# Australian almond variety evaluation program - AL22009

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Hort Innovation

THE UNIVERSITY of ADELAIDE

australian almonds

# History

- Started in 1997
- Combined hybridisation and molecular approach
- Funding from HAL/HIA/ARC

# Breeding approach

***Objective:*** *to breed improved cultivars with superior kernel quality, self-fertility, disease resistance, high productivity.*

- Classical breeding using local and imported material
- Waite almond germplasm collection, Lindsay Point & ACE
- Primary evaluation based on nut & kernel characteristics
- Secondary evaluation on productivity, disease tolerance
- Tertiary evaluation on long-term yields

# Progress to date

- 84 parent cultivars used
- 315 different crosses achieved
- 44,000  progeny produced in 16 years
- 37 cultivars imported since 1997
- 60+ superior selections to date
- Secondary and tertiary evaluations blocks established

# Evaluation trials

- Almond Centre of Excellence
- Dareton
- Lindsay point

# Desirable traits

- Sweet kernel, large kernel, thin skin, light colour
- Self-fertile
- Soft - semihard shell
- Tight shell seal
- High productivity
- High flower density
- Slightly erect tree habit
- Drought tolerance

# Primary evaluations

- Kernel taste – sweet
- Kernel size – >1.4 g
- % double kernels – <5%
- Kernel colour – light
- Shell hardness – paper, soft, semihard, hard
- Shell seal – well sealed
- Kernel appearance – score /10
- Total score /35

# Variation in morphological traits

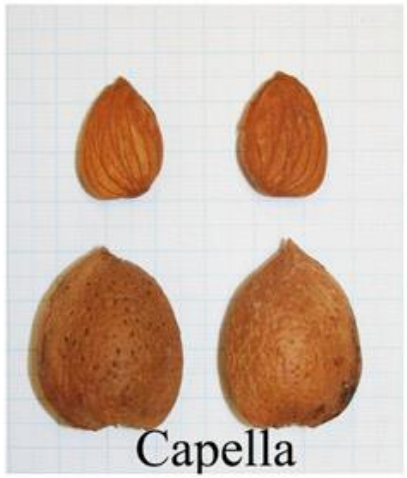
# Secondary and Tertiary evaluations

What do we assess for?

- Yield
- Growth Habit
- Nut quality
- Crack out
- Disease tolerance

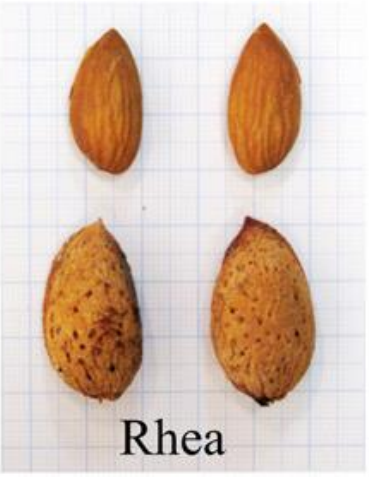
# Six new varieties

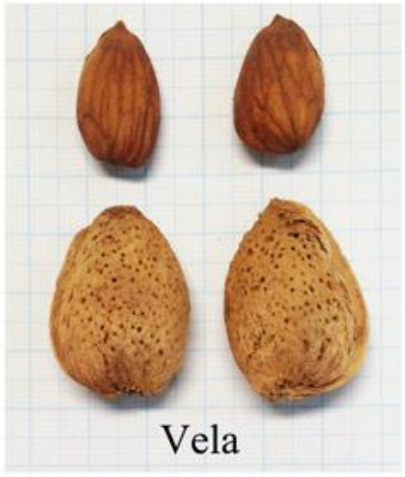
- Six new cultivars released in 2016 and 2017, Maxima, Mira, Carina, Rhea, Vela and Capella









JANUARY 2017

# ALL ABOUT ALMONDS

ESTABLISHMENT

## AUSTRALIAN ALMOND VARIETY - CARINA

Carina is high spur bearing with a compact to medium canopy that may suit higher orchard densities. The hull flares away from the shell in a 'banana' fashion and the semi-hard shell reduces kernel quality downgrades and late season bird damage.

### KEY POINTS

- Self-fertile variety
- Spur bearing
- Early harvest
- Early pollinator for Nonpariel


### POMOLOGICAL TRAITS

**Growth habit** Spreading
**Branching density** Medium high
**Nut location** Spurs and one year old wood
**Flowering time** Early mid, full bloom 4 days earlier than Nonpareil
**S compatibility genotype** S7Sf
**Pollination** Self-fertile variety. Cross pollination unnecessary. Good level of autogamy.
**Compatible Pollinators** Nonpareil, Monterey, Peerless, Price, Rhea
**Flowering density** High
**Length of flowering** Long, approx. 4 weeks
**Bearing precocity** Precocious
**Cropping capacity** High
**Cropping regularity** Good. Little to no alternate bearing
**Bacterial spot tolerance** Very good
**Harvest season** Early
**Harvest ease** Good
**Husking ease** Good. Hull is easily separated from shell

### COMMERCIAL TRAITS

**Nut shape** Ovate
**Kernel size** Medium (1.13 g)
**Crackout percentage** 28.6%
**Shell texture** Semihard shell
**Double kernels** No doubles
**Kernel appearance** Attractive, skin colour light plump kernel
**Kernel composition** Oil 57.4%; oleic acid 62.3%; Vitamin E 53.8 mg/100g oil

### GLOBAL ASSESSMENT

Carina is a highly precocious variety that has consistently out yielded the current industry benchmark, Nonpareil by 12% (eight years of yield assessments). It has superior fruit characteristics with a semi-hard shell, fully sealed shell and sweet tasting, lightly coloured kernel. The kernel is less likely to be damaged by insects and moisture due to the fully sealed shell, enabling a higher quality kernel. The semi-hard shell is less likely to result in bird damage during the growing season. It can be used as an early pollinator for Nonpareil, replacing Peerless, Price or Monterey. The growth habit is slightly spreading similar to Nonpareil but crops mostly on spurs. The hull detaches easily from the shell at harvest, a characteristic that may lend itself to in-field de-hulling in the future. Carina is self-fertile and can pollinate itself in single variety orchards.

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ALL ABOUT ALMONDS

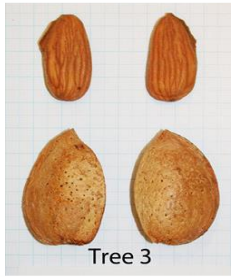
ESTABLISHMENT

## AUSTRALIAN ALMOND VARIETY - MAXIMA

Maxima is a highly spur bearing tree that is suited to planting in traditional or higher density orchards. The hull flares away from the shell in a 'banana' fashion and has a very large kernel that may be suited to markets where large size attracts premium pricing.

### KEY POINTS

- Cross-pollination needed
- Spur bearing
- Late pollinator for Nonapriel
- Very large kernel size




### POMOLOGICAL TRAITS

**Growth habit** Spreading
**Branching density** Medium high
**Nut location** Spurs and one year old wood
**Flowering time** Medium, full bloom 4 days later than Nonpareil
**S compatibility genotype** S3S8
**Pollination** Cross-pollination needed
**Compatible Pollinators** Nonpareil, Carmel, Monterey, Capella, Wood Colony, Mira
**Flowering density** High
**Length of flowering** Medium, approx. 3 weeks
**Bearing precocity** Precocious
**Cropping capacity** Very high
**Cropping regularity** Good. Little to no alternate bearing
**Bacterial spot tolerance** Very good
**Harvest season** Early mid
**Harvest ease** Good
**Husking ease** Good. Hull is easily separated from shell

### COMMERCIAL TRAITS

**Nut shape** Cordate
**Kernel size** Very large (2.05 g)
**Crackout percentage** 26.1%
**Shell texture** Semihard
**Double kernels** No doubles
**Kernel appearance** Attractive, skin colour light and bright
**Kernel composition** Oil 62.4%; oleic acid 59.9%; Vitamin E 51.7 mg/100g oil

### GLOBAL ASSESSMENT

Maxima is a semi-hard shelled variety that has consistently out yielded Nonpareil by 20% over eight years of yield assessments. It has superior fruit characteristics with a semi-hard shell, fully sealed shell and very large, sweet tasting, lightly coloured kernel. Maxima's two main outstanding qualities are its early precocity to crop on spur wood and its large kernel size, approximately 2 grams. The full enclosed shell seal provides protection against insect and bird damage, whilst the hull detaches easily at harvest. The growth habit is slightly spreading similar to Nonpareil but bears mostly on spur growth. Maxima can be used as a late pollinator for Nonpareil, replacing Carmel and Wood Colony. Maxima needs cross pollination to successfully bear fruit.

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# Challenges

- Grower adoption
- Processing
- Consumer acceptance
- Crack out
- Consistent yield and nut quality
- Tree health

# Australian varieties

- Carina[A] - is highly spur bearing with a compact to medium canopy that may suit higher orchard densities. The hull flares away from the shell in a ‘banana’ fashion and the semi-hard shell reduces kernel quality downgrades and late season bird damage. Self-fertile, early NP pollinator.

- Capella[A] - is slightly open tree that is suited traditional orchard densities. The hull flares away from the shell in a ‘banana’ fashion and hard shell reduces kernel quality downgrades and late season bird damage. Self-fertile, late NP pollinator.

- Maxima[A] - is a highly spur bearing tree that is suited to planting in traditional or higher density orchards. The hull flares away from the shell in a ‘banana’ fashion, semihard shell and has a very large kernel that may be suited to markets where large size attracts premium pricing. Late pollinator for NP.

# Australian varieties

- Mira[A] - is an upright spur bearing tree that is suited to planting in traditional orchard densities. The hull flares away from the shell in a ‘banana’ fashion and the semi-hard shell reduces kernel quality downgrades and late season bird damage. Self-fertile, late NP pollinator.

- Rhea[A] - is an upright bearing tree that is suited to planting in traditional orchard densities.  It is a paper shell and the kernel itself has a hint of marzipan similar to Carmel and may be suitable for inclusion in the Carmel market. Early pollinator for Nonpareil.

- Vela[A] – is an upright to spreading tree, spur bearing with high cropping capacity. It is self fertile, papershell and the kernel has a similar appearance and taste profile to Nonpareil. Early pollinator for Nonpareil.