



## McGregor Museum Kimberley

### Botany Department: Discover Northern Cape Plants

Discover the interesting world of Northern Cape plants and learn about how plants have adapted to survive in these arid western areas of South Africa.

To experience the wide-open spaces and take a closer look at the exquisite beauty of these desert plants, you need to visit the Northern Cape. However, do not visit this area unprepared – do your homework beforehand. A good start is to consult the latest guide [Hidden Splendour](#) a guide to the natural history of the Kalahari and surrounds. This guide also refers to some of the more detailed reference works.

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How many plants are there?



Biome, Grassland Biome & Desert Biome.

There are an estimated 5400 plant species in the Northern Cape Province. These plants occur in six large vegetation units known as biomes. Each biome is a broad ecological unit that represents major life zones of large natural areas, defined mainly by vegetation structure and climate. There are six biomes in the Northern Cape, namely the Savanna Biome, Nama Karoo Biome, Succulent Karoo Biome, Fynbos

Each biome is subdivided into vegetation types, which are groups of plant communities that share similar ecosystem processes, and have similar climatic and geological requirements. There are many vegetation types in the Northern Cape. The Orange River Nama Karoo is an example of one of these vegetation types, within the Nama Karoo Biome. It is found along most of the Orange River from its confluence with the Vaal River near Kimberley to the Richtersveld in the far northwestern corner of the Northern Cape. A common plant of this vegetation type is the Quiver Tree (Kokerboom) *Aloe dichotoma* that grows on the broken, rocky terrain.

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### Why are plants important to us?

Plants produce oxygen, without which we cannot live. They also produce food in the form of stored energy through the process of photosynthesis. During photosynthesis, solar energy is converted into forms of stored energy that we can ingest as food, and oxygen is released in the process. They are therefore fundamental to our survival and we cannot live without plants.

Plants are needed for many other reasons too. Plants are used for horticulture, recreation, in the arts, religion, folklore and as traditional medicines. We produce many products from plants, such as chemicals, insecticides, wood, latex, oils, plastics, paper, rope, and perfume.

Artists use plant derivatives as media to create art. Common plant-derived materials are wood, paper, inks and dyes. Many musical instruments are made out of wood, such as string instruments and drums.

Traditional medicine is widely used in South Africa and is an effective form of health care.

### What is an endemic plant?



An endemic plant is a plant that is naturally restricted to a certain region, such as a mountain range or specific vegetation type.

In the Northern Cape more than 30% of the plants are endemic. Most of these occur in the Succulent Karoo along the west coast of South Africa. Many of these plants are rare or threatened, with a very limited distribution. The endangered baster kokerboom *Aloe pillansii*, a tree aloe, is endemic to the Richtersveld in the far north-western corner of the

Northern Cape.

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## What is a rare or Red Data Plant?



This is a plant that is listed under one of the categories in the Red Data List of Plants. It is listed as such because it is under threat of extinction, often endemic to an area, and has a limited distribution.

More than 10% of the world's threatened plant species are found in southern Africa. Approximately 1000 Northern Cape plant species are listed as red data plants.

There are various categories in the Red Data List that give us an indication of the conservation status of each species. The categories are "Extinct", "Endangered", "Vulnerable", "Rare", "Indeterminate" and "Insufficiently Known". Plants classified as "Extinct" are those that are no longer known to exist in the wild. Those classified as "Endangered" are in danger of extinction if the factors causing their numbers to decline continue operating.

A number of factors can be responsible for a decline in the size of plant populations. They may eventually cause the extinction of a species. Once this species is lost, it can never be replaced. The most common threat to many arid plants is overgrazing. Overgrazing leads to a decrease in the number of plant species, a change in the ecological balance, and the eventual loss of plant diversity. Large-scale agriculture (crop farming) along the Orange River can lead to a loss of species that only occur in this area. Similarly expansion of urban areas and the development of roads also take their toll. Strip and open cast mining along the Vaal and Orange Rivers pose a threat, and few natural areas along these river systems are left untouched as a result of the accumulated disturbances and developments. Plant collectors that collect rare plants for trade or other purposes can pose a serious threat to some species. The most recent book on the threatened plants of South Africa is the *Red Data List of Southern African Plants* by C. Hilton-Taylor, published in 1996.

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## What is a herbarium an ark of plant diversity?



If herbarium plant specimens are treated properly, they can be a source of extractable DNA. In future the DNA of extinct species housed in herbaria could possibly be used to recreate these plants. As such, plant collections in herbaria should be seen as one of the most important resources on earth today.

Today's collections will show our grandchildren what our world was like. If more species become extinct, these specimens safely stored in herbaria will be the only direct evidence that certain species ever existed.

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## Why shouldn't we let plant species go extinct?

Every species of plant and animal plays an important part in keeping our environment intact and functional. Each species that disappears upsets the delicate balance that we rely upon for our survival. New extinctions show us that all is not well. There are indications that the current rate of plant extinctions is far greater than the estimated natural extinction rate. If this loss of biodiversity continues, we will soon be facing a conservation crisis.

We should try to ensure that more species are not lost due to careless and unnecessary human impact on our environment. The next plant species that goes extinct might just contain the compound needed to cure AIDS or cancer.

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## What is a quiver or Kokerboom?



The Kokerboom or Quiver Tree *Aloe dichotoma* is a tree aloe. It is also a succulent plant because it has the ability to store water in its stems and leaves. It is one of the most characteristic plants of the Northern Cape, and is known as 'garas' by the Namas (from the word meaning "to scratch lines") and 'choje' by the Bushmen.

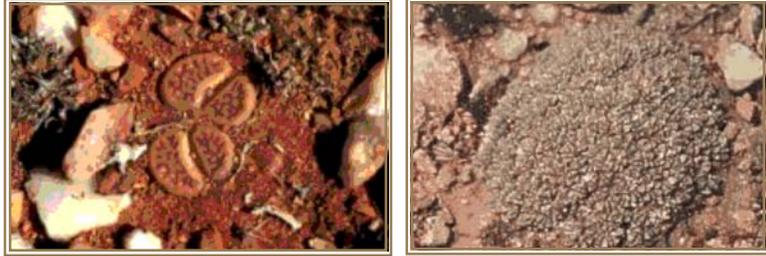
Confined to the Northern Cape and Namibia, this tree aloe is found growing mainly on the rocky habitat of the hills along the Orange River. In places it occurs in dense "forests", and good examples of these occur just south of Kenhardt and between Pofadder and Pella. The Doringberg hiking trails near Prieska pass by these gentle aloe giants, and close to 4 000 trees can be seen in the Kokerboom forest on the Kokerboom hiking trail near Kenhardt.

It has a thick, peculiar corky trunk and a crown of branches topped with large rosettes of fleshy, grey-green leaves. The margins of the leaves have small triangular "teeth" for protection. Bright canary-yellow flowers appear during winter, which produce a copious supply of nectar that attracts a host of nectar lovers. Many birds including Mousebirds, Dusky Sunbirds and Pied Barbets enjoy a feast of nectar if they get to the flowers before the baboons do. In the past local people hollowed out the soft branches and used them as quivers for their arrows, hence the English vernacular name. Small animals make their homes between the leaves and in the corky trunk. The Pied Barbet is fond of enlarging holes in the trunk to construct its cosy nest, while Sociable Weavers build huge communal nests of grass in the crown, sometimes covering the whole tree. These Sociable Weavers' nests are shared by up to 400 birds, and often other species such as Pygmy Falcons and Redheaded Finches. A remarkable quality of this tree is its ability to accumulate water in its leaves and corky tissue. It has developed these adaptations because of the harsh climatic conditions in which it survives. Low air humidity, low soil moisture and intense sunshine levels have made it necessary to absorb even small amounts of moisture whenever the opportunity arrives. It has a superficial root system enabling it to absorb moisture quickly.

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## How do plants survive in hot, dry areas?

The Northern Cape has a semi-arid to arid climate with a low rainfall and extreme temperatures from as low as  $-8^{\circ}\text{C}$  in winter to  $41^{\circ}\text{C}$  in summer. So how do plants manage to survive under these conditions?



Many of the desert plants are dwarf-like and have small leaves that lose less water than large leaves. Examples are the small Karoo shrubs, many of which can also drop their leaves during the hot months and grow new ones after it rains or when it gets cooler.

Some plants store water in their leaves. This helps them to survive long periods without rain. Well-known examples are aloes, such as the Kokerboom *Aloe dichotoma*. Others store water in their stems. Many *Euphorbias* do this and, in addition, some species have a waxy layer that coats the stems to prevent water loss.

Stone plants are adapted in a number of ways. They are very small, have only a few, very succulent leaves, and are half buried beneath the soil to escape the heat and reduce moisture loss. They have the same colour and markings as the pebbles or soil around them, and are therefore camouflaged and well hidden from herbivores (plant-eating animals). They often grow between light-coloured pebbles on which dew condenses at night when they cool, and the shallow roots of these plants then quickly absorb the moisture droplets.

Another way plants escape the heat is to grow in the shade of another plant or a rock. Many of the Stapeliads, which are small stem succulents with large, attractive flowers, grow inside shrubs where they are sheltered from direct sunlight and animals.

Light-coloured leaves reflect sunlight that helps to keep the plant cool. *Antimima*



*lawsonii*, a dwarf, compact shrub, has very small, light-coloured leaves that do just that. This plant also grows between whitish pebbles that further improve the local microclimate.

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## What is Namaqualand famous for?

Namaqualand is part of the Succulent Karoo, harbouring a beautiful and fascinating flora without equal on a global scale and truly a place of marvel. The Succulent Karoo stretches from Sutherland westwards to Nieuwoudtville and Calvinia, over the escarpment and in a broad band along the west coast into Namibia in the north. This region, and in particular Namaqualand which is strongly influenced by winter rainfall and fog, is an extraordinary desert that harbours a range of succulent plants beyond compare. It boasts a bulb flora richer than that of any other arid region and provides a springtime display of annual flowers that draws thousands of admirers and photographers. Some 5000 diverse and fascinating plant species exist in this special region, representing a botanical marvel to rival the fynbos of the well-known Cape Floral Kingdom.

The terrain varies from coastal sandy flats to mountain ranges of diverse geological formations – granite, gneiss, quartzitic sandstone, lava, quartzite, dolomite, conglomerate and shale. The mild temperatures during winter and summer remain remarkably constant as a result of the influence of the cold Benguela Current of the Atlantic Ocean. Rain borne on cold fronts falls during winter, and is on average less than 400 mm a year. Unlike the rest of the Northern Cape, the rainfall in Namaqualand is remarkably reliable and this is the fundamental explanation for its unparalleled diversity of leaf succulents, bulbs, high numbers of minute succulents and the regular displays of spring flowers. In this dwarf succulent shrubland mesembs (vygies) with succulent leaves and crassulas are dominant, and bulbs are abundant. Most of the succulents are small and compact, and as a result there is much space and habitat available in which to develop, which is why succulent species are so diverse in this Biome. The high floral diversity of this intriguing place and the fact that 50% of the species are found nowhere else in the world, places Namaqualand in the unique position of being the only desert hotspot of biodiversity. Indeed, this area has concentrations of diversity of tortoises, lizards, mole rats, monkey beetles, bee flies, bees, wasps and scorpions.

The Succulent Karoo of the Northern Cape can be subdivided into five major areas: the Richtersveld – probably the most scenic mountain desert in the world and most arid region of South Africa; the Namaqualand hills – the heart of Namaqualand with picturesque granite domes covered in seasonal flower splendour; the flat Sandveld – dry sand dunes next to the cold water of the Atlantic Ocean; the Knersvlakte with its characteristic white quartzite pebble fields; and the bulb centre of the world – the mountainous uplands from Nieuwoudtville into the Roggeveld mountains.

The Richtersveld, at first impression, appears to be a lonely, harsh and arid lunar landscape of various shades, with little plant life. On closer inspection however, and especially during the winter, it is full of beautiful miniature gardens of colour as the flowers display their splendour. Growing in between pebbles or in rock crevices, the

highly specialised plants survive and evolve in their own niches. Tucked away in the northwestern corner of Namaqualand, the Gariiep (Orange) River forms its northern boundary. Part of the unique flora of this strange wilderness is protected in the Richtersveld National Park and the Nababeep Nature Reserve. A rare wonder, endemic to the Richtersveld, is the giant quiver tree *Aloe pillansii* that is restricted to small populations and highly endangered. It is the home of the halfmens *Pachypodium namaquanum*, a rare species and perhaps the most intriguing of all the stem succulents. Even more intriguing is the button plants *Conophytum* species, described as little succulent gems. They are extreme miniature leaf succulents; small clusters of fused leaves, covered with thin papery skins to survive the dry season. After good rains they shake off their papery protections and explode in a miniature exuberance of colour.

The granitic Namaqualand hills, locally known as the hardeveld, not only harbour numerous colourful daisies; small mammals and reptiles are abundant. Bat-eared Fox and aardwolf, steenbok and duiker can be seen, and the dassie rat lives amongst the rounded boulders. Brant's whistling rat is responsible for the burrow systems in sandy areas, which provide ideal conditions for seed germination. These rats have an interesting social system and whistle to their neighbours to make their presence known. Frequently seen birds are Namaqua sandgrouse, black korhaan and jackal buzzards, sometimes black-breasted snake eagle soars overhead and the illusive cinnamon-breasted warbler might be spotted hopping over the rocks. Annual plants, mostly of the daisy family, are largely responsible for the impressive fields of colour between the 'klipkoppe' during spring. However, these annuals constitute only 8% of the flora of the Succulent Karoo, and are a result of human interference with the environment: they reclaim the ploughed wheat fields. They are short-lived and die off at the end of spring, leaving behind many seeds that lie dormant in the soil throughout summer to germinate again during the next autumn or favourable period.

In between the daisies on the rocky domes, two stems succulents, the botterboom *Tylecodon paniculatus* and quiver tree *Aloe dichotoma*, are prominent. Other interesting leaf succulents such as the brightly coloured *Ruschia* and *Drosanthemum* species and various crassulas abound. Visit Goegab Nature Reserve near Springbok and the Namaqua National Park (ex Skilpad Nature Reserve) west of Kamieskroon for spectacular springtime floral shows.

The Knersvlakte, another sub-region of the Succulent Karoo in the Western Cape, is characterised by its carpet of miniature succulent plants between the white quartzite pebbles of the gravel plains. This fascinating area is the only home to the well-adapted and bizarre bababoutjies (*Argyroderma*) and thumb mesembs (*Dactyloopsis*).

Along the west coast the Sandveld lies adjacent to the cold Atlantic Ocean and receives much fog. Breathtaking passes to drive to the Sandveld are the Spektakel and Messelpad passes (from Springbok to Kommagas) which take you through spectacular scenery. This diamond, fish and crayfish country is a sandy, flat area with some rocky

ridges protruding at intervals. The soils are poor in nutrients, and scattered low shrubs and small trees dominate the plant life. Succulents, especially trailing and creeping species are abundant. Plants, which carpet the sands with bright colours, include *Lampranthus* species, creeping mesembs *Cephalophyllum* species and the bokbaaiwygie *Dorotheanthus bellidiformis*.

The mountainous upland of the Bokkeveld Plateau and the Roggeveld is best entered from the west along Vanrhyn's Pass which cuts through a range of vegetation changes; from the lower slopes covered with daisies and bulbous plants to sandstone cliffs supporting true Cape fynbos. The Nieuwoudtville area is the most popular destination to see the many endemic bulb species of the Succulent Karoo, but travelling further into the Roggeveld can reveal areas equally rich in bulbs and succulents. Autumn (March – April) is the time to see brilliant shows of amaryllids – kwaslelie *Boophone haemanthoides*, *Brunsvigia bosmaniae*, the star-like flowers of *Hessea* and paint-brush heads of *Haemanthus*. Spring brings forth fields of daisies and exquisitely beautiful irises and orchids, and one of the glories of Nieuwoudtville, the rooikatstert *Bulbinella latifolia* var. *doleritica*. New species are still being discovered; a new *Clivia* species was recently discovered in the Oorlogskloof Nature Reserve. Other places to see are the Nieuwoudtville Wild Flower Reserve, the Glenlyon Reserve, a dense quiver tree *Aloe dichotoma* forest on the farm Gannabos on the road from Nieuwoudtville to Loeriesfontein, and the serene and misty Nieuwoudtville Waterfall.

Sadly, the Succulent Karoo is a heritage that was and still is being abused and needs to be protected at all costs while there is still the opportunity to do so.

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### Botany at Wildebeest Kuil

The vegetation that occurs around Kimberley forms part of the Kimberley Thorn Bushveld. On the koppies like the one at Wildebeeskuil, we often find a higher diversity of smaller shrubs and a different grass species composition to the plains. Many of these species prefer rockier habitats such as that of the Wildebeeskuil koppie, comprised of andesite rocks and small quartzite stones.

The larger, thorny shrubs that are prominent on the koppie are common around Kimberley; blackthorn *Acacia mellifera* and umbrella thorn *Acacia tortilis*. Shrubs that prefer the rockier soils include suurkaree *Rhus ciliata* and puzzle bush *Ehretia rigida*. A few small trees are also present on the top of the koppie and near the boardwalk, namely the shepherd's tree *Boscia albitrunca*, camel thorn *Acacia erioloba* and buffalo thorn *Ziziphus mucronata*.

The dwarf shrubs growing on and around the koppie are shrubs that are common to the Karoo, and you might notice a few skaapbossie *Pentzia* species. Other common dwarf shrubs are the Januariebos *Gnidia polycephala*, bloublommetjie *Felicia muricata* and the heuningbos *Melolobium* species that is very attractive to bees. The low growing,

yellow-flowered shrub is the vermeerbos *Geigeria ornativa* and the pretty annual daisy flower common in winter and spring is the botterblom *Gazania krebsiana*.

If you are lucky to walk the trail at the right time, you might see a few bulb species in bloom. Most of the local bulb species are very small and sparse, but have beautiful and delicate flowers. The sweet scented bobbejaanuintjie *Babiana hypogea* even grows on the trail path, and the lovely uintjie *Gladiolus permeabilis* is an unobtrusive and little known Gladiolus species.

Common grasses to be seen include the tall turpentine grass *Cymbopogon plurinodis*, red grass *Themeda triandra*, finger grass *Digitaria eriantha*, spear grass *Heteropogon contortus* and several love grass *Eragrostis* species.

A large specimen of the thorny prickly pear *Opuntia ficus-indica* is present on the middle section of the koppie. This cactus-like intruder is a declared alien invader plant.

The red mounds dotting the koppie are the homes of the snouted harvester termite *Trinervitermes trinervoides*. These little termites feed on grass and while the workers gather short bits of grass, the soldiers squirt a sticky, turpentine-like fluid from their snouts to fend off any predator nearby. However, this defense is no good against the aardwolf and armadillo, as these termites make up a large proportion of their diets and they keep the termite numbers in check.

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