

Poncirus trifoliata

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NSW DPI Citrus Team



Origin

The trifoliate orange (*Poncirus trifoliata*) has grown in China for thousands of years and in Japan since the 8th Century. It was introduced into Australia in the latter part of the 19th Century, but because of the restricted growth of many trees propagated on this stock, it became unpopular. Trifoliate orange became the preferred rootstock for heavy soils after research identified transmission of viroids, in particular citrus exocortis viroid, via infected budwood as the cause of the dwarfing and decline problem. Many selections of *P. trifoliata* have been made and named. The one in common use in Australia is a small leaf, small flower selection known as the Australian selection or *P. trifoliata* 22. A dwarfing selection known as 'Flying Dragon' is sometimes used as a stock for the retail trade.

Advantages

- ✓ *Phytophthora* resistant
- ✓ nematode resistant
- ✓ tristeza immune
- ✓ cold tolerant
- ✓ tolerates waterlogging
- ✓ good quality fruit
- ✓ compact tree

Disadvantages

- ✗ dislikes highly acid or alkaline soils
- ✗ sensitive to salinity
- ✗ sensitive to calcareous soils
- ✗ drought sensitive
- ✗ exocortis susceptible
- ✗ slow growing in nursery

Tolerance to environmental and soil conditions

Poncirus trifoliata is most suitable for lime-free soils and can withstand cold and wet conditions. However impeded drainage can result in 'sudden death' of trees on this stock. Trees on *P. trifoliata* grow well on fertile clays to loams but are intolerant of highly acid or highly alkaline soils. They also react to saline conditions, and trees on *P. trifoliata* readily take up chloride through the leaves; a problem most often observed in trees watered by overhead irrigation. It is one of the preferred rootstocks for replant sites. *Poncirus trifoliata* does not develop a very deep or wide root system, but feeder roots are highly fibrous. It has poor drought tolerance.

Pest and disease

Poncirus trifoliata is highly resistant to *Phytophthora* root and collar rots caused by the

fungus *Phytophthora citrophthora* and to the citrus nematode (*Tylenchulus semipenetrans*). It is immune to citrus tristeza virus. Budwood for propagation on this stock should be obtained from the Auscitrus Budwood and Seed Scheme to ensure freedom from citrus exocortis viroid (CEV) and other viroids, which cause dwarfing, and from citrus tatter leaf virus to which trifoliata orange is sensitive resulting in a yellow ring at the bud-union. This rootstock is responsive to viroid dwarfing and is recommended as a stock for viroid dwarfing of oranges.

Field performance

Poncirus trifoliata is generally a good rootstock for oranges, satisfactory for grapefruit (although small fruit size is sometimes reported), most mandarins and lemons with the exception of Eureka lemon. A major drawback with *P. trifoliata* is the slow initial establishment of new plantings. Cropping efficiency is good. Trees propagated on *P. trifoliata* are suitable for planting at high density. Field performance in tropical and sub-tropical regions is generally poor.

Nursery performance

P. trifoliata is the slowest growing of all commercial rootstocks. Nursery trees on *P. trifoliata* take 6–12 months longer to grow than Troyer and Carrizo citranges. It is the most difficult of the commonly used rootstocks to propagate. Propagation of *P. trifoliata* in early spring and late autumn is difficult due to extended winter dormancy. Small-flowered selections of trifoliata orange are less vigorous than large flowered types and are more bushy.

Fruit quality

Fruit quality is excellent, with high total soluble solids and acid content and smooth thin peel. Fruit size is medium and maturity mid to late. Juice content is high. Trees propagated on *P. trifoliata* produce fruit with high early season acidity but show excellent late holding characteristics.

Scion compatibility

Incompatible with Eureka lemon, a yellow ring incompatibility develops at the bud union. Cincturing at the bud-union is often a problem

with Imperial mandarin, which can be overcome by use of a sweet orange interstock.

Growers should ensure that trees are propagated from true to type, disease free seed and premium budwood obtained from Auscitrus.

Extent of plantings

P. trifoliata is the most commonly used rootstock for the heavier soils of the Riverina and Cullumberrin in New South Wales. It is also the major rootstock used in coastal areas of NSW. Sales of *P. trifoliata* seed through Auscitrus are consistently higher than for other stocks, although less than the cumulative figure for Troyer and Carrizo citrange.

Overseas experience

P. trifoliata is the predominant rootstock in China, Japan and Argentina. It is also used in the Central Valley of California in heavy soil areas.

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