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# Alstroemeria

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# ALSTROEMERIA

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About 60 species of *Alstroemeria* grow wild in South America, in habitats ranging from the snowline of the Andes and high mountain plateaus down through the highland forests to the coastal deserts.

- *A. aurantiaca* is native to Chile. It is a hardy plant with bright orange or yellow flowers and a short flowering period in summer. It is the parent of many of today's cutflower types.
- *A. caryophyllaea* is native to Brazil. Its flowers are white with red markings and are scented like carnations.
- *A. haemantha* (previously known as *A. ligtu*) is native to Chile. Its flowers have pink to bright red outer segments with green tips. The inner segments are reddish-yellow with reddish-purple spots.
- *A. ligtu* is native to Chile. It has deep red flowers that have white markings on the upper segments.
- *A. pelegrina* is native to Peru. It has lilac flowers with maroon spots. There is also a variant with pure white flowers, *A. pelegrina* cv. *Alba*.
- *A. psitticina* (also known as *A. pulchella*) is native to Brazil. It is more tolerant of heat than *A. aurantiaca*. Its flowers are dark red with green tips.
- *A. pulchra* is native to Chile. It has white to pink flowers. The upper segments are splashed with yellow, and streaked and tipped with red or purple.
- *A. versicolor* is native to Chile. Its flowers are yellow or orange with purple spots.

A member of the lily family, *Alstroemeria* grows from a rhizome that also develops tuberous storage outgrowths and fleshy roots. The aerial shoots can be either vegetative or reproductive. Normally shoots that have unfolded more than 30 leaves will not flower and remain vegetative.

The leaves of *Alstroemeria* are unusual in that they rotate through 180 degrees as they unfold, so that the upper surface becomes the lower surface and vice versa.

## Hybrid varieties

The 'Dr Fleming' series, or 'Orchid' types, are infertile hybrids of *A. aurantiaca*. 'Walter Fleming' has yellow and white flowers. However, new Dutch and English varieties have superseded these hybrids. For example, 'Canaria' is a mutant of 'Walter Fleming' and 'Rosita' is a mutant from the triploid variety 'Regina'.

Several European companies such as van Zanten, van Staaveren, Konst and Hilverda offer new *Alstroemeria* hybrids. These are protected by Plant Breeders Rights legislation and plants are relatively expensive. These new varieties are available from the following suppliers. Not all are tolerant of the high Western Australian summer temperatures.

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- **Maxiflora**

12-16 Vika Avenue  
MONBULK VICTORIA 3793  
Ph: (03) 9756 6492  
Fax: (03) 9752 0080 (Agents for Konst varieties)  
E-mail: info@maxiflora.com.au  
Website: www.maxiflora.com.au

- **Propagation Australia Pty Ltd**

PO Box 2082  
Crestmead Mail Centre  
CRESTMEAD QUEENSLAND 4132  
Ph: (07) 3803 5566  
Fax: (07) 3803 4670  
E-mail: sales@propagation-australia.com.au  
Website: www.propagation-australia.com.au

Each of these companies maintains a comprehensive website where pictures, descriptions and production details of varieties are listed. Orders can be placed either directly with the company, or through its agent in Australia. Table 1 lists some of the varieties available.

Van Staaveren: [www.vanstaaveren.nl](http://www.vanstaaveren.nl)  
Van Zanten [www.vanzanten.nl](http://www.vanzanten.nl)  
Hilverda: [www.hilverda.nl](http://www.hilverda.nl)  
Konst: [www.Alstroemeria.com](http://www.Alstroemeria.com)

## Propagation

Most varieties of economic importance are now strictly protected by Plant Breeders' Rights propagation by growers is not permitted.

Plant of older varieties may be propagated by rhizome division during dormancy (summer). Take care to keep as much of the root system intact as possible and replant promptly. Tissue culture is the usual commercial method of propagation.

## Planting

Deciding when to plant is an economic decision that weighs reduced production against higher, early season prices. The usual time of planting is autumn although planting all year round is possible.

*Alstroemeria* is usually planted in beds 1.0 m wide. Overseas recommendations for plant spacing vary between cultivars. In Western Australia plants are usually spaced at 40-60 cm in row and two rows 40 cm apart per bed. Due to our warmer climate and the more vigorous plant growth, 60 cm is probably the better spacing although this will depend on variety.

## Trellising

*Alstromeria* is a vigorous crop and will reach 2.5 m in height. Trellising is essential. The same system as carnations is ideal, using four to five layers of 20 x 20 cm mesh spaced at 50 cm intervals. The netting is regularly elevated as the plant develops in order to avoid the stems falling over.

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## Soil conditions

Any well drained soil is suitable. Poor drainage will create problems with rhizome diseases such as *Fusarium*, *Rhizoctonia*, *Pythium* and *Phytophthora*. Keep the soil pH below 6.5. High pH can lead to iron and manganese deficiency. Since the crop is perennial it is essential the soil must be free of weeds. In sandy soils the addition of organic matter may be desirable. This should be done before soil disinfection so any weed seeds are killed.

## Irrigation and fertiliser

Irrigation is essential. *Alstroemeria* has a great deal of very lush growth which demands a lot of water, particularly in hot weather. Ground level microjets are recommended. Ideally short, but frequent, irrigations should be applied on Perth's sandy soils to prevent leaching of nutrients. Consult your adviser for the latest recommendations.

*Alstroemeria* is salt sensitive. Trials with some varieties showed that growth slows as soon as the EC rises above  $0.5 \text{ mSm}^{-1}$ . For every unit of EC above that, growth decreases by 15 per cent, yield by 10 per cent and stem length by 5 per cent.

Suitable fertiliser for *Alstroemeria* is a carnation feed such as:

Ammonium nitrate - 5.3 kg  
Potassium nitrate - 10.0 kg  
Magnesium sulfate - 2 kg  
Librel BMX<sup>®</sup> - 50 to 100 g  
Iron chelate - 50 to 100 g  
Copper chelate - 50 to 100 g

This makes up 100L of stock solution which should be diluted at 1:200 or an EC not exceeding 1.8 mS/cm.

Overseas literature suggests higher rates for nitrogen than these - preferably a nitrogen to potassium ratio of 2:1. However, other sources state that a ratio of 1:2 gives the best flowering. Successful growers in Western Australia are using N:K ratios ranging from 0.8:1 to 1.3:1.

Experiment with higher levels of nitrogen early on to promote vegetative growth, then gradually decrease the amount of nitrogen as flowering time approaches. During cooler weather, keep the ammonium forms of nitrogen to a minimum.

Phosphorus is usually applied two to three times each year at 100 g per square metre of super-copper-zinc.

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## Foliar analysis

The following figures are recommended nutrients levels for normal healthy growth. Leaves to be sampled are recently matured leaves from the top of the plant.

Element	Concentration
Nitrogen (% dry weight)	3.8-5.6
Phosphorus (% dry weight)	0.3-0.7
Potassium (% dry weight)	3.7-4.8
Calcium (% dry weight)	0.6-1.8
Magnesium (% dry weight)	0.2-0.4
Iron (ppm)	175-275
Zinc (ppm)	35-68
Manganese (ppm)	13-50
Copper (ppm)	2.7-15
Boron (ppm)	13-50
Molybdenum (ppm)	59-87

*Alstroemeria* leaves often show signs of yellowing, especially during summer. 'Wilhemina' is extremely susceptible. The cause is uncertain.

**Iron deficiency shows as an even yellowing of the youngest leaves. It tends to be worse in spring and also after a flush. In serious cases, use iron chelate, e.g. 6-8 g Fe-EDDHA per m<sup>2</sup>. Iron chelate ca also be added to the liquid feed.**

Manganese deficiency shows as interveinal chlorosis, mainly in young leaves and appears mostly in spring and summer. Correct with foliar sprays of manganese sulphate at 1-2 g/L.

**In magnesium deficiency, leaves are spotted with yellow green lines between the veins connecting to the entire edge of the leaf. It occurs on older leaves. Again, foliar sprays of magnesium sulphate at 2 g/L can be used.**

## Crop management

During thinning, a distinction is made between thinning young and old plants. Initially young plants develop thin shoots that may or may not carry a flower bud. These are pinched to assist in the formation of a plant framework. Later however, to get good quality flowering stems and high yields it is necessary to thin out excessive vegetative growth. Blind shoots are recognisable by the pattern of leaf growth at the top of the stem. These shoots may be pulled out from the base of the plant. Thin and/or short flowering shoots should also be removed and any flowers that are not harvested. Flowers left on the plant contribute to an increased period of plant dormancy after cropping.

Thinning enables young shoots to receive more light the increased air circulation and reduces the risk of leaf pathogens such as Botrytis. The amount of thinning required will change with the variety.

Yields from *Alstroemeria* vary enormously between cultivars. In the Northern hemisphere 'Samora' is acknowledged as being one of the most productive varieties yielding 250 stems per square metre per annum compared to only 100 for some of the other varieties. Our limited experience to date in Australia indicates that these figures can be exceeded by about 50 per cent.

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## Flowering

Due to the differing origins of *Alstroemeria* species it has been possible to breed hybrids with a range of requirements for flower initiation and development. The requirements for floral induction in the hybrids can be separated into two groups:

- The white/yellow ('Orchid' types) which originated from one interspecific cross.
- The red/orange types, e.g. 'Regina' which originated from several interspecific crosses.

The white/yellows require a shorter cold period, a higher devernalisation temperature and a shorter daylength for flowering than the red/orange group.

The older cultivars of *Alstroemeria* are long day plants requiring 13 hours of daylight for flower initiation. In Perth this daylength occurs in about the 3rd week of March and again in mid-September. A longer daylength may promote earlier flowering but the number of stems per square metre may be less. This becomes an economic decision, the grower must weigh up less production against higher, early season prices. Actual, optimum daylengths differ slightly between cultivars. The yellow/white cultivars frequently respond best to daylengths of 12-13 hours whereas the red/orange varieties such as 'Harmony' and 'Rosita' respond better to 13-14 hours. Varieties listed as AYR do not need supplementary lighting for winter flowering.

## Air temperature

*Alstroemeria* is a temperate crop and suffers from heat stress in our hot summer months. The considerable amount of lush vegetative material is a contributing factor. The roots are unable to keep up the supply of water to the rapidly transpiring leaves. Wilting occurs during the day and is often followed by leaf scorching. Orchid-types are especially sensitive to this. Overhead misting is useful. Growers in Perth have found that growth under shadecloth, rather than plastic produces a better plant for most of the year.

Flower initiation takes place at low temperature whereas flower development, is promoted by higher temperatures. However, high temperatures also enhance shoot formation while preventing the development of flower buds so that many blind shoots are formed.

Winter flowering varieties require a minimum night temperature for an optimal growth of 12°C, 15°C to 16°C is maintained. With non-flowering varieties, the temperature in the winter period can be reduced to 8°C.

*Alstroemeria* is frost sensitive so growers under shadecloth will need to think about frost protection. The easiest solution is to use overhead irrigation which is linked to a thermostat and will come on when the temperature drops below a certain preset level – say 2°C.

The same overhead irrigation system may be used for both frost protection and misting depending on the nozzle used. Frost protection uses low volumes and large droplet sizes whereas misting is dependent on small droplet size to present a large surface area for evaporation and thus efficient cooling.

## Soil temperature

*Alstroemeria* plants require vernalisation (a period of cold temperature) in order to stimulate shoot growth. Then shoots become floriferous as daylength increases. For 'Orchid' types this is about 4 weeks at 5°C. Once flowering begins, older hybrid types will produce flowering shoots indefinitely until the soil temperature goes above 15°C for extended periods. Air temperature is not important. Trials with three breeding lines of all year round (AYR) hybrids in the Netherlands found that soil temperatures varying up to 22°C did not affect flowering of either of the four cultivars used ('Rio', 'Rosita', 'Rosario' and 'Red Sunset'). The effect of maintaining a constant soil temperature varied markedly between cultivars. 'Red

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Sunset' produced 150 per cent more under a constant soil temperature of 16°C whereas 'Rio' produced 22 per cent less.

Shoot initiation occurs underground and so is affected by soil temperature. Soil temperatures over 20°C, are detrimental to flower initiation causing an increase in the number of blind shoots. Soil cooling with the use of polythene tubes circulating iced water has had variable results. Mulching may be beneficial.

## Lighting

Light bulbs or florescent lights with a light intensity of 40 lux (150-200 mW/m<sup>2</sup>) can be used for daylength extension. If lights are used as daylength extension, total daylength must be 13 hours. If night break lighting is used then 12 hours is sufficient, or if applied as cyclic lighting, 13 hours.

Three weeks is required for flower initiation, this can also be continued to enhance flower development.

Most growers in Perth do not light their crops.

## Pests and diseases

Aphids are the most common problem in *Alstroemeria*. They are found on the flowers and young shoots between plants. They cause the shoots and leaves to become deformed. In addition, aphids secrete honeydew, making plants sticky and sooty mould develops. Symptoms are small and/or large holes in the leaves and the growing points may be destroyed. Aphids are also a problem as they transmit viruses. Control with synthetic pyrethroids such as Ambush<sup>®</sup> or Mavrik<sup>®</sup>.

Thrips suck plant sap and cause malformation of young shoots and inflorescences. Flowers may not open or are misshapen, with brown petal tips. Synthetic pyrethroids are most commonly used for control. Specific chemicals such as Regent<sup>®</sup> or Avid<sup>®</sup> may be required if Western Flower thrips are present.

Caterpillars may also infest the crop, particularly in summer. Slugs and snails eat off the young developing shoots. Pellets containing methiocarb (Mesuro<sup>®</sup>) or metaldehyde will control them. Mites are sometimes a problem. Infection is often in isolated patches.

Dichlorvos may cause damage to *Alstroemeria*.

Several root rots are known to infect *Alstroemeria*, including *Pythium*, *Phytophthora*, *Rhizoctonia* and *Fusarium*. Clean planting material is used in clean soil will help prevent root rots becoming a problem unless waterlogging occurs. Nematodes (*Pratylenchus*) are noted as a problem overseas.

*Botrytis* can be a problem in warmer weather, particularly in times of high humidity. A spray programme using a rotation of Rovral<sup>®</sup>; Zyban<sup>®</sup> and Bravo<sup>®</sup> may be used. Keep humidity low by using fans to dry wet foliage on cool mornings if growing under plastic, ensure adequate ventilation and thin plants regularly.

Chemicals and other management techniques for controlling pests and diseases are constantly changing. Consult your advisor for the latest information.

Virus is present in *Alstroemeria* in Western Australia. The symptoms come and go depending on the time of year. It does not appear to be a problem. It may be the *Alstroemeria* mosaic virus which is prevalent in the northern hemisphere but has not yet been formally identified in Western Australia. When the virus occurs in isolation it causes faint leaf chlorosis and sometimes flower breaking in dark coloured cultivars. However, it



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occurs most commonly together with a strain of lily symptomless virus and less frequently with tobacco rattle virus resulting in severely affected plants. Freesia mosaic virus has also been recorded in *Alstroemeria* in Italy. Leaves are deformed and chlorotic but flowers appear normal.

## Allergy

Some people are allergic to the sap of *Astroemeria* plants which causes a skin rash in susceptible people. Growers quote as high as 40 per cent of workers.

## Harvesting and postharvest handling

The correct stage at which to harvest the crop is when the primary florets are showing colour and are just about to open (the rolled petal stage). The stems are pulled or cut depending on the variety, and the length and firmness of the plants. If a stem is pulled with a piece of rhizome attached then cutting will be necessary. Pulling is obviously easier. When grading and bunching the white, bent portion at the base of the stem should be trimmed. Work overseas has shown that subsequently cutting off this blanched portion of stem increases water uptake and vase life. The leaves of *Alstroemeria* are normally stripped from the lower portion of the stem. *Alstroemeria* is usually sold in five stem bunches.

After harvesting, flowers will wilt rapidly and so should be placed in a preservative in the coolroom to remove field heat, as soon as possible. When flowers are placed in clean water first, and treated later, they will not absorb as much preservative since they are completely saturated with water so treatment time may need to be adjusted to compensate for this.

During bunching, flower heads are arranged evenly, and five stems per bunch are cut off at the same length. Leaves must be stripped from the bottom 10 cm of stem. The bunches are usually sleeved and stored in a coolroom at 5-7°C in buckets containing water or a post harvest solution. Water in the buckets should be changed at least once a week and the buckets cleaned using a chlorine solution (5 ml chlorine to 1 litre of water). Afterwards, rinse well with clean water.

*Alstroemeria* may be cool stored for 6 days at 1°C. A vase life of 14 days is considered normal. The crop is ethylene sensitive so an STS pulse using the same rates and times as for carnations is beneficial although this is not a treatment used in Western Australia. The use of a preservative solution containing sugar and 8-HQS will also promote flower opening, however, the most pressing problem with *Alstroemeria* is leaf yellowing. Using a specially formulated product (Chrysal –SVB-II®) will prevent this disorder. Four hours is the optimum treatment time to combat leaf yellowing. Most growers use only this latter treatment. Growers need to be aware that varieties differ in their response to postharvest treatments.

Postharvest treatments are best applied at about 5°C (in a coldroom). At ambient temperatures, despite the increased uptake, treatment is less effective due to the faster rate of plant development.

The post-harvest treatment can take place directly after harvesting, either before or after grading. Bunches must be transferred to clean water prior to sale if an STS pulse was used. STS must be disposed of in the prescribed manner.

## Disclaimer

This material has been written for Western Australian conditions. Its availability does not imply suitability to other areas, and any interpretation or use is the responsibility of the user. Mention of product or trade names does not imply recommendation, and any omissions are unintentional. Recommendations were current at the time of preparation of the original publication.