



General guidelines to growing and maintaining healthy *Proteaceae*

In South Africa we have 14 genera and 352 species, most of which are endemic to the winter rainfall zone. However, some *Leucadendron* and *Leucospermum* also occur into the summer rainfall zone, whilst *Protea* occurs throughout South Africa and into tropical Africa.

South African *Proteaceae* is represented in all 9 provinces of the country, from Cape Agulhas at its southernmost tip, to northern Limpopo. Its habitat is remarkably variable, from windswept, sandy coastal flats just above sea level (forms of *Protea cynaroides*) to inaccessible basalt cliffs 2300m high in the Kwa-Zulu Natal Drakensberg (*Protea nubigena*), but it is in the unique fynbos vegetation of the south-western and southern Cape where its greatest diversity can be found. One of the distinctive peculiarities of the *Proteaceae* in the Cape Floristic Region is its adaptation to fire, in which most species are killed outright and survive in seed form, but a number endure and re-sprout from persistent subterranean lignotubers, like *Leucadendron salignum* and *Protea cynaroides*.

Members of the protea family are essentially social plants, although there are some exceptions. Many of the species growing in their natural habitat occur in close proximity to one another, forming close-knit communities. The individual plants protect one another from prevailing-winds and form a dense cover that prevents compaction, keeps the soil cool and reduces the rate of evaporation. In cultivation, growing *Proteaceae* in association with other fynbos plants such as buchus, ericas, phylicas and restios creates a pleasing effect and lengthens the life of plants. At the outset it has to be accepted that most fynbos plants are relatively short-lived in cultivation and have to be replaced from time-to-time.

Fynbos generally are adaptable and, with an understanding and appreciation of the basic growing requirements of these plants, one is assured of a reasonable chance of success and a great deal of pleasure.

Climatic conditions

It is important to plant your fynbos in full sun. It is well-known that especially *Leucospermum* fails to flower if planted in complete shade. Those from the winter rainfall area require excellent air circulation and cool nights, and cannot abide high humidity in summer, whereas the summer rainfall species are more tolerant of high humidity. In their natural habitats, proteas are found growing in areas that show considerable variation in temperature. For example, a maximum of 32°C or more is not uncommon during the summer, particularly in the Sandveld and Cederberg. Temperatures are lower in the mountain ranges where the effects of prevailing winds, mists and cloud have a cooling effect. The minimum temperature in these mountainous areas may fall below 0°C, but usually not for long periods of time. Snow falls regularly on the Cape Mountains during winter.

Plants belonging to the *Proteaceae* occur in regions where the rainfall varies from as low as 180 mm to 2500 mm per annum. This, however, is rather deceptive. In their natural habitat many species occur in

depressions, gullies, valleys and on south-facing slopes where the plants utilize underground moisture through seepage accumulated during winter. A good example of this is the King Protea (*Protea cynaroides*) which is always found growing in areas with abundant underground seepage. When choosing a site for growing proteas in the open, always ensure that you have an adequate supply of water until the plants are established, a well-drained acidic soil, a sunny aspect and good air circulation; proteas perform best in windy conditions.

Hardiness

Whereas forms of certain summer rainfall species are moderately or strong frost tolerant, the winter rainfall species, especially those from the south-western Cape, are generally only tolerant of light frost (down to -2°C) for short periods, once the plants are fully established. The leaves of those which can take heavy frost (-6°C or more) are generally unaffected by frost although their flowerheads may be damaged. In susceptible areas, young plants (1-2 years old) can be covered at night with frost blankets and seedlings should generally be regarded as frost tender while young (the first 2 years) and only once well-established do their hardiness capabilities become evident.

Soil

Generally, populations of the same species grow in close proximity to each other. This establishes a dense vegetation cover for minimal root disturbance; keeps the soil cool and helps to reduce the rate of evaporation. The vast majority of South African fynbos occur in the south-western and southern Cape, hugging the coast and mountainous regions eastwards to Port Elizabeth and spreading up the west coast to south-western Namaqualand. The soils are variable, generally nutrient-poor soils are best.

A soil with more than 30% clay in the top- and sub-soil is not recommended for the planting of most *Proteaceae* even though species of *Proteaceae* also grow on Bokkeveld shale, which has a high clay content, but generally in cultivation fynbos don't survive in heavy clay media, and in such conditions one needs to plant on slopes or create soil mounds into which acid compost has been thoroughly mixed; the addition of gypsum will assist in separating the clay particles. A limited number of proteas will tolerate clay soils but many will grow well in good garden loam. If your soil is not ideal, it is best to dig as big a hole as possible and mix some of your garden soil with composted pine bark or the Arnelia potting mix. This creates a transitional layer for the roots to move out of the pot through the bark and soil, as a large chemical or physical barrier will stop the roots from extending in deeper soil layers.

Along the coastal regions, proteas are often found growing in pure sand and generally the pH values of the soils they favour are acidic. Most species need a pH of 5-7, although there are lots of instances of proteas growing in areas with alkaline soils with pH values as high as 8.4. One of the most important requirements for growing proteas is a well-drained soil that is well-aerated. Most fynbos, including the *Proteaceae* family, thrive in acidic soils; although some species and cultivars can tolerate more alkaline soils, such as *Leucospermum patersonii* 'Carnival Coast', *Leucadendron salignum* 'Red Devil' and *Agathosma serphyllacea*. Most proteas are waterwise once fully established

Planting

In winter rainfall areas, proteas are best planted out into the garden and permanent containers in autumn (April and May), once cool, moist weather has definitely set in. Before planting, the chosen site should be cleared of all growth, and individual holes, at least 40cm deep, prepared for each plant. At planting, don't add any bone meal, other form of phosphorous or compost to the planting hole. Any organic material with high levels of phosphorous or high pH should be avoided. The recommended planting distance is 0.65m for species that attain a maximum height of 2m and those exceeding 2m are planted at a distance of 1m. Smaller species, such as *Agathosma* and *Serruria* can be planted 0.5m apart. After removal from the pot, be sure to place the plant at the same level it was in the container, and disturb the roots as little as possible. Firm the soil around each plant and water well.

In summer rainfall areas, proteas are best planted out immediately after the frost period has passed, in Aug and Sept, while the air is still cool. Proteas like to be planted in groups, which provide mutual support in strong wind, keep the soil cool and give a better display.

Mulching

During the hot summer months in winter rainfall areas, the soil surface dries out rapidly and becomes too hot, especially in very sandy soils, thus soil mulching is necessary to retain soil moisture (reduce irrigation), keep the roots cool and reduce weed growth. *Proteaceae* surface roots are very sensitive to disturbance, thus in suppressing weed growth, mulching reduces the need to pull out weeds by hand. To avoid root disturbance, do not pull out large weeds by hand, but cut them off just below soil level with sharp secateurs.

Mulching additionally conditions the soil as it decomposes by adding small amounts of nutrients and organic matter. This layer of mulch should be laid at planting, 5-8cm thick, but kept away from the stem to minimise the risk of fungal diseases. Surface mulches can comprise any decayed organic material such as that made from leaves, straw, wood chips, pine bark (well-aged), gravel or crushed rock, newspaper or woven reed mats. Acid compost or decayed pine needles form excellent mulch, but mushroom compost is detrimental as it contains high levels of phosphorus fertilizers. Soil temperature around the plants can also be reduced by placing stones or rocks around the base of trunks.

Watering

Once fully established in garden beds with loam soils, most proteas are drought tolerant, but during their first two summers they will need a thorough soaking twice or three times a week depending on prevailing weather conditions. Thereafter moisture can be reduced as they become more established. When planting in very sandy soils, watering daily or every second day may be necessary.

By mulching the area the soil is kept moist and soil temperatures are kept down. Plant roots should not be subjected to sudden changes in temperature as this may encourage fungal infection. Fungal infection may result in plants that are kept too wet at night over long periods, especially amongst species of *Serrurias*, thus watering is best done in the early mornings as at this time, water temperature is more or less the same as that of the soil. When grown in containers, plants need a good soak every second day or daily in hot weather. Species from marshy habitats like *Mimetes hirtus* and *Berzelia albiflora* like high soil moisture content but still need good drainage to allow adequate aeration of the roots.

Pruning

Light pruning is essential to maintain the desired shape and extend the life of protea plants. Two types of pruning are used: thinning-out and heading-back. Thinning-out is the removal of excess, diseased or dead branches at their base. Heading back is the removal of branches (especially those which have flowered) at any point above the base, to encourage resprouting. In heading-back, branches of most species must always be cut at a point where healthy leaves occur, in order for strong new growth to occur from the leaf axils. Exceptions are species with lignotubers like *Mimetes cucullatus* and *Protea cynaroides*, in which branches are severely headed-back to the base of the plants to encourage resprouting.

Young plants should be tip-pruned six months to a year after planting. This encourages branching, a more compact growth habit and much more attractive plant.

In mature protea plants, all old heads should be removed and half the stems can be headed back. This is best done directly after the flowering period and before active vegetative growth begins, which for most species is from late summer to winter. Do not cut plants if the leaves and stems are wet. Always use sharp secateurs to prevent excessive damage to the cut area.

Pruning tips for some genera

Protea

Cultivars with big leaves like most of the *Protea* can be pruned after the first flowers were produced by heading back the flower stem 10-15cm above where the stem originates from the main stem. It is important that the remaining bearer has several (8-10) healthy leaves as new shoots won't sprout from a bearer without leaves. Non-flowering stems of the genus *Protea* should not be pruned back to bearers as these will produce flowers the following year. The variety 'Pink Ice' will only flower 18 months later if pruned in June/July. Care should be taken when pruning back older *Protea* plants; never remove more than 50% of the plant leaf area.

Leucospermum and *Serruria*

Will flower every year and the flowering shoots should be headed back to bearers after flowering. The bearers, with several healthy leaves, should be cut approximately 8-10cm from the main stem. Non-flowering stems can also be cut to the same height, but thinner excess stems should be removed completely, as should poorly shaped stems and suckers.

Leucadendron

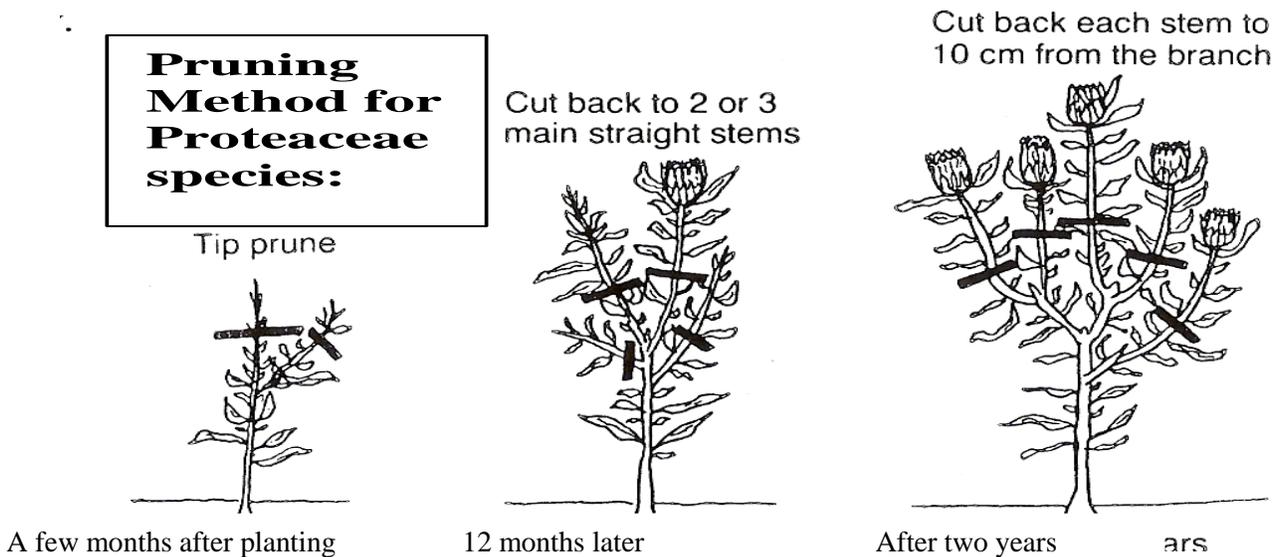
The cultivars can flower every year depending on the time of prune. The flowers should be headed back to bearers after flowering. The bearers, with healthy leaves, should be cut approximately 6-10cm from the main stem. Non-flowering stems can also be cut to the same height, but thinner excess stems should be removed, as should poorly shaped stems and suckers. The smaller the leaves the shorter the bearer could be which you leave on the plant, as long as there are plenty of healthy leaves on the bearer. The same principal still applies; don't remove more than 50% of leaf area of the plant.

It is preferable to cut out any weak stems that have failed to flower, thereby encouraging the remaining stems to produce healthier, more vigorous growth. The same can be said for damaged and crooked stems in

both young and established bushes. Pruning of *Proteaceae* species improves the quality and quantity of flowers, helps to reduce disease, extends the life of the plant and creates a more compact, pleasing and well-proportioned plant.

Each bearer should produce two to three flowering stems for the next season. These flowering stems will increase in number as the plant becomes older and larger. As the stem number increases, the length of each stem will decrease and so the removal of a few of the extra shoots will help to increase stem length. The removal of these shoots is best done early in the growing season, while the shoots are still soft and easy to remove.

In order to keep a natural look within the landscape, only cut half the stems back to bearers after flowering (go through the bush and cut every second stem). The remaining stems can be cut back to bearers as soon as new shoots start to appear (on the previously pruned bearers).



Container cultivation

With the modern trend towards smaller outdoor living spaces and courtyard and patio gardening, the cultivation of proteas in containers is gaining popularity. With adequate care, container-grown proteas can provide much pleasure and when in flower, certain smaller species and dwarf cultivars can be brought indoors for a few days at a time. Those recommended for containers are low growing species and those that resprout from lignotubers like *Protea cynaroides*.

Attention needs to be paid to regular watering, which may have to be applied daily in hot weather. Heavy mulching, re-potting every second year and the application of a slow-release fertilizer is recommended. Placement of containers has to be carefully considered so that they do not overheat on very hot days and morning sun and afternoon shade is best during summer.

Nutrition

Proteaceae species grow naturally in nutrient-poor soils and so there is little need for additional fertilizer application. All members of the *Proteaceae* family have a very narrow range of optimal concentrations of mineral elements and are sensitive to excess phosphorus and nitrogen. For these reasons, particularly fertilizers high in phosphates should not be used. The addition of compost to the soil should also be avoided as the compost may have high levels of nitrogen and phosphorus, which are potentially toxic for *Proteaceae*. Some of the plant material removed during pruning may be left on the ground to decompose and help to replenish soil nutrients. Cut the removed shoot into small sections to act as a fresh mulch.

In most gardens with loam soils, no supplementary feeding is really necessary although the application of organic fertilizers derived from seaweed and fish will encourage the development of the proteoid feeder roots. In very sandy soils, and in potted plants, a mulch of acid compost and organic slow release fertilizer, applied in granular form in late winter and mid-summer at half the recommended rate, is all that is required. Most artificial fertilizers must be avoided, especially those containing Phosphorus (P) as they are absorbed in excessive quantity by the proteoid roots, resulting in collapse and even death of plants. Manure, mushroom compost and bone meal must not be used.

Additionally we recommend products such as:

Talbourne organic fertilizer 5:1:5 (16) for proteas, in which nutrients are released slowly. It contains all the macro-nutrients needed, but more importantly, the micro nutrients as well, but has to be applied sparingly.

The organic fertilizers Kelpak (derived from Seaweed) and Seagro (a fish emulsion), applied at half the recommended rate, are recommended for establishing newly rooted cuttings and seedlings. Apply monthly from August to April with plenty of water to mature plants.

Bio Ganic and Bio Ocean (Atlantic Fertilisers) at 150-200g per m² can be applied twice to three times a year spread on the surface around the plant. Apply in spring, mid-summer and autumn.

Iron (Fe) Deficiency

A deficiency in the soil is rare but iron can be unavailable for absorption if soil pH is not between about 5 and 6.5. Common problems are high soil alkalinity (the pH is above 6.5), the soil has a high clay content, is compacted or overly wet. High levels of phosphorus in the soil can also cause iron deficiency. The most obvious symptom of iron deficiency in plants is commonly called leaf chlorosis. Iron is needed to produce chlorophyll, hence its deficiency causes chlorosis. This is where the leaves of the plant turn yellow, but the veins of the leaves stay green. Typically, leaf chlorosis will start at the tips of new growth in the plant and will eventually work its way to older leaves on the plant as the deficiency gets worse. Any plant may be affected, but mainly acid-loving plants such as fynbos, azaleas, hydrangeas and camellias.



Fixing Iron Chlorosis in Plants

Iron Fertilizers - Wonder Ferrofood granules (Efekto)

- Apply once or twice to rectify according to lowest recommended application rate.

Iron can be applied as iron sulphate or in a chelated form

- 5 ml Iron sulphate (FeSO_4) dissolved in 1 L water OR 5 ml Iron chelate (Fe EDTA) dissolved in 1 L water, enough for 1m^2 .

	FeSO_4 Iron sulphate	FeEDTA Iron chelate
Reduce soil pH	✓	
Reduce phosphorous in soil	✓	
Foliar Application – quick result		✓
Supplement iron when soil pH is low		✓
Supplement iron when soil pH is neutral to high	✓	
Use in high calcium water/soil	✓	

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