All About Walnuts

Origin

According to Roman legend, the walnut originated when Bacchus, the Roman god of pleasure, fell in love with Carya, the youngest of three daughters of Dion, king of Laconia. When the jealous older sister endeavoured to prevent the two from meeting, Bacchus turned them into stones and, for reasons clear only to a Roman god, transformed his beloved into a walnut tree. In recent times, most observers have suggested the crop has more mundane origins.

Background

Many parts of Australia have a Mediterranean climate that is suitable for walnut production. Walnut production is attractive to investors because it is highly mechanised, orchards are low in maintenance, and stay productive for at least 40 years. Unlike stone and pome fruit, harvested nuts are not perishable and can be stored for a long time. Other conditions that favour the walnut industry in Australia is clean air and water and fewer pests and diseases. Australian nuts are produced counter-seasonally to the Nothern hemisphere, which creates opportunities to tap into those markets.

All walnut species are native to temperate or sub-tropical climates and are deciduous trees. Most walnut species are highly regarded for their timber and all produce edible nuts. Other genera in the walnut family (*Juglandaceae*) that interest us is the *Carya* (pecans and hickories) family.

Black walnuts – The Eastern black walnut (J.nigra) has wood that are highly prised for furniture and gunstock. It is also used as a rootstock in commercial walnut production. The Northern black walnut (J. hindsii) has for a long time played an important role in the California walnut industry as a rootstock.

Persion walnut – Persion or English walnut (*Juglans regia*) are what make up most of the commercial pecan nut varieties. They are characterised by four-chambered nuts with hulls which dehisce and separate from the shell at maturity.

The predominant English varieties found and produced in Australia (according to time of leafing) are:

- Hartley
- Franquette
- Serr
- Ashley
- Sunland
- Chico
- Vina
- Tehama
- Tulare
- Howard
- Chandler
- Cisc

Up until the late 1980's, Franquette made up 70% of trees planted in Australia, followed by Treve Mayette, Eureka, Myrtelford, Jewell and Wilson's Wonder, all of which produce nuts from terminal buds (see Table).

Cultivar	Pistillate flowers from lateral buds %	Blooming	Nut size gm/kernel	Kernel %	Light kernel colour %	Shell seal	Nut yield
Franquette	5	late	5.3	47	90	good	fair
Treve		late	-	-	78	poor	low

Mayette							
Eureka		late	7.7	50	40	good	moderate
Payne	88	early	5.7	50	68	good	high
Hartley	5	late	6.1	46	76	good	high
Serr	85	mid	5.8	50	70	good	low
Ashley	85	early	5.8	50	70	adequate	high
Sunland	82	mid	10.6	57	85	good	high
Chico	96	very early	5.2	47	60	good	very high
Vina	70	mid	6.3	49	90	good	high
Amigo	74	early	5.9	51	63	fair	high
Howard	89	late	6.6	49	96	good	very high
Chandler	89	late	6.5	49	100	adequate	very high
Tulare	72	mid/late	7.5	53	86	good	high
Lompoc	50	early	7.5	54	60	good	high

Table. A selection of the main cultivars available in Australia.

Rootstocks

Most walnut orchards are planted with bare-root grafted trees on seedling rootstock. Rootstock varieties consist predominantly of *Juglands hindsii* (Northern Californian Black or NCB), *Juglans nigra* (Eastern Californian Black) and *Paradox* which is a vigorous hybrid between *Juglans regia* and *Juglans hindsii*. Seed for Paradox can be collected from a black walnut parent, commonly *J.hindsii,* naturally pollinated with *J. regia* pollen*. Paradox* is preferred as a rootstock because of its hybrid vigour and it has more resistance to soil-borne diseases than either of its parents. NBC has less vigour than Paradox but appears to be more resistant to crown gall disease caused by *Agrobacterium tumefacience*. J.nigra is relatively resistant to *Phytophthora* root and crown disease and exits more cold hardiness than *J. hindsii.*

Variety selection

Leafing and bloom date

Date of leafing and bloom date are important to consider in choosing your variety. Later leafing varieties on the average suffer less damage from late spring frost or rain-related disease problems such as walnut blight.

Pollen shedding and pistillate flower receptivity

Dates of pollen shedding and pistillate (female flower) receptivity are factors in pollination. Pollen shedding Pollen shedding which coincides with pistillate bloom shoul assure adequate pollination. Most walnut varieties do not shed pollen at the proper time to completely cover their own receptive period. For this purpose two (or more) varieties are often planted together to assure adequate pollination. Excess pollen can induce pistillate flower drop which is especially sever with Serr variety.

Lateral bud fruitfulness

Varieties with high (80-90 percent) lateral bud fruitfulness will bear more heavily during early years than will varieties with a low lateral bearing habit. But a variety with 90% lateral bud fruitfulness is not always better than a variety with 70% lateral bud fruitfulness. The number of lateral buds which actually grow and produce nuts, and the number of nuts per shoot are very important ingredients in yield.

Nut quality characteristics

Light coloured kernels have traditionally commanded a higher price in the market. The market prefers a large nut with a large, well developed kernel. The kernel should be easily removed from the

shell, and should a high percentage of large halves. Good shell strength and shell integrity are also important.

Site selection

The climate in the area and the microclimate at the orchard site are important considerations. Spring frost, summer heat, fog, low winter chill, late spring or early fall rainfall, and wind are all important considerations when choosing varieties and establishing a new orchard.

Walnuts require good soil drainage. They grow best on fertile, deep, well-drained loams. Walnuts planted on marginal soils will require much more exacting management to achieve success. Irrigation requirements for walnuts are likewise important. A reliable supply of good quality water is vital to a successful walnut operation. Walnuts have a low tolerance for soluble salts, especially sodium and chloride, and are very sensitive to excess boron. Walnut production are limited in many areas due to insufficient winter chill. Most varieties require about 800 hours of winter temperatures below 7'C. Absence of winter cold can result in delayed and sporadic bud break, poor yield and branch dieback. Cool summer temperatures can reduce kernel size and result in poorly filled nuts. Excessive summer heat can cause sunburn and kernel darkening or shrivel, particularly if moisture stressed.

Pests and diseases

Walnut blight The major nut and foliage disease of walnuts are caused by the bacterium Xanthomonas *campestris* pv. j*uglandis*. Bacteria overwinter in dormant buds and infect leaves and developing nutlets under wet conditions. In climates where rain occurs only in the autumn, winter and early spring, blight can be controlled by copper sprays at flowering and before rainy periods. It becomes more difficult in climates with sporadic rain throughout the growing season.

Phytophthora root and crown rot This fungal disease may be carried to new sites by farm equipment and irrigation water and can cause the decline and death of walnut trees. Early symptoms of infection are poor growth, small chlorotic leaves and premature leaf senescence. This is followed by twig die-back, partial defoliation and, finally, tree death.

Crown gall The soil-borne bacterium *Agrobacterium tumefacience*, which causes the root and crown galls, can girdle a walnut tree. Bacteria enter trees through wounds or natural openings. Disease-free nursery stock, good sanitation, avoidance of wounds and pre-plant dips or sprays with antagonistic bacteria should be sufficient to control crown gall.

No serious insect pests are found in Australia but bird damage can be serious if left uncontrolled. In walnut orchards in Victoria and New South Wales, long-billed corellas, sulphur-crested cockatoos and galahs are causing substantial crop losses and damage by tearing and breaking young shoots and leaves. Effective management depends on a combination of bird management strategies.