and technical support for the establishment and rehabilitation of field banks.
- Financial and technical support for plant breeding.
- Incentives for farmers to maintain their local varieties.
- Financial and technical support for the conservation research and sustainable development of under-utilized plants and medicinal plant species.
- Translation of essential PGR information into Portuguese.

CHAPTER 8
Global Plan of Action

1 Preparation of material to raise international awareness about the true value and potential of PGR. Some of this material should be aimed at policy-makers, and other to read awareness among the public in general and farmers in particular. It should be available in as many languages as possible.

2 Recognition of countries' sovereign rights over their PGR, even when these are stored in the banks of other countries, regional banks, IARCs or other international institutions.

3 Worldwide acceptance of the FAO Code of Conduct for the Collection and Transfer of PGR.

4 Recognition by Governments of their responsibilities for the conservation of the PGR existing within their countries.

5 Recognition of Farmers' Rights in relation to PGR which are enhanced and marketed by public or private, national or international enterprises or institutions.

6 Greater emphasis to be placed on *in situ* conservation and the involvement of farmers in PGR conservation.

7 Establishment of an International Fund for the conservation of PGR, and of mechanisms for the transfer of PGR conservation and utilization technology from developed countries and IARCs to developing countries.

8 Recognition of Angola as a country that deserves urgent and special attention, because of the great variety of its PGR, because of the depressed state of its agriculture, and its relative backwardness in this conservation area, all of which have been primarily caused by prolonged war.

8.1 COUNTRY REPORT UPDATE AUGUST 1995

1 At the end of July 1995 the Luanda Bank received essential seed drying and conservation equipment from Sweden.

2 Luanda Gene Bank is moving to slightly larger premises, hopefully as a temporary measure, while a purpose-built genetic resources centre is constructed.

3 A National Seed Service is being formed by the Ministry of Agriculture, principally as a monitoring body for imported seeds and for those produced within the country.

Abbreviations

AAA	Associação Angolana do Ambiente (Angolan Environment Association).
CCA	Companhia de Celulose de Angola (Angolan Cellulose Co.).
CIAT	Centro Internacional de la Agricultura Tropical.
DNAF	Direcção Nacional de Agricultura e Florestas.
FC	Faculdade de Ciências (Science Faculty) UAN.
FCA	Faculdade de Ciências Agrárias (Agriculture Faculty).
UAN	(National Agriculture and Forestry Division-Minader).
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics.
IDA	Instituto de Desenvolvimento Agrario (Institute of Agricultural Development Extension service).
IDF	Instituto de Desenvolvimento Florestal (Institute of Forestry Development).
IIA	Instituto de Investigação Agronómica (Agriculture Research Institute).
IITA	International Institute for Tropical Agriculture.
ISCED	Instituto Superior de Ciências de Educação (Higher Education Institute).
MINADER	Ministério da Agricultura e do Desenvolvimento Rural (Ministry of Agriculture and Rural Development).
NGB	Nordic Gene Bank.

RRSFSADC Rede Regional de Sementes Florestais da SADC (SADC Tree Seeds Network).

SEA Secretariado de Estado do Ambiente (State Secretariat for the Environment).

SECafe Secretariado de Estado de Cafe (State Secretariat for Coffee).

SEEA Secretariado de Estado para Energia e Aguas (State secretariat for Energy and Water).

SMIP *Sorghum* and Millet Improvement Program.

SPGRC SADC Plant Genetic Resources Centre.

UAN Universidade Agostinho Neto.

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