Product: Kangaroo paw
Botanical name: *Anigozanthos* species
Cultivar: ‘Big Red’
Because of their striking and unusual candelabra-like flower stems, kangaroo paws were one of the first Australian native flowers to be brought into cultivation, and they remain a major cut flower.

A wide range of new cultivars and hybrids with varying flower colours and forms have been developed in Australia and overseas. Plants are now commonly derived from tissue culture, which means that all plants (and flowers) of a given cultivar are true to type.

Each flower consists of a narrow tube that flares open to form a star-like end. Its dense cover of fine, velvety hairs creates the colour.

Kangaroo paws are marketed on both the domestic and overseas markets, especially Japan. Strong competition from lower-cost producers in Israel, Japan, the USA, South America and South Africa has reduced Australian market share.

‘Big Red’ is a tall cultivar, available early in the season, and has been selected as an example for this specification.

Growers wishing to compete on the export market may need to offer a range of cultivars over an extended season lasting 6 months. The main cropping season is spring.

Kangaroo paws are one of the few native flowers offering a marketable yield within 6 months of planting, if planted in summer. However, successful marketing requires a good understanding of crop scheduling and selection of cultivars to suit each market. Seek reputable advice for the selection of cultivars best suited to your area and major target markets.

Some cultivars are more prone to fungal diseases, which cause severe leaf spotting and blackening, especially under humid conditions. Grey mould (botrytis) may affect the flowers, and can cause product decline during transport to market.

At harvest, the top part of the flowering stem needs to be firm, and 1–3 flowers per stem need to be open. Otherwise the stems will wilt, producing a condition known as ‘bent neck’, and the flowers will fail to open. Generally stems are marketed without foliage.

Kangaroo paws will quickly wilt if allowed to become water stressed and should be placed in water as soon as possible after harvest, and kept well hydrated through to the end consumer. ‘Big Red’ is especially prone to wilting. Because flowering stems of ‘Big Red’ are very branched, you must sleeve bunches before hydrating, because the flowers can be fragile (florets break off) if the stems are very turgid.

A sugar pulse is needed for maximum vase life, with the rate dependent on cultivar (see ‘Pulsing’). But too much sugar can cause leaf blackening and drying of the flower.

Kangaroo paws can show partial or total loss of flower pigmentation, giving florets a bleached appearance. Red cultivars are most susceptible to bleaching. This seems to happen in late summer and autumn when the young inflorescence is still hidden within the shoot tip. Not all flowering stems are affected. Sometimes the entire inflorescence aborts. Many reasons have been suggested, including adverse weather (e.g. a combination of low light and high temperature) and a nutritional imbalance (copper deficiency is proposed) or toxicity.

Flowers on plants grown under cover may be paler owing to the absence of UV light. Red cultivars such as ‘Big Red’ are especially prone.

Exposure to temperatures <1 °C can result in deformed flowers.

The information in this specification applies to the minimum acceptable grade in the market, or AA grade, where 40% to 50% of the sleeve is full of flowers. To compete on the export market, a higher grade – AAA, where 60% of the sleeve is full of flowers – may command more market interest.

**Lack of cooling and overheating are the main causes of poor quality.**

Do not cut stems too early – unless the stem at the tip of the flower spike is firm and at least 1–3 individual flowers are open, the flowers will wilt and not open. More florets will open in transit.

The ‘floppy test’: Gently shake the flowering stem and observe the tip. If any of the stem near the tip is still floppy, the stem is still immature and should not be picked.

Some people are allergic to the fine hairs on the stems and florets, suffering skin and respiratory irritation. Dipping (to protect against botrytis) usually removes most of the free hairs. Sensitive workers, especially those handling large quantities of undipped flowers, should wear protective clothing, especially on the forearms and hands, and perhaps a dust mask.

**Flowering season:**

August to December (other cultivars flower all year round or at different times).

**Typical postharvest life:**

10–15 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:**

Other species and hybrids of *Anigozanthos*, including *A. pulcherrimus* and *A. flavidus*. 
Product: Kangaroo paw  Cultivar: ‘Big Red’

**STAGES OF OPENING**

**Stage 1**
Immature stage: unacceptable to markets (all florets closed)

**Stage 2**
Slightly immature: early harvest stage; preferred by only a few markets, especially export (1 floret per branch fully open)

**Stage 3**
Prime stage for domestic markets and some export markets (2 florets per branch open and 1 almost open)

**COMMON DEFECTS**

Common defects to avoid at market entry:
- Wilting
- Shrivelled, unopened, deformed or damaged florets
- Frost damage
- Poorly coloured florets
- Borer holes due to caterpillars on florets and stems
- Insect or snail damage to stems
- Damaged florets due to bird feeding
- Overmature florets
- Bent, twisted, broken or discoloured stems
- Florets missing on one side of flowering stem (caused by the stem falling over during development)

- Immature florets and not enough florets set
- Poor handling – broken branch
- Bent stem
- Poorly fitting sleeve – replace before marketing
- Small deformed florets – discard
- Very overmature – 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**
Late stage: suitable mainly for domestic markets

**Stage 5**
Latest stage to market: ready for immediate end customer use

**Stage 6**
Overmature stage: unaccepted by many markets

Cold or frost has caused deformed florets – discard
Bird feeding damage – discard
 Slug or snail damage on stems – do not market
Insect chewing damage on stems

Typical bunches with and without sleeve
# FLOWERS

<table>
<thead>
<tr>
<th><strong>Appearance</strong></th>
<th>Well-defined, uniform, deep claret red; not faded. Flowers arranged symmetrically around the stem and pointing upwards.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When to harvest</strong></td>
<td>Export: 1–3 individual flowers open per stem; top part of stem firm and not floppy. Domestic: at least 5 flowers open. Avoid harvesting when flowers are wet.</td>
</tr>
<tr>
<td><strong>Damage</strong></td>
<td>No wilting. No damaged or broken flowers. No bird or snail damage to flowers or stems.</td>
</tr>
<tr>
<td><strong>Contamination</strong></td>
<td>Product free of grit and soil, weeds or weed seeds, living or dead insects, and signs of live insects or spiders, such as webbing.</td>
</tr>
<tr>
<td><strong>Pests and diseases</strong></td>
<td>No insects, insect damage or disease.</td>
</tr>
</tbody>
</table>

## LEAVES

| **Appearance** | No leaves on marketed stems. |

## STEMS

| **Appearance** | Rigid and strong enough to support blooms. Bend <10°; no twisting. Trim off lower flowering branches so the lower 40 cm of stem is clean – this makes it easier to assemble and tie bunches. Ensure stem ends are neatly cut. |
| **Length** | Cut stems at least 10 cm above ground level, making a horizontal cut. (Angled cuts result in pointy stubs that are dangerous to the next harvester.) |

## RECOMMENDED HANDLING AT HARVEST

Minimise drying out and exposure to heat – pick when it is cool. Some growers pick straight into pulsing solution and carry out grading, bunching and sleeving during the pulsing process. Others move stems quickly to the packing shed to be graded, trimmed, bunched and sleeved before placing the bunches into buckets of pulsing solution (dry stems are easier to trim and bunch). In large plantations, flowers are cut, graded and bunched in the field. Move cut stems into shade promptly and then to a cool packing shed.

## GRADING AND BUNCHING

| **Processing** | Processing can be done before pulsing (in the packing shed or in the field for large volumes) or while the stems are pulsing. Reject any contaminated stems. Sort stems according to length and thickness. Prepare bunches to buyer requirements. Recut stems. Tie bunches. Add sleeves. Return bunches to pulsing solution to complete pulse. |
| **Stem length** | According to market demand. |
| **Bunching** | The number of stems per bunch varies, and is determined by their length and by market and buyer requirements. Long stems are usually sold in bunches of 5. Different markets require different bunches. Especially for export, stems should be approximately the same diameter within a bunch, with the ends aligned. Use 1 tie near the base – keeping all ties the same distance from the base of the bunch improves presentation, as does the use of green bunching tape. Use the sleeve to support the bunch. Ensure the finished bunches will fit into the box without the heads touching the end. Trim the stems if necessary. |

### Stems per bunch

<table>
<thead>
<tr>
<th>Stem length (cm)</th>
<th>FOR EXPORT</th>
<th>FOR DOMESTIC MARKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>90</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>&lt;90</td>
<td>As per market requirements</td>
<td></td>
</tr>
</tbody>
</table>

### Sleeves

Sleeves are essential, as it is almost impossible to pack unsleeved kangaroo paws. Sleeves help maintain quality and reduce drying out while improving product appearance. Use microperforated sleeves, which help prevent the formation of condensation. Select the sleeve size to suit the size of the bunch – e.g. for export, long, narrow sleeves are preferred. Use looser sleeves for domestic product to improve presentation.
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).

Temperature and humidity

If necessary, hold at 2–4 °C (but not colder) in high relative humidity (≥95%) for up to 5 days.

Pulsing

Kangaroo paws need a sugar pulse to maximise vase life. The optimum sugar concentration is 20–25 g/L for ‘Big Red’. Other cultivars may require more or less. Check the optimum pulsing solution by doing your own trials.

Use a high-quality water to make up solutions. Pulse for 12 hours at 20–24 °C (packing shed), or longer at 2–4 °C. Some growers double the sugar strength and pulse for half the time.

Pulse in cool room if weather is very hot.

Too much sugar may cause leaf blackening and flower dehydration.

Prepare fresh pulsing solution for each batch.

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 <5 °C.

COMMON POSTHARVEST PROBLEMS

Refer to Postharvest Manual* for general advice.

Fungal decay in storage due to botrytis (grey mould)

Use preharvest fungicide sprays during wet weather to reduce the risk of botrytis disease.

Use preharvest insecticide sprays to reduce the pest population at harvest.

Dip flowers that are to be packaged and held for any significant length of time (export product) in a registered fungicide or insecticide solution with added wetting agent for not less than 1 minute, then dry naturally for 2 hours to ensure thorough disinfection.

Insects (for export)

Use preharvest insecticide sprays before export.

Pack bunches of the same size (stem number or weight, and stem thickness) together.

Pack bunches firmly in boxes so the product will not move and be damaged.

图: kangaroo paws do not appear to be susceptible to ethylene.

PACKAGING

Pack bunches of similar length together, and ensure all bunches meet this specification.

Pack boxes according to customer requirements.

For export, do not pack mixed cultivars in the one box, unless requested.

Pack bunches firmly in boxes so the product will not move and be damaged.

Pack head to tail, or use export hooks or stem breaks to ensure the tops of the bunches do not move in transit, or the florets will be damaged or crushed.

Use boxes with holes to allow forced-air cooling.

Cool flowers to 2–4 °C before transport.

Messages for importers and wholesalers

- Recut stems and place into fresh water containing a reputable commercial postharvest solution, or a solution containing a registered biocide and sugar.

- 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 and sugar.

- 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.

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