

## 'Bitters', 'Carpenter' and 'Furr' Trifoliolate Hybrids: Three New Citrus Rootstocks

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'Bitters', 'Carpenter' and 'Furr' trifoliolate hybrids, tested as C22, C54, and C57 respectively, are three new citrus rootstocks released in August 2009 by the University of California Riverside. These three rootstocks are hybrids of Sunki mandarin x Swingle trifoliolate orange originally produced by the USDA breeding program at Indio, and later selected and tested by the University of California, Riverside. As rootstocks for citrus, they produce good quality fruit on small ('Bitters') or medium-large ('Carpenter' and 'Furr') trees. They all show good tolerance to Citrus tristeza virus (CTV), but vary in their tolerance of *Phytophthora* and nematodes. They all produce uniform seedlings due to high levels of nucellar embryony, and are graft compatible with sweet orange, Lisbon lemon and grapefruit. They also appear compatible with mandarins based on observation of 11 year-old satsuma and Pixie trees. In the nursery, seedlings of all three have more branches than seedlings of 'Carrizo' or 'C35'. An important attribute of 'Bitters' is that it is relatively tolerant to calcareous soils. Budwood will be available from the Citrus Clonal Protection Program in September 2009.

'Bitters' produces a small tree, with high yield relative to canopy volume. Young trees on this rootstock showed good tolerance to freezing. Fruit quality of late navels was good and granulation was no worse than fruit on 'Carrizo' or 'C35'. It is tolerant to CTV, moderately tolerant to *Phytophthora parasitica*, not very tolerant of citrus nematode, and very tolerant of calcareous soil. 'Bitters' is considered promising as a replacement for sour orange rootstock for grapefruit in Texas.

'Carpenter' produces medium to large trees, with good yield. Young trees on this rootstock showed moderate tolerance to freezing. Fruit quality of late navels was good and granulation was no worse than fruit on 'Carrizo' but was slightly worse than on 'C35'. It is tolerant to CTV, moderately tolerant to *P. parasitica*, very tolerant of citrus nematode, and moderately tolerant of calcareous soil. Trees on 'Carpenter' produced high yields in a trial in Florida.

'Furr' produces medium to large trees, with good yield. Young trees on this rootstock showed good tolerance to freezing. Fruit quality of late navels was good and granulation was no worse than fruit on 'Carrizo' or 'C35'. It is tolerant to CTV, very tolerant to *P. parasitica*, very tolerant of citrus nematode, and moderately tolerant of calcareous soil. In most trials trees on 'Furr' produced more suckers than trees on 'Carrizo', 'C35', 'Bitters', or 'Carpenter'.

Budunions of 16-year-old trees of Lane Late navel orange on three rootstocks at Lindcove Research and Extension Center.



Bitters



Carpenter



Furr

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