



**Culture of  
ORNAMENTAL  
PROTEAS**

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## PLANT NAMES

All scientific plant names are based upon the 1969/1970 Index Seminum of the National Botanic Gardens of South Africa. Synonyms are those currently being used commercially. Readers working with older plant listings may find selected former species names for proteas on the back cover of this publication.

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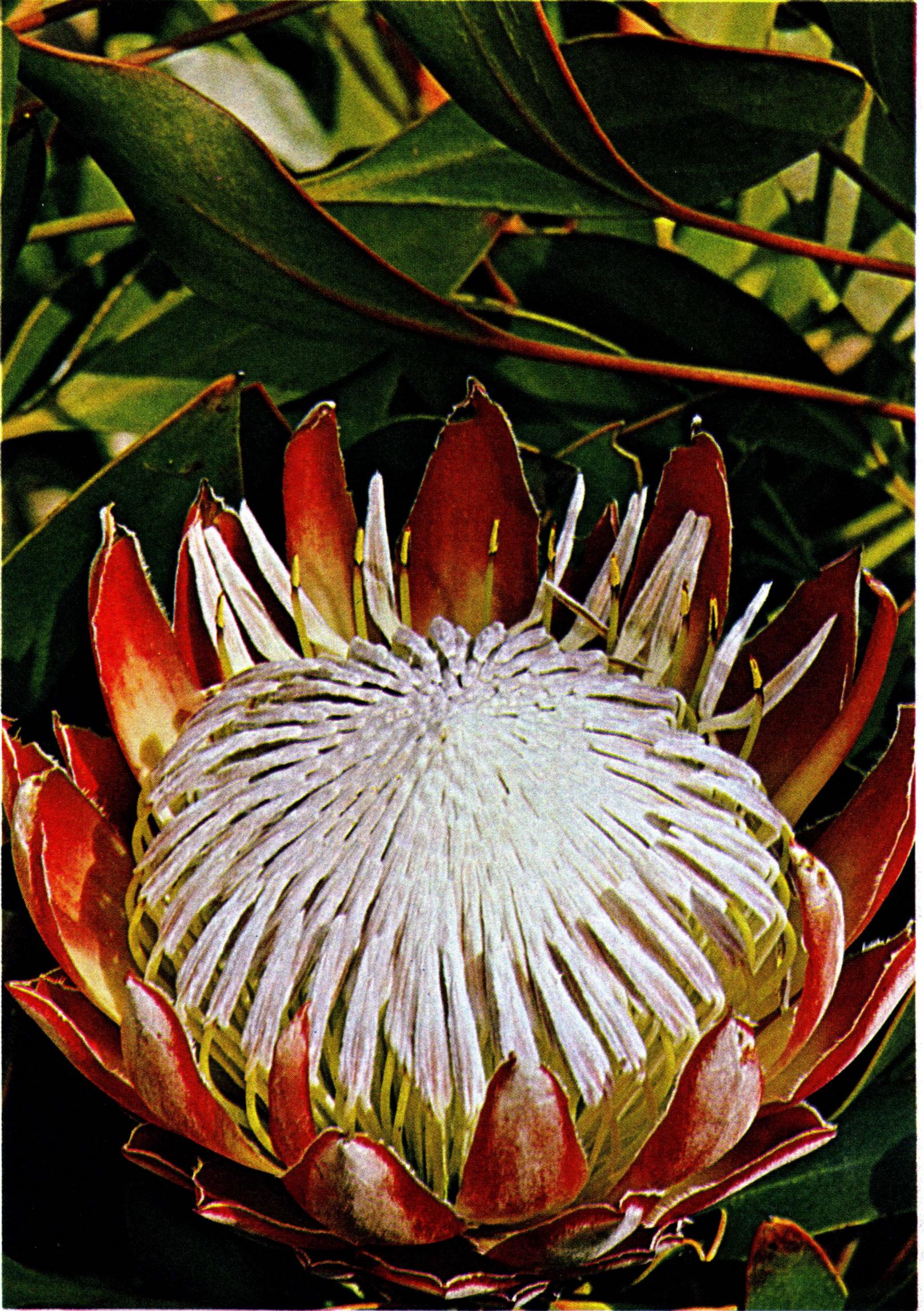
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**CULTURE OF ORNAMENTAL  
PROTEAS**

by  
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and  
**PHILIP E. PARVIN**

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King protea (*Protea cynaroides*).

# CULTURE OF ORNAMENTAL PROTEAS

Donald P. Watson and Philip E. Parvin

## Proteas: What They Are

“Protea” refers to any member of the family Proteaceae, which includes over 1500 species of trees, shrubs and herbs from the southern hemisphere, especially Australia and South Africa. All members of South African Proteaceae are woody evergreens, usually with entire, leathery, and often hairy leaves; and are not indigenous to any other parts of the world.

Proteas are outstanding because of their style of growth and the architectural quality of their flowers.

Typifying the great variation found among the genera in this family, the term “protea” was derived from the sea-god Proteus who could readily change into any form he chose. The small individual flowers of the large macadamia tree, the huge flowers of the king protea, or the yellow-, red-, or amber-colored flowers of the ground-hugging, creeping pincushion provide

evidence of the great variation within the family.

Silky oak (*Grevillea robusta*) or “oka-kilika,” used widely in the Islands for reforestation; macadamia (*Macadamia integrifolia*), introduced in 1890 and planted for its edible nuts; fire-wheel tree (*Stenocarpus sinuatus*), with scarlet, wheel-like flowers, rarely seen but a spectacular ornamental; and kahiliflower (*Grevillea banksii*) or “ha’iku” are some members of the family that have been grown in Hawaii.

The genus *Protea* is characterized by large bracts, often brightly colored, surrounding a composite flower. These bracts may be smooth or pubescent (covered with velvety hair). Some species have bracts tipped with dark “fur” and are called “bearded.” The predominate color in this genus is pink with occasional albinos. Other colors are reds and more rarely greens.

Protea, the national flower of South Africa, refers especially to *Protea cynaroides*, the giant or king protea which has flowers up to 1 foot in diameter.

*Protea repens*, sugarbush, with its rosy-tipped, sticky bracts forming an urn, *Leucospermum cordifolium*, nodding pincushion, with pink, yellow or orange dome-shaped flowers, and *Leucadendron argenteum*, silver tree, with its glistening, grayish-blue foliage, are other popular proteas from Africa.

### Potential for Hawaii

Many years ago, few people would have thought that Hawaii-grown macadamia nuts would whet the appetite of gourmets all around the world. Macadamia, however, is but one highly esteemed member of the family Proteaceae. Flowering proteas are so greatly admired in South Africa that they are used as emblems on the coins and stamps. In Australia the waratah (*Telopea speciosissima*), a magnificent crimson peony-like bloom, is the state flower of New South Wales.

Through the dissemination of seed and information, the National Botanic Gardens of South Africa, at Kirstenbosch, has been largely instrumental in bringing into cultivation the ornamental members of Proteaceae.

While the ornamental members of the family have been somewhat neglected even in their native habitat until recently, ten years ago, Marie Vogts, president of the South African Association for the Advancement of Science, observed that there were astounding

possibilities of economic importance for these plants. She stated:

“The fact that the South African Proteaceae have lately been grown under a variety of conditions has once again focused the eyes of the world on them. Already an anxious competition to be first in the world market has set in. I am not only judging from reports in the Press and from enquiries made through the various embassies but also from numerous letters received in recent months from places as far apart as Hongkong, Chicago, Towoomba, Dresden and Nairobi, not to mention places in regions such as Western Australia, New Zealand, California and Southern Europe, where one would expect interest because of a similarity in climate. It would appear that there is again a great demand for new and uncommon garden plants. Proteas are outstandingly effective both as garden shrubs and as cutblooms. They flower for long periods, often for more than half a year and the flowers carry and last well.”

Some proteas for landscape usage are being grown commercially in South Africa, Australia, New Zealand, a few near Nice in the South of France, in Corsica, the Scilly Isles and Cornwall in England. Some are also being produced in Florida and California.

A limited number of small growers in Australia and New Zealand produce cut flowers from nursery-grown plants. These are marketed locally at relative-



**Nodding pincushion** (*Leucospermum cordifolium*) growing at Kula, Maui.

ly low prices and a few are exported for special exhibits and special orders. It is not unusual to see passengers carrying boxes of proteas in the air terminals in South Africa. Many of the cut flowers are gathered from native plantings. Lack of uniformity, consistent supply, and good quality reduce the export market for South Africa. Protea export is further limited by plant inspection and high airfreight rates to markets in Europe, Japan, and North America.

It is estimated that there will be more than 20 acres of proteas in production for cut flowers in California by the early 1970's. This acreage will be limited to three or four species, and there have already been instances of frost damage in locations already planted. Sales are reported brisk and demand is good whenever these flowers become available in the market. In a

very few special locations in Florida, proteas are also being tried.

As with the macadamia, however, there are locations in Hawaii, especially above 2000 feet elevation, ideally similar in soil and climatic conditions to those where proteas grow in their native habitat. Based on tests to date, it is apparent that Hawaii-grown proteas could rival those produced anywhere else in the world. Due to their exotic appeal and excellent shipping and keeping qualities, further research and development of cultural and crop management practices is underway.

Proteas are not exactly easy plants to manage. Their growth response is unpredictable. They grow naturally in well-drained acid soils of granite origin on hillsides. Some are productive in sandy soils, others in deep, rich soil; but all of them apparently thrive where there is plenty of cool fresh

breeze. They cannot tolerate close humid conditions or poor drainage and overwatering.

In 1965, Dr. David Williams introduced 50 species of proteas and began evaluating them at Kula, the Maui Branch of the Hawaii Agricultural Experiment Station. Since that time, the pace of this research has been increased.

The present research program at the Maui Branch Station is evaluating and screening as many of the ornamental proteas as possible, selecting those that

have potential for landscape plants and for cut flower production. Experiments are being conducted to determine the shelf life of the crop and the best means of propagation, pruning, fertilizing and harvesting.

This publication is intended to supply prospective growers with information presently available. It must be looked upon, however, as a source of preliminary direction which may need some modification as the experiments progress and as more specific data become available.

## DESCRIPTIONS OF SELECTED PROTEAS

From 1500 species, the following 23 have been selected for description. These include the most successful species currently being grown in Hawaii, as well as the most promising from other areas.

### **Honeycone** (*Banksia collinia*)

Bears showy cylindrical heads of deep honey-colored flowers with purplish-brown, protruding stamens; leaves are narrow toothed, dark green with silvery undersides, borne on slender grayish branches; grows to 10 feet as a dense shrub.

### **Heatherleaf** (*Banksia ericifolia*)

One of the most popular banksias; erect flower cones to 8 inches in length may appear from pale yellow, through the more commonly found golden amber shades, to a deep orange brown; flowers last 2 weeks in water.

Leaves are narrow, needle-like, 1/2 inch long, deep green with silvery reverse, densely covering a bush from 6 to 10 feet in height.

### **Cutleaf** (*Banksia grandis*)

The largest of the banksias, reaching 40 feet in height with 12-inch leaves, cut to the midrib in triangular segments, yellowish green above and silvery below; the large cones of yellowish-green flowers are 12 inches long and conspicuously placed.

### **Shooting star** (*Banksia occidentalis*)

Cylindrical heads of bright brownish-red flowers, 4 to 6 inches long; borne on ends of ascending reddish branches; leaves narrow, 6 inches long, shiny above, with velvety texture beneath, forming a neat-growing shrub to 8 feet tall.

### **Goldcone** (*Banksia spinulosa*)

Bears elongated cones of deep-yellow to reddish-orange flowers; leaves narrow, dull green; and the plant resembles a compact form of *B. ericifolia*, grows only 4 to 6 feet tall.

### **Silver tree** (*Leucadendron argenteum*)

The silver foliage of this tree in the bright sunlight is difficult to describe,



Combflower (*Leucospermum catherinae*).

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Rose-spoon protea (*Protea eximia*).

Bauer banksii (*Banksia baueri*).



more conspicuous than the small, yellow, male pollen-bearing flowers or the small, silvery, female cones; flowers appear on separate plants and are not always present.

The plant, with upright branches, is prized primarily for its foliage which is covered with leaves overlaid with silvery hairs that reflect light.

**Combflower** (*Leucospermum catharinae*)

Yellow, pin-wheel-shaped flowers on a plant 6 feet in height and 6 feet in diameter, with gray-green foliage; flowers freely on the tips of the branches.

It appears to grow better under cultivation, is cold resistant, and does not thrive in hot, dry exposures.

**Cripplewood** (*Leucospermum conocarpodendron*)

Conical yellow inflorescence is similar to some chrysanthemums; in the early stages the flower is somewhat buried by large, dark-green leaves which later open to expose flowers 3 inches in width.

Plant grows to a height of 10 feet with decidedly tree-like branching habit. The gnarled nature of the branches gives it the name of "cripplewood" or "kreupelhaut".

**Nodding pincushion** (*Leucospermum cordifolium*)

Its attractive dome-shaped inflorescence of rosy-orange styles is borne on a sturdy stem with large dark-green leaves. The flower color varies from orange yellow to darker rosy orange and the cut flowers, often 4 inches in diameter, last for 3 to 4 weeks.

The plant grows to 6 feet in height and spreads out to 6 feet in diameter. Being a prolific bloomer, it is covered with flowers for 3 to 4 months, often yielding more than 100 flowers per plant.

**Twin flame** (*Leucospermum cuneiforme*)

Twin flowers about 2 inches in length open as light-orange pincushions and as they mature turn darker in color; long, dark-green, leathery leaves are deeply notched across the tip and closely cover the stem.

The plant is a most attractive broad shrub because of the changing color of its large crop of showy flowers; grows to a height of about 5 feet.

**Tangerine pincushion** (*Leucospermum lineare*)

Derives its name from the color and form of its flower; a somewhat flattened pincushion that is borne on long, straight stems with foliage that resembles short pine needles.

Plant grows to a height of 3 feet and is especially attractive because of its needle-like dark foliage that points upward throughout the length of the stem.

**Ribbon pincushion** (*Leucospermum muirii*)

The name "ribbon" is descriptive of the curled, yellow flower with red strip in the center of the inflorescence. Yellow orange in their overall color and about 2 inches in diameter, these flowers are conspicuously extended beyond the gray-green leaves.

The plant reaches a height of 4 to 5 feet but the overall effect is dainty and less sturdy than some other species.



**Tangerine pincushion** (*Leucospermum lineare*).

**Creeping pincushion** (*Leucospermum prostratum*)

The small, yellow flowers that are less than 2 inches in diameter darken to red as they mature. Consequently, yellow-, red- and amber-colored flowers are present at the same time and conspicuous against the gray-green foliage. This plant is a good ground cover for well-drained soil in full sunlight.

**Pineleaf** (*Protea aristata*)

The brown-colored bud opens into a deep pink cone-shaped flowerhead that is borne on the tips of graceful branches that are covered with leaves resembling pine needles. By many, this deep-pink flower is thought to be one of the most attractive of the proteas.

It is a slow-growing plant that is also attractive because of the soft, green, needle-like foliage.

Grafted specimens seem to display greater vigor than seedling plants.

**Wooly beard** (*Protea barbigeras*)

Inflorescence is up to 8 inches in diameter with soft-pink to deep-rose coloring; cone-like fuzz in the center of the inflorescence rises to a dark-brown or black peak. Island-grown flowers have not displayed good opening quality.

The plant grows to 4 feet in height spreading to 6 feet.

**King protea** (*Protea cynaroides*)

The flowers often reach 12 inches in diameter. Pink to crimson bracts surround a silver-gray mound of individual flowers. Its resemblance to an artichoke suggests its name "cynara" (artichoke). The plant apparently responds well to heavy pruning and exhibits great variation in flower color with some forms pale pink and others deep red.

## PROTEAS SUGGESTED FOR LANDSCAPE USE

### Successfully grown

Heatherleaf Banksia <i>Banksia ericifolia</i>	Flame Goldtips <i>Leucadendron eucalyptifolium</i>	King protea <i>Protea cynaroides</i>
Oakleaf Banksia <i>Banksia robur</i>	Brownring Goldtip <i>Leucadendron stokoei</i>	Rose-spoon protea <i>Protea eximia</i>
Goldcone <i>Banksia spinulosa</i>	Goldtips <i>Leucadendron xanthoconus</i>	Princess protea <i>Protea grandiceps</i>
Feathery red <i>Grevillea thelemanniana</i>	Combflower <i>Leucospermum catherinae</i>	Baby protea <i>Protea lacticolor</i> hybrid
Kahiliflower <i>Grevillea banksii</i>	Cripplewood <i>Leucospermum conocarpodendron</i>	Long-bud protea <i>Protea longiflora</i>
Formosan conebrush <i>Isopogon formosus</i>	Nodding pincushion <i>Leucospermum cordifolium</i>	Bredasdorp sugarbush <i>Protea obtusifolia</i>
Suntips <i>Leucadendron adscendens</i>	Twin flame pincushion <i>Leucospermum cuneiforme</i>	Gleaming protea <i>Protea pulchra</i>
Silver tree <i>Leucadendron argenteum</i>	Ribbon pincushion <i>Leucospermum muirii</i>	Sugarbush <i>Protea repens</i>
Twinleaf Bush <i>Leucadendron comosum</i>	Rocket pincushion <i>Leucospermum reflexum</i>	



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Pink mink (*Protea nerifolia*) in South Africa.

### Promising but not proven

*Banksia baueri*  
*Banksia grandis*  
*Banksia occidentalis*  
*Leucadendron gandogeri*  
*Leucospermum lineare*  
*Leucospermum tottum*  
*Protea amplexicaulis*  
*Protea laurifolia*  
*Protea minor*  
*Protea nerifolia*  
*Telopea speciosissima*

### Apparently unsuccessful

<i>Aulax cneorifolia</i> Insignificant flowers, thin, open growth.	<i>Leucadendron daphnoides</i> Unattractive, brown flowers.
<i>Hakea lauriana</i> Weak, open growth.	<i>Leucadendron laureolum</i> Poor growth; brown cones.
<i>Isopogon petiolaris</i> Stunted, slow growth; unattractive flowers.	<i>Leucadendron tinctum</i> Poor growth; brown cones.
<i>Isopogon dawsonii</i> Unightly flowers.	<i>Leucospermum bolusii</i> Dirty-white flowers.
	<i>Paranomous reflexus</i> Open, sprawly growth.



Cripplewood (*Leucospermum conocarpodendron*) at Kula, Maui.



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Nodding pincushion (*Leucospermum cordifolium*) and silver tree (*Leucadendron argenteum*) in their native habitat.

Rarely does the plant grow to more than 5 feet in height, but its characteristic leaves, with an oval or pointed blade, often grow up to 3 inches across. Red margins on some leaves and char- treuse margins on others make this foliage most characteristic.

**Rose-spoon protea (*Protea eximia*)**

One of the most reliable, large-flowered species, with a rich red center, but with much variation in the intensity of the color of the flowers. Bracts are spoon shaped; flowers reach a diameter of 5 inches and are characterized by the spoon-like bracts protruding outward and upward.

The silver-green leaves are broadly oval and wrapped thickly around upright branches.

The plant grows 6 to 8 feet in height, is dense in appearance, and flowers profusely.

**Princess protea (*Protea grandiceps*)**

This pale-pink to salmon-pink and red inflorescence somewhat resembles a single peony; bracts are edged with a fringe of silky reddish-brown and white hairs that surround arched white or yellow pistils. The inflorescence is often 4 inches in diameter and 6 inches in length.

The plant grows into a good form 5 feet in height. The foliage closely surrounds the inflorescence and is a whorl of oval grayish-green leaves with red or brown margins.

**Pink mink (*Protea nerifolia*)**

The name aptly describes the beard of black or purplish fur, tipping the topmost bracts of pink. Several colors are found, from a deep rose pink to light salmon, and this species is noted for its profuse blooming habit.

**Long-leaved protea (*Protea longifolia*).**



The plant grows to 10 feet in height and spreads to 6 feet, with "oleander-like" leaves covered with silvery hairs giving a velvety texture.

#### **Sugarbush** (*Protea repens*)

The unopened bud of this flower is long, pointed and honey gold at the tip with the points of the bracts a translucent rosy pink. These flower buds, 5 inches in length, are attractive before they open.

The plant is large and well-shaped, growing to 9 feet in height and 6 feet in diameter. Distinctive long, strap-shaped gray-green leaves complete the picture of an attractive shrub.

#### **Prince** (*Protea speciosa*)

A long, narrow flower bud formed from layers of creamy yellow to bright pink with distinctive brown tufts on the tip.

Its wide, green leaves, 4½ inches long and 2 inches wide with a gray-green color and leathery texture, cling to the stem and often hide part of the flower. It makes a vigorous shrub but rarely grows more than 3 feet in height.

#### **Blushing bride** (*Serruria florida*)

The dainty, creamy-white flowers, often with a pink and pale-green tinge, are as attractive in bud as when fully open. Several flowers on one stem are ideal for flower arrangement.

Finely divided, fern-like leaves make soft and attractive background for the flower cluster. The shrub itself barely grows to more than 4 feet in height and is somewhat open and ungainly in appearance. With proper pruning,

however, it can be shaped and used effectively for landscape purposes.

#### **Waratah** (*Telopea speciosissima*)

The state flower of New South Wales is a most spectacular deep-red inflorescence 6 to 8 inches in diameter with the typical incurving habit of the pincushion leucospermum. Leathery bracts of the same color surround the flower and as it opens make it a spectacular flowering shrub.

The tree itself, under best conditions, will grow to be 20 feet in height. It responds well to heavy pruning and heavy feeding and makes a good specimen plant.

#### **Princess protea** (*Protea grandiceps*).



## PROTEAS SUGGESTED FOR CUT FLOWERS

### Successfully grown

Combflower

*Leucospermum catherinae*

Cripplewood

*Leucospermum conocarpodendron*

Nodding pincushion

*Leucospermum cordifolium*

Rocket pincushion

*Leucospermum reflexum*

Wooly beard

*Protea barbiger*

Protea pink

*Protea compacta*

King protea

*Protea cynaroides*

Rose-spoon protea

*Protea eximia*

Baby protea

*Protea lacticolor* hybrid

Gleaming protea

*Protea pulchra*



Rose-spoon protea (*Protea eximia*).

Sugarbush

*Protea repens*

Blushing bride

*Serruria florida*

Waratah

*Telopea speciosissima*

### Promising but not proven

*Banksia attenuata*

*Banksia coccinea*

*Banksia collinia*

*Banksia ericifolia*

*Banksia grandis*

*Banksia media*

*Banksia robur*

*Banksia speciosa*

*Banksia spinulosa*

*Banksia victorial*

*Leucospermum ellipticum*

*Leucospermum lineare*

*Leucospermum vestitum*

*Protea aristata*

*Protea grandiceps*

*Protea harmeri*

*Protea lacticolor* hybrid

*Protea laurifolia*

*Protea minor*

*Protea nerifolia*

*Protea speciosa*

*Protea stokoei*

### Apparently unsatisfactory

*Leucadendron* species

Although cones keep well for dried arrangements, most cones lack the sales appeal of a good cut flower.

*Leucospermum bolusii*

Small, tight clusters of rather unattractive dirty-white flowers.

*Protea longiflora*

Poor keeping quality—hairs collapse in center of flower.

## PROPAGATION OF PROTEAS

### Seedage

In their native habitat, seeds germinate readily in the soil where they fall from the mother plant. Freshly harvested seed has a higher germination percentage than seed that has been stored for several months.

Controlled self-pollination has revealed self-incompatibility in protea and some leucospermums, but self-compatibility in other leucospermums and *Serruria florida* has been observed. It has been assumed by investigators in Africa that the apparent poor germination often may be attributed to the lack of an effective method of sorting out sound seeds.

"Immature" seed may be collected as early as 4 to 5 months after flowering, but should be planted at once as this "soft" seed may lose its viability rapidly.

Usually, fully ripened seed is harvested from old flower heads about the time the next crop of flowers appears. This seed holds its viability for 3 years.

Trials at Kula have indicated that mature seed of many species will germinate more rapidly and with a higher percentage of germination if it has been soaked in concentrated sulfuric acid for 5 minutes before being thoroughly washed and sown in a well-drained soil mixture. Of the 18 species tested, only *P. longiflora* and *P. lepidocarpodendron* showed higher percent germination when untreated.

Best results have been obtained by sowing seed in the fall of the year, as cooler weather approaches. At higher

elevations, spring planting is also effective.

Sow seeds in a mixture of one-third sand, one-third peat or other organic matter, and one-third vermiculite with a trace of iron chelate. Place fine gravel in the lower third of individual containers. Treat the seed with damping-off fungicide and place it on the surface of a well-firmed soil mixture, covering it with a layer of perlite or vermiculite.

It is important to locate seed beds in the open in the full sun where there is good air movement. Never allow the seed beds to dry out during germination, but avoid hot, close, humid conditions. To decrease water loss and insure a constant and even supply of moisture around the seed, light shading of the seed bed is suggested until a few weeks after germination.

Germination varies according to the genera and the species, but anything from 3 weeks to 3 months and more is typical.

*P. barbiger* germinated in 10 days, *P. eximia* started in 19 days, *P. cynaroides* in 22 days, and *L. cordifolium* in 28 days.

While much emphasis in the past has been placed on the possible presence of an inhibiting factor reducing germination and regular watering in such a way that this factor is washed through and leached out of the soil, it now seems to be a discredited hypothesis.

### Cuttings

Since there is considerable variation especially in flower color and habit of

growth among plants of the genera *Leucospermum*, *Leucadendron* and *Protea*, vegetative propagation of the most desirable seedlings becomes essential for the production of a uniform commercial planting.

Cuttings may be rooted in a misthouse where a maximum of sunlight is available and where the moisture is reduced during periods of low or no sunlight. Good air circulation is essential at all times. The leaves are removed from the bottom half of the individual cutting.

While the size of cuttings will vary among the species, 6- to 8-inch terminal sections of new growth as soon as it becomes brittle seem to be the most satisfactory material for good rooting. Use of rooting powders before sticking the cuttings into a mixture of 1 part coarse soil, 1 part peat, and 1 part cinders is recommended.

**King protea (*Protea cynaroides*) rooted cutting.**



**Nodding pincushion (*Leucospermum cordifolium*) rooted cutting.**

Two to three months are required for rooting after which cuttings can be potted individually in plastic sleeves or other containers where they can be held under mist in the open air until they are well rooted and ready for transplanting into the field. Experimental work in New Zealand and South Africa indicates that most ornamental proteas can be propagated by cuttings and that it takes about 6 months to produce a plant that is ready to be marketed.

### Grafting

In Stellenbosch, South Africa, considerable increase in the rate of growth of plants has been obtained by grafting *P. aristata* on *P. compacta*, and *P. grandiceps* on *P. compacta*. Using a whip and tongue graft of woody stems about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in diameter gave satisfactory results.

## CULTIVATION OF PROTEAS

### Soil

Most proteas thrive in a well-drained, acid soil. A pH of 5.5 to 6.5 is ideal and they do best in windy locations or where there is excellent air drainage. Still, humid air with plants rooted in a poorly drained, heavy soil is a lethal combination.

### Planting

Planting holes should be at least 2 feet in diameter and 2 feet deep.

Prepare the planting site well. Remove the first 12 inches of soil, break up the bottom layer in the hole, and incorporate some organic matter. The hole should then be filled with the original top soil enriched with organic fertilizer.

In some parts of the world, nursery plants are produced in plastic sleeves and allowed to become 8 to 12 inches in height before they are transplanted

to their permanent location. Nursery field-grown plants are usually root pruned a month or two before digging for transplanting. After transplanting, growth is often slow. New, fine roots are extremely sensitive and may respond to the presence of mycorrhiza in the soil.

Planting distances will vary according to the species and the pruning practices. Usually planting on 5- to 6-foot centers is satisfactory. An average length of time from seed to the production of the first flowers is from 2 to 3 years.

The sudden death of a plant at any age is common and most prevalent at the end of a dry season or after overwatering. A belief that proteas are difficult to cultivate seems to have existed for some time. Some scientists have said that there are toxins in the seeds or in the root system, a naturally produced poison that may inhibit ger-

Protea nursery at the National Botanic Gardens, Kirstenbosch, South Africa.



mination or suddenly kill a large specimen. It is likely that this theory is not well founded and that the sudden death of a formerly healthy plant can be attributed to a serious outbreak of soil-borne fungi, especially in poorly drained soil.

While no experimental data is available on the fertilizer requirements, observations indicate that proteas respond to a standard fertilizer program. Thorough watering weekly and the use of mulches to conserve moisture is recommended as long as the plants are being grown in a well-drained location. In Southern California, applications of cottonseed meal around the base of the plant are deemed beneficial.

### Pruning

Proteas as a group do not fit into the generally accepted idea of a garden

shrub. With a few exceptions, they do not produce quantities of blooms at one time, and many plants are inclined to become leggy and misshapen with age. The old blooms dry up and persist with a certain amount of drying and discoloration of the foliage during the summer, making many of the plants more suitable for an informal planting.

All proteas must be pruned to produce vigorous growth. All young plants, with the exception of silver tree, should have their leading tips pinched out when they are transplanted. Regular pruning must start when the plant is small and be continued as an annual routine. Heavy pruning prevents leggy shrubs and thus will yield larger numbers of better quality flowers.

For commercial flower production, plants should be disbudded to a single flower per stem.

## MARKETING

### Demand

Proteas are among the longest lasting cut flowers. They also dry well, lasting indefinitely in dried arrangements. In preliminary tests in Honolulu, pincushions lasted 12 days in water, and 27 days in a preservative solution. Keeping quality studies showed similar results in excess of 3 weeks in preservative solutions for *P. barbiger*, *P. compacta* and *P. cynaroides*.

Proteas also ship well over long distances. Shipments from the West Coast to key cities over the United States have arrived in excellent condition.

One of the major obstacles to the successful introduction of a new cut flower is generating a demand for the product. Traditionally, the majority of the wholesale florists in the United States stock only what the retail florist demands, and are understandably wary about investing in unknown materials.

The best way to acquaint the retail florist with a new product is through his trade press, and through the ever-popular floral design schools held as part of regional, state and national conventions.

Since the first proteas in the United

States were grown commercially in California over 6 years ago, there have been several attempts to introduce these flowers to the retail florists. Proteas have been featured at florists' conventions for several years. In 1968, the Southern California Floral Association sponsored a floral designer who traveled the summer design school circuit, using and publicizing proteas. In all cases, retail florists are reportedly impressed by the "architectural quality" of the flowers and the textures and colors, but insist upon longer stem length.

### Price

Retailers on the West Coast of the United States pay from 25 to 50 cents per stem for pincushions, depending upon stem length and quality. Mid-western and Eastern florists pay up to double that price when shipping costs and commissions are included.

A second category of proteas, including pink mink (*P. nerifolia*), rose-spoon protea (*P. eximia*) and sugar-bush (*P. repens*), averages approximately 60 to 75 cents per flower, F.O.B. West Coast. Due to the scarcity and limited demand for the king protea, retailers on the West Coast pay as much as \$3 per bloom for *P. cynaroides*.

### Economics of Production

It is of little value to potential producers to note mainland prices when considering the economic feasibility for proteas in Hawaii, unless local costs of production are known. Is \$3 per bloom enough to pay for the cost of flowering a king protea? How many blossoms can be expected per plant per year; per square foot of ground? The techniques of crop production, management, and costs are an important part of research projects currently underway. For example, at Kula, the average number of

**Packing pincushion (*Leucospermum cordifolium*) for the retail florist.**



pincushions cut per plant in December was 42, in January 37 and in February 45. Growers must determine their costs in order to see if commercial production is justified.

### Potential Outlets

The two most widely spread proteas in production on the Mainland today are *P. cynaroides* and *L. cordifolium*. Due to the weight, export of the king protea in competition with California is questionable. The pincushion is another matter. In the spring of 1969, Southern California pincushions came into production from 90 to 100 days after the first cut in Maui. If this difference persists, *L. cordifolium* might

fit nicely into an early market on the Mainland. It must be remembered, however, that Southern California experienced unusually bad weather in January and February 1969.

Certainly Hawaii must consider for its major exports other more exotic species and a "mixed pack" of assorted proteas that would be easier for mainland retailers to handle.

Perhaps one of the best ways to market small quantities of proteas is to mix them in with exotic flower "packs". If retail outlets in Hawaii handled proteas, visitors would associate them with other tropical flowers that are shipped in quantity.

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NATIONAL BOTANIC GARDENS  
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\*Reference to a seed or plant source does not imply approval or recommendation by the College of Tropical Agriculture, University of Hawaii, to the exclusion of others that may be suitable.

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## PROTEAS UNDER EVALUATION AT KULA, MAUI BRANCH STATION

<i>Aulax cneorifolia</i>	<i>tinctum</i> (= <i>grandiflorum</i> )
<i>Banksia attenuata</i>	<i>venosum</i>
<i>coccinea</i>	<i>xanthoconus</i> (= <i>salignum</i> )
<i>collinia</i>	<i>Leucospermum</i>
<i>ericifolia</i>	<i>bolusii</i> (= <i>album</i> )
<i>grandis</i>	<i>catherinae</i>
<i>media</i>	<i>conocarpodendron</i>
<i>occidentalis</i>	(= <i>conocarpum</i> )
<i>robur</i>	<i>cordifolium</i> (= <i>nutans</i> )
<i>speciosa</i>	<i>cuneiforme</i> (= <i>attenuatum</i> )
<i>spinulosa</i>	<i>muirii</i>
<i>victorial</i>	<i>reflexum</i>
<i>Grevillea banksii</i>	<i>Paranomous reflexus</i>
<i>thelemanniana</i>	<i>Protea amplexicaulis</i>
<i>Hakea bucculenta</i>	<i>barbigera</i>
<i>lauriana</i>	<i>compacta</i>
<i>Isopogon anemonifolius</i>	<i>cynaroides</i>
<i>dawsoni</i>	<i>eximia</i> (= <i>latifolia</i> )
<i>formosus</i>	<i>grandiceps</i>
<i>petiolaris</i>	<i>harmeri</i>
<i>Lambertia formosa</i>	<i>lacti</i> hybrid
<i>Leucadendron adscendens</i>	<i>lacticolor</i> hybrid
<i>argenteum</i>	<i>lepidocarpodendron</i>
<i>comosum</i> (= <i>aemulum</i> )	<i>longiflora</i>
<i>daphnoides</i>	<i>longifolia</i>
<i>discolor</i>	<i>obtusifolia</i>
<i>eucalyptifolium</i>	<i>pityphylla</i>
<i>gandogeri</i> (= <i>guthrieae</i> )	<i>pulchra</i>
<i>laureolum</i> (= <i>decorum</i> )	<i>repens</i>
<i>salicifolium</i> (= <i>strictum</i> )	<i>Serruria florida</i>
<i>stokoei</i>	<i>Telopea speciosissima</i>

= symbol indicates former species name which may be helpful when working with older plant listings. Plant names used in this publication are based upon the 1969/70 Index Seminum of the National Botanic Gardens of South Africa.



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