C35 citrange rootstock – a complicated story

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C35 citrange rootstock — a complicated story

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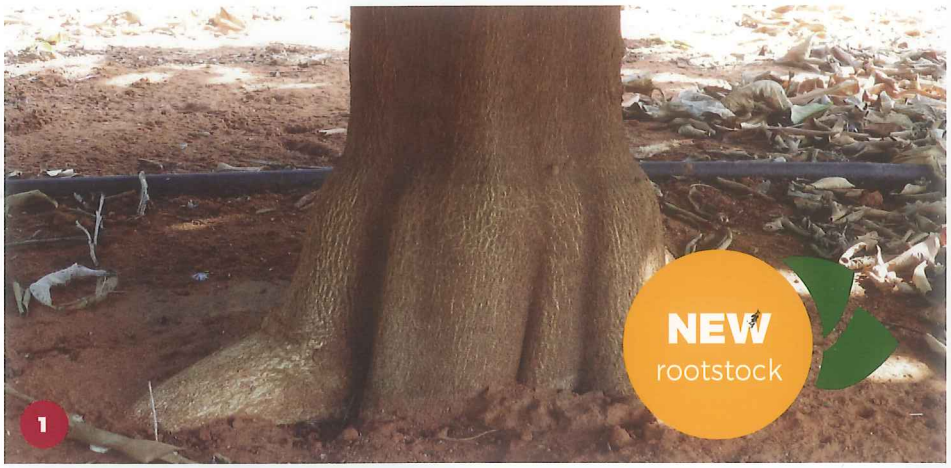
Key points

Conflicting results from trials

Different results at Loxton, Dareton

Risks remain in commercial use



C35 citrange is a hybrid of Ruby Blood orange and trifoliate orange made in 1951 and released by the University of California, Riverside in 1986.

It can be used in both virgin and replant sites, has tolerance to Phytophthora root rot, cachexia, Citrus Tristeza Virus (CTV) and nematodes. C35 does not suit high pH soils, has poor salt tolerance and should not be used in heavy clay soils. In Spain C35 citrange has been used to extend the harvest period for navel oranges due to C35 producing a slightly higher juice acid content than fruit grown on Carrizo citrange. The sensitivity of C35 to calcareous soil is also very evident when these two rootstocks are growing together, with iron deficiency yellowing more evident in trees growing on C35. In Spain, trees on C35 rootstock are said to be 10-15% smaller than those on Carrizo citrange.

American experience shows C35 citrange can produce moderate to high yields of good quality fruit from smaller sized trees.

However, there is a report from the USA that Murcott mandarin performed differently over a wide range of soil types, with an overall poor rating. Another report said that decline issues with C35 occurred in a Valencia trial after 10 years of age. Overseas information also suggests that Eureka lemon is incompatible with C35.

In Australia C35 citrange is not a widely grown rootstock and results from a mandarin trial in Queensland suggested it offered no real advantage over existing recommended rootstocks. It caused benching at the graft union with Imperial mandarin but this had not led to tree decline.

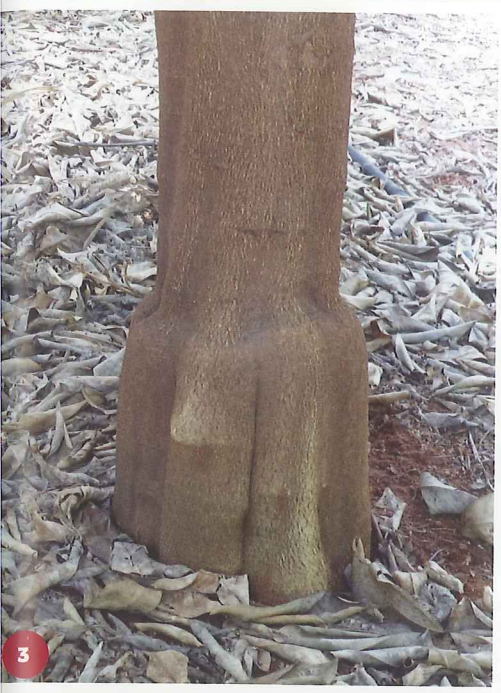
Rootstock trials incorporating the newly released C35 were established in the Riverland between 1989 and 2002, mainly at the Loxton Research Centre. These former trials were retained, with South Australian state government funding allowing them to be revisited in 2015 and 2016 to assess their long term performance. Results from the 2015 and 2016 investigations indicate that C35 failed to live up to early promise, with less than optimum performance under Navelina, Hockney and Summer Gold navels as well as Afourer, Murcott and Imperial mandarins.

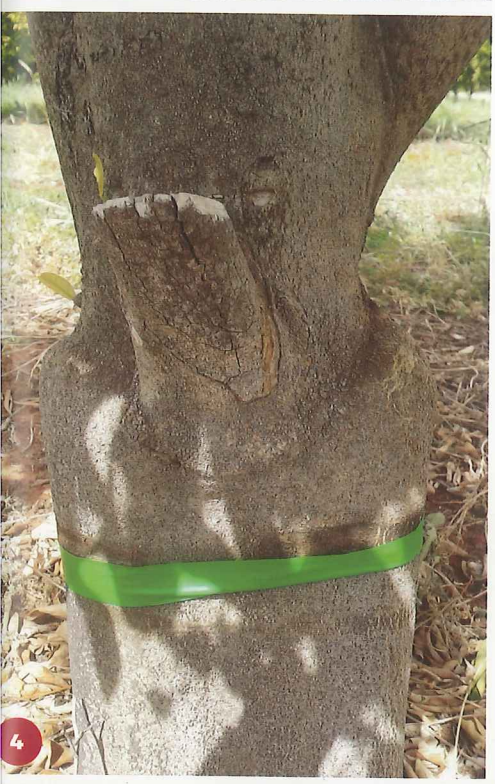
The recommendation developed from revisiting the trials at Loxton is that there are some concerns with most of these varieties, and Navelina should definitely not be propagated to C35 citrange.

Incompatibility symptoms with Navelina did not appear until trees were around 12 years of age, but when they did they led to widespread tree death.

Single rows of C35 were also included in commercial navel blocks at Dareton Research Station, NSW between 2002 and 2005, as well as under a range of new citrus varieties from 2005 to the present.

The Dareton plantings are not currently showing any signs of incompatibility on 13 year old Atwood and 12 year old Cara Cara navels. The budwood used to propagate these trees was from Auscitrus and of high health status. Tree size difference between C35 and Troyer/Carrizo citranges in these plantings is minimal, with the strongest and most noticeable effect apparent in a 15 year old Hockney navel planting.





1. Bud union of 6 year old Tango mandarin on C35 rootstock at Dareton
2. Bud union of 10 year old IRM2 low seed Murcott mandarin on C35 rootstock at Dareton
3. Bud union of 13 year old Atwood navel on C35 rootstock at Dareton
4. Bud union of 13 year old Afourer mandarin on C35 rootstock at Loxton
5. Bud union of 18 year old Navelina navel on C35 rootstock at Loxton

Some risks are involved with the use of C35 citrange rootstock.

The Hockney variety was carrying at least one viroid when propagated and this appears to have reduced the tree size by approximately 30% on C35 rootstock in comparison to the adjacent C32 and Troyer citrange rows. Yield and fruit size information was collected over four seasons from these rows, with C32 and Troyer citrange rows yielding significantly more fruit than the C35 row. An increased tree density of at least 20% would be required to give a cumulative yield equivalent to that of the adjacent C32 and Troyer citrange rows.

Hockney navel is an old South Australian selection which was included in a navel evaluation trial at Dareton in 1992. It has naturally large fruit size and was carrying several viroids which have been gradually eliminated from the mother tree source. Summer Gold navel also did not have a high health status source when propagated for both the Loxton and Dareton trials. So a factor in the long term performance of C35 citrange could be related to the health status of the variety grafted onto this rootstock.

New citrus mandarin and orange varieties established at Dareton since 2005 have been propagated on Troyer citrange, Swingle citrumelo, Trifoliate orange, Cleopatra mandarin, C35 citrange and Volkameriana rootstocks.

All this budwood is ex Australian Post Entry Quarantine and supplied for evaluation as high health status by Auscitrus. No problems have been observed in any of these trees on C35 citrange to date.

C35 is a relatively new rootstock with some conflicting results from small scale research trials. Some risks are involved in its larger scale commercial use in Australia until more performance data is available. The use of high health status budwood supplied by Auscitrus is recommended when using C35 citrange rootstock.

MORE INFORMATION
The work with C35 rootstock at Dareton was originally funded under Horticulture Australia Limited (HAL). The current work is funded by Hort Innovation using the citrus R&D levy with co-investment from NSW Department of Primary Industries and funds from the Australian Government. The project which revisited the Loxton trials was funded by the SA State Government and the Commonwealth Government through the Industry-led Research Sub Program (IRSP) of the South Australian River Murray Sustainability (SARMS) program, under project number IRSP-R1-008.