Product: King protea
Botanical name: Protea cynaroides
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**Botanical name:** Protea cynaroides  
**Cultivars:** Seedlings, selections and named cultivars, including ‘mini kings’.

The spectacular king protea is a major cut flower. It is grown in many countries and has a long flowering season. Like most proteas, it originates from South Africa.

The huge flower head consists of many florets crowded together on the central dome and is cupped by velvety bracts. The bracts are arranged in several tiers extending up the flower head, with short, scaly outer rows and larger, more attractive inner rows.

While there are many forms and cultivars, the most common king protea has silvery pink bracts surrounding a dome of silvery pink florets. There are also a white form and various other selections (pinkish to red). The flower head varies in shape from a very wide inverted cone to a more narrow funnel shape. There are also several selections of ‘mini kings’ with smaller flower heads.

The leaves are generally large and rounded, and typically bright green. Florists like to use the lower leaves separately in arrangements.

Although flowers will not open if they are picked too early, the fully grown but unopened bud is acceptable in some markets.

Protea flowers are rich in nectar and pollen, and as a result attract many insects, which in turn can attract spiders.

Leaf blackening following harvest can be a major problem. The severity of this disorder varies between cultivars. Blackening can occur within 3–5 days of harvest and greatly reduces the visual appeal and vase life.

The exact mechanism of leaf blackening is still not fully understood, but it results from the cut stem drawing on the carbohydrate reserves in the leaves to supply sugar in order to complete the development of the flower head. This leads to oxidation and thus darkening of phenols within the leaves. It occurs more quickly in warmer climates and in proteas stored at warm temperatures and under low light conditions.

**Flowering season:**  
Most of the year, with a peak in July to December.

**Typical postharvest life:**  
14 days.  
Export can reduce the vase life, especially if the transport conditions are not cold, the product dries out or transport takes too long.

**Other products to which this specification can be generally applied:**  
Selections of *Protea cynaroides*, including ‘mini kings’.

Market presentation - Sleeved vs no sleeve leading to damage
Product: King protea

STAGES OF OPENING

Stage 1 Immature stage with bracts tightly closed: unacceptable to markets

Stage 2 Early stage: preferred by only a few markets, e.g. for export

Stage 3 Ready to market (earliest stage): 4–5 bracts still folded over dome

COMMON DEFECTS

Common defects to avoid at market entry:
- Overmature flower heads
- Deformed, dull or poorly coloured flower heads
- Flower heads damaged by birds or insects
- Damaged bracts, e.g. insect chewing
- Damaged leaves
- Leaf yellowing or spotting
- Presence of insects or disease on flowers or leaves
- Damaged bracts due to poor handling

- Atypical flower head – may not be acceptable to buyers
- Yellowish leaves and bent stem – discard
- Leaf blackening – do not market
- Scale insects on leaves – do not market
The stages shown apply to the product at market entry. Pay attention to the weather, time of year, and mode and duration of transport, because the flowers will continue to open during transport. You must consult with your target market to ensure that the flowers arrive at the desired stage.

Stage 4
Ready to market (latest stage): prime stage for domestic markets

Stage 5
Latest stage for domestic markets

Stage 6
Overmature stage: unaccepted by many markets

Damaged bracts due to poor handling – do not market
Cold-damaged flowers (uneven opening) – discard
Dull flowers (old stock) – do not market
Torn leaves – discard

Poor-quality leaves due to fungal disease – discard
Leaf spots; flower too open – do not market
Deformed flower due to borer or bird damage – discard
Insect contamination (e.g. Monolepta beetle) – disinfect before marketing
FLOWERS

Appearance
- Flower head fully formed and at final size.
- Bracts opening evenly to reveal the central dome, with 4–5 bracts still folded over the dome (export markets and if shipping to domestic markets in boxes).
- Bracts reflexed to reveal central dome, and outermost rings of florets open (for immediate domestic sale).
- Flower size proportional to stem length – market smaller heads on shorter stems.
- Flower head follows in a straight line from the stem (and is not offset from the stem at >15°).
- Flower head not hidden by leaves.
- No bypass shoots or secondary blooms.

When to harvest
- Flower mass (dome) firm and 10% or fewer florets open.
- Flower head well coloured and typical for the selection.
- Avoid harvesting when flowers are wet.

Damage
- No damaged bracts, or asymmetrical, deformed or damaged blooms.
- Discard any poor-quality product with insects or fungal infections.

Contamination
- Ensure the flowers are free of grit and soil, weed seeds or weeds, and signs of insects or spiders, such as webbing.
- Shake the stems over white paper to check what is present, and take appropriate action to disinfect before sending to market, especially if exporting.

Pests and diseases
- No apparent pest or disease damage. The very large and complex flower head makes insect disinfection difficult: earwigs, spiders and bees can be a problem.
- A preharvest spray to chase out insects and spiders may assist.

LEAVES

Appearance
- Fresh; bright green.
- Not dull or wilted.
- Minimum discoloration (<3% by area and affecting <10% of leaves).
- No leaf blackening.

At harvest
- Do not harvest or store when foliage is wet.
- Strip leaves from lower 10 cm or 1/3 of the stem, being careful not to damage the stem – cut with sharp secateurs if necessary.

Damage
- Minimum evidence of pests, diseases or other blemishes such as mechanical damage. Leaves entire (no insect feeding damage).
- No scale insects, earwigs or spiders. No spider webs.
- Free of visible chemical residues.

STEMS

Appearance
- Rigid and strong enough to support blooms, without being too heavy and bulky. The Japanese market prefers strong, thick stems.
- Bend <15°.
- Free of disfiguring trim marks or other blemishes. Neatly cut end.

Length
- According to market demand, typically as recommended in ‘Grading and bunching’ below.

RECOMMENDED HANDLING AT HARVEST

Minimise drying out and exposure to heat – pick when it is cool, preferably straight into buckets of clean water or a reputable commercial postharvest solution, and hold in the shade. Move cut stems promptly to a cool, shaded packing area. Cool quickly to remove field heat and stop the blooms from continuing to open. Ensure cool room has continuous, uniformly bright light to assist in minimising leaf blackening (fluorescent lights need to be like very bright office lights to be effective).

GRADING AND BUNCHING

Grading
- Flowers are generally marketed as single stems.
- Grade quickly to minimise time stems are out of water.
- Reject any contaminated stems.
- Sort stems according to length and thickness: flower head proportional to stem length (typically 20%–25% of the total stem length for larger blooms). Market smaller heads on shorter stems.

Bunching
- Smaller flowers may be bunched in 5s with a single tie.

<table>
<thead>
<tr>
<th>Stem length (cm)</th>
<th>Length of flower head (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>18–20</td>
</tr>
<tr>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>80</td>
<td>14</td>
</tr>
<tr>
<td>70</td>
<td>11</td>
</tr>
<tr>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>5</td>
</tr>
</tbody>
</table>

Sleeves
- Use sleeves, especially for export product, to protect bracts. A tight sleeve holds the bloom together and makes flowers easier to pack.
**HOLDING AND STORAGE**

**Cooling**

Effective cooling soon after harvest is important to retaining quality and maximising vase life. There are two options:
- Cool, process, cool – for example, remove field heat by cooling flowers immediately on entry into shed to 10 °C in buckets of solution, process flowers (bunch, grade), and then cool to 2–4 °C by either forced-air cooling (if boxed) or holding overnight in a cool room.
- Process within 1 hour of cutting, and then cool to 2–4 °C by either forced-air cooling for 20–30 minutes (if boxed) or holding overnight in a cool room (if in buckets). Forced-air cooling of packed flowers is ideal for large volumes of product.

**Temperature and humidity**

Hold in a high-humidity cool room (95%) at 2–4 °C. Another way of achieving high humidity is to cover the flowers with plastic sleeves or plastic sheeting, as long as there is no condensation on the leaves, which can lead to blackening.

**Postharvest solutions**

**Postharvest solution:** Hold in cool potable water with an added registered biocide. Pulsing probably does not benefit king proteas. Leaf blackening is probably not reduced by glucose pulses, even though they reduce blackening in some *Protea* species and cultivars. Sucrose pulses do not reduce leaf blackening.

**Holding solution:** Same as the postharvest solution. Sell quickly.

**Longer-term storage**

For longer storage seek professional advice, and test in the market before committing product. Leaf blackening is likely to be a greater problem after storage.

**PACKAGING**

Pack only dry, cold flowers. Especially for export, stems in each box should be approximately the same diameter and length, and flower head size should be consistent.

Pack with flower heads at each end of the box and stems in the middle to avoid damaging blooms.

Pack stems firmly in boxes or use export hooks or stem breaks so the product will not move and be damaged. Use shredded paper to protect flower heads. Avoid packing too many stems per box.

Use boxes with holes to allow forced-air cooling.

Minimise water loss. For long-distance shipping consider lining boxes with a layer of paper.

Cool flowers to 2–4 °C before transport.

**LABELLING AND DOCUMENTATION**

Label boxes and buckets as recommended in *Postharvest Manual* or as required by customer.

Ensure box contents are exactly the same as specified in the documentation and on the end of the box.

**TRANSPORT**

Refrigerated vehicle at 2–4 °C for long-distance transport.

**COMMON POSTHARVEST PROBLEMS Refer to Postharvest Manual* for general advice.**

<table>
<thead>
<tr>
<th>Insects (for export)</th>
<th>Avoid postharvest dips. Fumigate flowers before dispatch. Avoid fumigating at 20 °C or higher, or significant leaf blackening may result. Shake out any dead insects after fumigating and before packing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene sensitivity</td>
<td>King protea is not sensitive to ethylene.</td>
</tr>
<tr>
<td>Leaf blackening</td>
<td>Some growers recommend that in hot weather, plants should be watered the night before picking, and that flowers be picked late in the day, after they have had time to accumulate carbohydrates. Careful postharvest handling will help reduce or prevent leaf blackening. Picking flowers when the foliage is dry (and keeping it dry), cooling them quickly after harvest and storing them at 2–4 °C will help. Keeping cut stems under continuous bright light may also help reduce its incidence. Pulsing with glucose does not appear to reduce leaf blackening. Follow harvest, holding and storage advice. Sell flowers quickly.</td>
</tr>
</tbody>
</table>

**Messages for importers and wholesalers**

- Recut stems and place into fresh water containing a reputable commercial postharvest solution, a registered biocide or cut-flower food. Cool product before marketing or sending on and keep it cool.
- Maintain good hygiene and keep containers clean.

**Messages for retailers**

- Recut stems and place into fresh water containing cut-flower food or a registered biocide.
- Use clean buckets and containers for displays.
- Do not display flowers in areas that are exposed to full sun, draughts, high temperatures or vehicle exhausts, and preferably do not display near fruit and vegetables. Use refrigerated displays if possible.
- Tell the customer how to care for the flowers and emphasise the need for cut-flower food in solutions. Give the customer a sachet of cut-flower food to take home.

**Messages for consumers**

- Keep vase filled with the correct solution of cut-flower food. Check daily, as flowers can use a lot of water. If cut-flower food is not used, change the water at least every second day. Always use clean vases and clean water.
- Do not display in areas that are exposed to full sun, draughts or high temperatures. Keep as cool as possible without freezing.
- Discard other flower types in the same vase when they reach the end of their vase life.