

Troyer and Carrizo Citrange

December 2005, Primefact 22/183, First edition
NSW DPI Citrus Team



Advantages

- ✓ *Phytophthora* resistant
- ✓ nematode tolerant
- ✓ tristeza tolerant
- ✓ cold tolerant
- ✓ highly polyembryonic
- ✓ moderately vigorous

Disadvantages

- ✗ dislikes high pH soil
- ✗ dislikes clay soil
- ✗ sensitive to salinity and waterlogging
- ✗ sensitive to calcareous soils
- ✗ overgrows mandarin scions

Origin

Troyer and Carrizo citranges are hybrids of Washington navel orange and *Poncirus trifoliata*. The original crosses were made in the early 1900s by the United States Department of Agriculture with the intention of producing cold tolerant scion varieties. They were later identified as being suitable for use as rootstocks. Commercial use of these rootstocks began in Australia in the 1960s. They are visually indistinguishable, and under Australian conditions there is little difference in the performance of trees on either rootstock. They are general purpose rootstocks and are widely used for most commercial varieties in Australia with the exception of Eureka lemon.

Tolerance to environmental and soil conditions

These rootstocks are intolerant of high pH soils with high levels of available calcium and also intolerant of saline conditions. Trees on these stocks frequently show micronutrient deficiencies (zinc, iron, manganese), especially in the spring flush. Suitable for replant sites. Moderately cold tolerant. Best results with Troyer/Carrizo citrange are achieved in well drained soils. Both rootstocks are unsuitable for heavy clay soils.

Pest and disease

Troyer and Carrizo citranges are tolerant of tristeza virus and *Phytophthora* root rot but are less tolerant than *Poncirus trifoliata*. They are also tolerant to citrus nematodes, but this varies with the nematode biotype. Both stocks are responsive to viroid dwarfing. The citranges are prone to sudden death in soils with impeded drainage.

Field performance

Main lateral and fibrous root development can be poor in young trees. Mature trees are medium to large. Young trees on these stocks are vigorous and produce good crops of high quality fruits in their early years. Crop regulation should be considered an essential management requirement for mandarin cultivars grown on these rootstocks. Trees in the Murray Valley older than 20 years often show a tendency to produce smaller fruit.

Nursery performance

Troyer and Carrizo citrange are highly nucellar and produce uniform, vigorous, upright stocks that are easy to manage in the nursery. Most varieties are easy to propagate on both rootstocks with the exception of Imperial mandarin, where poor bud take is sometimes encountered. Nursery trees are faster growing than *Poncirus trifoliata* but slower than Rough lemon.

Fruit quality

Fruit quality is excellent, but there is a tendency for increased albedo breakdown in older trees. Fruit size is medium, with a thin, smooth rind. Juice and sugar content are high and acidity levels are medium to high. Fruit maturity is earlier than *Poncirus trifoliata*, Swingle citrumelo and Cleopatra mandarin but later than Rough lemon.

Scion compatibility

Fully compatible with navel and Valencia orange varieties. These rootstocks are incompatible with Eureka lemon, forming a yellow ring at the bud-union.

The decline of Imperial mandarin trees on citrange stocks, which is related to excessive rootstock overgrowth at the bud union causing a cincturing effect, might be triggered by excessive early cropping and poor management of young trees.

Extent of plantings

Combined sales of Troyer and Carrizo citrange have increased rapidly over the last ten years and now account for more than 40% of total rootstock seed sales in Australia. In Queensland, Troyer citrange is the major rootstock used for mandarins. The citranges

are the most widely used general purpose rootstocks in the Murray Valley.

Overseas experience

Troyer is widely used in California, while Carrizo has been a leading rootstock in Florida. Whereas Troyer was more popular than Carrizo in Spain and South Africa, the reverse is now the case. In Israel most mandarin hybrids are propagated on Troyer citrange.

Reference number: PUB22/183.

© State of New South Wales through NSW Department of Primary Industries 2005. The information contained in this publication is based on knowledge and understanding at the time of writing (December 2005). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent advisor.