sinensis × *Poncirus trifoliata*), 'Swingle' citrumelo (*Citrus paradisi* × *P. trifoliata*), 'US-852' (*Citrus reticulata* 'Changsha' × *P. trifoliata* 'English Large'), 'US-812' (*C. reticulata* 'Sunki' × *P. trifoliata* 'Benecke'), 'US-897' (*C. reticulata* 'Cleopatra' × *P. trifoliata* 'Flying Dragon'), 'US-802' (*Citrus grandis* 'Siamese' × *P. trifoliata*), and 'US-942' (*C. reticulata* 'Sunki' × *P. trifoliata* 'Flying Dragon'), each have some strong attributes that prompted their release and commercial interest, including outstanding performance in field trials with commercial scion cultivars. Although information about each rootstock was provided during release, in many cases only limited information was available comparing the seven rootstocks because they were developed in different eras or tested in different trial locations. In this study, we compare the nursery characteristics, susceptibilities to disease, and performance of the seven rootstocks under a range of different field conditions. Although all seven rootstocks induce good scion fruit productivity under some conditions, the large differences in effect on scion vigor and tolerance of biotic and abiotic stresses, result in each rootstock having a different ideal niche for commercial use.

S18O04

The evaluation of Chinese rootstock for tree growth, yield and quality of 'Lane Late' oranges grown in Australia

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This paper reports on the short term performance of a range of new rootstocks imported from China. The experimental program was conducted at the Dareton Primary Industries Institute, New South Wales Department of Primary Industries beginning in 1997. A detailed data is presented from a 'Lane Late' trial which was propagated on to a range of rootstock treatments including *Citrus reticulata*, *Poncirus trifoliata*, *P. trifoliata* hybrid, *Citrus junos*, *Citrus erythrosa*, *Citrus aurantium* hybrid, *P. trifoliata* ('Tri22' Australian strain), *Citrus sinensis* and (*C. sinensis* x *P. trifoliata*). The Australian standard 'Tri22' was used for comparison purposes. This trial was established in October 1999 to evaluate the horticultural performance of new rootstocks established from single-node cuttings with a 'Lane Late' scion. Six years of data (2002-2007) were collected on tree growth, fruit yield and quality to identify superior rootstocks for the next phase of semi commercial plantings. Chinese *P. trifoliata* type, 'Houpi' and 'Zao Yang' resulted in higher cumulative yields of 127 kg/tree and 115 kg/tree, respectively compared to 81 kg/tree for the control ('Tri22'), and yield efficiencies of 2.4 and 3.2 kg/cm2, respectively compared to 2.5 kg/cm2 were produced. 'Houpi' had a large trunk circumference of 26 cm compared to 'Tri22' while 'Zao Yang' had a similar trunk circumference of 20 cm compared to 'Tri22'. Data on tree growth, fruit quality and fruit size distribution are presented for all other rootstocks.

S18O05

Dwarfing rootstocks for 'Valencia' sweet orange

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The Brazilian and other citrus industries will likely require, among other technologies, the use of rootstocks that are suitable for higher planting densities with high production efficiency of high quality fruits and tolerant to abiotic and biotic stresses. Considering this approach, hybrid rootstocks have been obtained by the Citrus Breeding Program of Embrapa Cassava & Fruits, in Cruz das Almas, Bahia State, Brazil. One experiment evaluating the first three commercial crops of 'Valencia' sweet orange budded on several genotypes in Colômbia, São Paulo State, Brazil, indicated that the hybrids 'TSKC ('Sunki' mandarin) x [LCR ('Rangpur' lime) x TR (trifoliate orange)] – 059', 'TSKC x CTSW ('Swingle' citrumelo) – 033', 'TSKC x CTSW – 041', 'LCR x TR – 001', 'HTR (trifoliate hybrid) – 051', 'HTR – 053' and 'HTR – 069' allowed planting densities higher than those

attained with the use of the traditional rootstocks 'Rangpur' lime and 'Sunki' mandarin. They also induced higher production efficiency of fruits with higher or equivalent quality in comparison to fruits on 'Rangpur' lime, which is the usual rootstock in Brazil. Additionally, 'TSKC x (LCR x TR) – 059' and 'LCR x TR – 001' induced higher tolerance to drought, with results similar to 'Rangpur' lime, and the first hybrid also anticipated fruit bearing of the scion variety. In spite of not being dwarfing rootstocks, the hybrids 'TSKC x CTTR ('Troyer' citrange) – 002' and 'TSKC x CTSW – 028', as well as 'Rangpur' lime selection 'CNPMF-03', 'Sunki Tropical' mandarin and 'Indio' and 'San Diego' citrandarins performed well.

S18O06

The development of improved tetraploid citrus rootstocks to facilitate advanced production systems and sustainable citriculture in Florida

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The 10 billion dollar/year Florida citrus industry is now under siege by an insect vectored bacterial disease Citrus Greening, also known as Huanglongbing (HLB). Genetic resistance to HLB is not present in commercial scion or rootstock cultivars. A possible mid-term solution to this problem is to shorten the grove rotation and time to profitability by adapting open hydroponics systems (OHS) or other similar evolving production systems to Florida conditions. Such systems that feature high density plantings being developed will require improved tree-size controlling rootstocks that bear early and produce good yields of fruit with juice of high quality. We have been exploring somatic hybridization of complementary diploid rootstocks via protoplast fusion to generate allotetraploid rootstock candidates, and more recently we have been conducting rootstock breeding at the tetraploid level by crossing superior somatic hybrids. Preliminary testing suggests that tetraploid rootstock candidates from both of these sources have potential to facilitate the success of new production systems, as selected allotetraploid rootstocks generally exhibit good soil adaptation, disease resistance, nursery and young tree growth, and also a strong tendency to reduce tree size. A major rootstock trial is underway that features high planting densities and a production system that mimics the principles of OHS, with a goal of identifying superior rootstocks for use in advanced production systems. This trial includes selected somatic hybrids, tetrazygs, diploid hybrids and controls, with trees being grown using slow release fertilizer and daily short-duration microjet irrigation. Yield and fruit quality data from this and other trials will be presented, as there are significant rootstock affects on both parameters. The best somatic hybrid and 'tetrazyg' rootstocks will be highlighted. The unexpected reduced impact of HLB in the trial will also be discussed.

S18O07

Citrus macrophylla rootstock improves the performance of 'Mexican' lime trees on citrus interstocks in calcareous soils

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Most lime orchards are planted using Mexican lime (ML) (*Citrus aurantifolia*) trees budded on 'Alemow' (ALE) (*Citrus macrophylla*) vigorous rootstocks on calcareous soils in México. Citrus tree size can be reduced using *Poncirus trifoliata* and hybrid rootstocks which are not well adapted to calcareous soils. The effect of different citrus rootstocks used as interstocks on growth and yield of ML trees was determined during 10 years in Tecomán, Col., México. The purpose was to reduce the tree size of ML/ALE combinations to increase the plant densities on calcareous soils to mitigate the impact of HLB disease. Twenty one different interstocks between ML scion and ALE rootstock and the control (ML/ALE) were evaluated. Sixteen trifoliate genotypes, four mandarins types and *Severinia buxifolia* (SB) were included as interstocks. ML trees on FDT and 'Hiryu' trifoliate orange interstocks reduced by over 40% the canopy volume compared to the control. Also FDT and 'Hiryu' showed the greatest interstock tree trunk, followed by many citranges. Average ML yield during the first five years ranged from 80.8-117.1 kg/tree/year. SB and 'Morton' citrange as interstocks obtained the