

orchard systems 2012

10th International
Symposium on
Orchard Systems

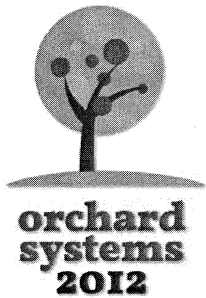
Stellenbosch
South Africa
3 - 6 December
2012

Programme
& *abstract book*



DANILLO CABRERA, 2012

10th International Symposium on Orchard Systems



**Stellenbosch South Africa
3 - 6 December 2012**



Dear Participant

Welcome to the 10th International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems. Our aim was to bring international scientists and other stakeholders involved in diverse aspects of fruit tree orchards together to provide a platform that will promote communication, collaboration and the sharing of knowledge and expertise for the benefit of all.

We hope you will have a fruitful experience.

Karen Theron

Karen Theron

ORGANISING COMMITTEE

Karen Theron
Convenor
Elmi Lötze
Wiehann Steyn
Nigel Cook
Gustav Lötze
Pierre du Plooy
Graeme Krige
Mike North
Piet Stassen
Erin Morkel
Retha Venter

SCIENTIFIC COMMITTEE

Karen Theron
Convenor
Michael Blanke
Tiziano Caruso
Nigel Cook
Luca Corelli-Grappadelli
Tom Deckers
Ted DeJong
Pierre-Eric Lauri
Gennaro Fazio
WG Chair: Rootstock, breeding & evaluation
Alan Lakso
Elmi Lötze
Gustav Lötze
Mike North
Frank Maas

John Palmer
WG Chair: Environmental Physiology of Fruit Crops
Stefano Musacchi
Ron Perry
Gabino Reginato
Greg Reighard
Terence Robinson
Michael Schmeisser
Wiehann Steyn
Stuart Tustin
WG Chair: Orchard and Plantation Systems
Piet Stassen
Ken Tobutt
Jeff Verammen
Matthew Whiting
Jens Wünche

AN EFFECTIVE *IN VITRO* METHOD TO ROOT THE PEAR ROOTSTOCK PYRIAM

Lucienne E. Mansvelt and L. Watts

ARC Institute for Wine, Vine and Fruit, Private Bag X5026, Stellenbosch 7599, South Africa
mansveltl@arc.agric.za

The rootstock Pyriam is a seedling from an open-pollinated pear (*Pyrus communis* L.) cv. Old Home and is an alternative for the pear rootstocks BP 1 or 3. Pyriam has a good capacity for yield and is best adapted in calcareous soils. Micropropagation of pear rootstocks has been described, and each rootstock has its unique micropropagation medium requirements. Therefore, the aim of this investigation was to develop *in vitro* rooting of shoots, which is a critical step in the micropropagation of woody plants that affects the transplantation and evaluation of the plants in the field. *In vitro* shoots of the pear rootstock, Pyriam, were proliferated on LPS medium supplemented with 4.44 μM BA and 0.49 μM IBA, 3 % sucrose and 0.7 % agar. Root induction was attempted by excising shoots and transferring them to the rooting medium (1/2 MS macro- and micro salts, 120 mg FeEDDHA, 5 mM L-glutamine, 1.185 μM mg/l thiamin-HCl, 0.555 mM myo-inositol, 0.4 μM GA₃, 1 % glucose and 0.65 % agar). The pH was adjusted to 5.2 before autoclaving. The effects of various concentrations of IBA (1.48, 1.97, 2.46 or 2.95 μM) on root induction were examined, and IBA was added before the medium was autoclaved. Roots started to develop from 10 days after root induction and were completed after 4 weeks. Rooting varied between 72% and 92% for the different IBA concentrations, and the best was at 2.46 μM IBA resulting in 92% rooting with 4 roots per explant.

MUME CLONES AS ROOTSTOCKS FOR 'AURORA-1' PEACH IN SÃO PAULO STATE, BRAZIL, AND PLANTING DENSITY

Newton Alex Mayer¹ and Fernando Mendes Pereira² and Gregory Reighard³

¹Embrapa Clima Temperado, BR 392, km 78, Caixa Postal 403, CEP 96010-971, Pelotas-RS, Brazil
alex.mayer@cpact.embrapa.br

²Universidade Estadual Paulista (UNESP), Faculdade de Ciências Agrárias e Veterinárias (FCAV), Departamento de Produção Vegetal, Via de Acesso Prof. Paulo Donato Castellane, s/n, CEP 14884-900, Jaboticabal, SP, Brazil pereira_fernando@terra.com.br

³Clemson University, SAFES, E-170 Poole Ag. Center, BOX 340310, Clemson, SC 29634, USA grghrd@clemson.edu

Dwarf rootstocks allow high density peach (*Prunus persica*) orchards and increase productivity. Since 1998, a research project has been carried out at the Faculdade de Ciências Agrárias e Veterinárias (FCAV/UNESP), Jaboticabal Campus, Brazil, involving mume clones (*Prunus mume*) as rootstocks for peach tree. In this research, two mume genotypes ('Clone 15' and 'Rigitano'), propagated by softwood cuttings were tested as rootstocks for 'Aurora-1' peach, in three spacing: 6m x 2m, 6m x 3m and 6m x 4m. The experiment was carried out under field conditions, in Vista Alegre do Alto (21°10'14" S, 48°37'45" W, 700 m of altitude), São Paulo State, Brazil. The region has mild winter with average accumulation of temperatures ≤ 7.0 °C of 17.9 hours per year. The evaluations were realized in 2005 and 2006 (2nd and 3rd year after planting, respectively). Rootstocks did not influence any of the evaluated variables (number of mixed branches/plant, fruit number/branch before and after fruit thinning, e.g.). The transversal fruit diameter was larger and productivity/ha higher in 6m x 2m space compared to 6m x 4m, in both years. In 2006, in spite of relative humidity being lower than the historical average of the region, the 6m x 2m space had the best results, with higher number of mixed branches/plant, fruiting, sprouting, longitudinal fruit diameter and yield/plant. The 6m x 2m space can be recommended for peach culture in this area. No incompatibility symptoms were found between rootstocks and scion, which makes possible the use of 'Rigitano' and 'Clone 15' as rootstocks for peach cv. 'Aurora-1'.

PRUNUS ROOTSTOCKS INFLUENCE STEM WATER POTENTIAL, C/N RATIO AND SHOOT ASH CONTENT IN PEACH

Newton Alex Mayer¹, Gregory Reighard², William Bridges² and Michael Glenn³

¹Embrapa Clima Temperado, BR 392, km 78, Caixa Postal 403, CEP 96010-971, Pelotas-RS, Brazil
alex.mayer@cpact.embrapa.br

²Clemson University, SAFES, E-170 Poole Ag. Center, BOX 340310, Clemson, SC 29634, USA
grghrd@clemson.edu

²Department of Mathematical Sciences, Martin O-117 wbrdgs@clemson.edu

³USDA-ARS-AFRS, 2217 Wiltshire Road, Kearneysville, WV 25430, USA michael.glenn@ars.usda.gov

Many peach rootstocks have been released in recent years with limited information about their physiological effects on scion vigor and productivity. In this study, two trials were established with 'Redhaven' on 9 (planted 2006) and 18 (planted 2009) rootstock cultivars, at the Musser Fruit Research Center, Seneca, South Carolina. A stem water potential (SWp) curve was developed with a Scholander pressure bomb on a single day ~ 6 weeks after harvest (August, 2011) with hourly evaluations between 5:00 and 20:00 on a 'Redhaven'/Lovell tree. The maximum negative SWp occurred at ~16:00. For each trial, SWp readings were done with three leaves per tree and 4 reps (single tree plots), before dawn and in the afternoon (~16:00, based on the SWp results). Carbon (C), nitrogen (N) and ash content analyses were done on 1-year-old shoots (5 per tree, 30cm-long, without buds), at the beginning of dormancy in November, 2011. Rootstocks influenced all variables studied in both trials. Trees that were more stressed (high negative SWp) before dawn were also more stressed in the afternoon (i.e., rootstocks *Prunus munsoniana* and *Empyrean*³). A similar pattern was observed for those trees/rootstocks with less negative SWp (i.e., *Prunus americana*, Fortuna and KV010127) predawn remained less negative in the afternoon. There was no correlation between SWp and C, N, C/N ratio or shoot ash content. Negative correlations were detected between C/N ratio and ash content. There was a positive correlation between N and ash content. These data suggested that SWp was not a reliable method to predict C, N or ash content accumulation in 1-year-old peach shoots from trees grown on many different rootstock genotypes.

INFLORESCENCE TYPE AND FRUIT SET IN 'VALENCIA' ORANGE TREES AFTER WINTER DROUGHT STRESS

J.C. Melgar¹ and J.P. Syvertsen²

¹Texas A&M University - Kingsville, Citrus Center, Weslaco, TX 78596 USA

²CREC, University of Florida-IFAS, Lake Alfred, FL 33850 USA jmsn@ufl.edu

Leafy inflorescences in citrus have been reported to favor higher fruit set and fruit persistence than leafless inflorescences. In subtropical humid climates like Florida, drought stress during winter may be used as a management strategy to delay flowering in late-season sweet orange cultivars destined for late-season mechanical harvesting to avoid the loss of young fruit from next year's crop. We studied the effects of winter time drought stress treatments on the ratio of young leaves to open flowers and fruit set to assess treatment effects on yield. During 3 consecutive winter seasons (2007-2009), three irrigation treatments were applied to 13- to 15-year-old 'Valencia' trees: 1. Drought, no irrigation and rain shield groundcover; 2. Rain only, no irrigation, no cover; and 3. Well-irrigated, normal irrigation plus rain and no cover. In spring after 100 days of treatment, covers were removed and all trees were well-watered and fertilized. Previously drought-stressed trees had fewer open flowers than well-irrigated trees in 2007 and 2009 but not in 2008 which may have been a consequence of the previous drought stress increasing alternate bearing. Previously drought stressed trees had more leafless inflorescences and fewer leafy shoots without flowers than well-irrigated trees. The young leaf / open flowers ratios on drought-stressed trees were 1.3-3.6 fold higher than on well-irrigated trees in 2007 and 2009. However, fruit number and yield in 2007 and 2009 were not significantly different between drought-stressed and well-irrigated trees, confirming the higher fruit set in drought-stressed trees than in well-irrigated trees.

DELEGATE LIST

Al Masrori, Hilal	Royal Court Affairs	Oman	hmamasrori@rca.gov.om
Avenant, Eunice	South African Table Grape Industry	South Africa	eunice@satgi.co.za
Avenant, Jan	ARC Infruitec-Nietvoorbij	South Africa	avenantj@arc.agric.za
Bezuidenhout, Karien	ARC Infruitec-Nietvoorbij	South Africa	lubbec@arc.agric.za
Biddlecombe, Tim	Farm Advisory Services Team	United Kingdom	tim.biddlecombe@fastltd.co.uk
Bijzet, Zelda	ARC Institute for Tropical and Subtropical Crops	South Africa	zeldab@arc.agric.za
Black, Brent	Utah State University	USA	brent.black@usu.edu
Blanke, Michael	Bonn University	Germany	mdblanke@uni-bonn.de
Booi, Sonwabo	ARC Infruitec-Nietvoorbij	South Africa	boois@arc.agric.za
Bortoluz, Leandro	Proterra Engenharia Agronomica	Brazil	lebortoluz@proterra.agr.br
Breen, Ken	Plant and Food Research	New Zealand	ken.breen@plantandfood.co.nz
Brink, Daan	Two-a-Day	South Africa	daan@tad.co.za
Bujdosó, Geza	Research Institute for Fruit Growing	Hungary	geza.bujdoso@uni-corvinus.hu
Cabrera Bologna, Danilo	National Agricultural Research Institute	Uruguay	dcabrera@inia.org.uy
Campbell, Hugh	Fruitgro Science	South Africa	hugh@fruitgro.co.za
Caruso, Tiziano	Universita degli Studi di Palermo	Italy	tiziano.caruso@unipa.it
Chavez, Carlos	University of Chihuahua	Mexico	carlos.chavez@unifrut.org.mx
Close, Dugald	Tasmanian Institute of Agriculture	Australia	dugald.close@utas.edu.au
Colombo, Rodrigo	Caxias do Sul University	Brazil	rodrigocolombo1310@hotmail.com
Corelli-Grappadelli, Luca	University of Bologna	Italy	luca.corelli@unibo.it
Corral Perez, Salvador	Grupo La Nortenita	Mexico	salvadorcorral@gpoln.com
Costa, Carlo	ARC Infruitec-Nietvoorbij	South Africa	costac@arc.agric.za
Costa, Guglielmo	University of Bologna	Italy	guglielmo.costa@unibo.it
Couto, Marcelo	Epagri	Brazil	marcelocouto@epagri.sc.gov.br
Cronje, Paul	Citrus Research International	South Africa	paulcronje@sun.ac.za
Dal Piaz, Marcos	Frutival	Brazil	marcos@frutival.com.br
Dalazen Machado, Bruno	University of Santa Catarina State	Brazil	brunodalazen@hotmail.com
Dallabetta, Nicola	Fondazione Edmund Mach	Italy	nicola.dallabetta@fmach.it
De Salvador, Flavio	Fruit Tree Research Centre	Italy	fr.desalvador@gmail.com
DeJong, Theodore	University of California, Davis	USA	tmdejong@ucdavis.edu
Dekena, Dzintra	Latvia University of Agriculture	Latvia	dzintra.dekena@puresdis.lv
Derossi, Marcos	Agropecuaria Schio	Brazil	lebortoluz@proterra.agr.br
Dreyer, Carlien	Two-a-Day	South Africa	carlien@tad.co.za
Elkins, Rachel	University of California, Davis	USA	rbelkins@ucanr.edu
Fallahi, Esmaeil	University of Idaho	USA	efallahi@uidaho.edu
Farrow, Rod	Lamont Fruit Farm	USA	rodf12786@aol.com
Fazio, Gennaro	Cornell University	USA	gf35@cornell.edu
Fernández-Fernández, Felicidad	East Malling Research	United Kingdom	felicidad.fernandez@emr.ac.uk
Ferreira, Nico	Two-a-Day	South Africa	nico@tad.co.za
Fideghelli, Carlo	CRA-FRU	Italy	carlo.fideghelli@entecra.it
Forqani, Ali	Royal Court Affairs	Oman	forqani@yahoo.com
Frias, Mauricio	Consoltora San Francisco	Chile	mauricio@scsf.cl
Friend, Adam	Plant and Food Research	New Zealand	adam.friend@plantandfood.co.nz
Gardner, Robin	ICFR	South Africa	robin.gardner@icfr.ukzn.ac.za
Gucci, Riccardo	Università di Pisa	Italy	rgucci@agr.unipi.it
Han, Zhenhai	China Agricultural University	China	rschan@cau.edu.cn
Hemly, Doug	Greene and Hemly	USA	doug@greeneandhemly.com
Heydenrych, Ernst	Oak Valley Estate	South Africa	mail@oak-valley.co.za
Hildebrand, Claus	Consortium Dt. Baumschulen	Germany	claus-hildebrand@t-online.de
Ionesca, Mirela	University of Agronomic Sciences and Veterinary Medicine	Romania	f1stanica@yahoo.co.uk
Kinawy, Magdi	Royal Court Affairs	Oman	kinawy@hotmail.com
Korbin, Małgorzata	Research Institute of Horticulture	Poland	malgorzata.korbin@inhort.pl
Kretschmar, Aike	University of Santa Catarina State	Brazil	aikeanneliese@yahoo.com.br
Krige, Graeme	Two-a-Day	South Africa	graeme@tad.co.za
Kviklys, Darius	Institute of Horticulture	Lithuania	dkviklys@gmail.com
Lakso, Alan	Cornell University	USA	anl2@cornell.edu
Lampinen, Bruce	University of California, Davis	USA	bdlampinen@ucdavis.edu
Lang, Gregory	Michigan State University	USA	langg@msu.edu
Laubscher, Hannes	DuToit Group	South Africa	hannes@dutoit.com
Lauri, Pierre-Éric	INRA	France	lauri@supagro.inra.fr
Leite, Gabriel	Epagri	Brazil	gabriel@epagri.sc.gov.br
Lepsis, Janis	Pure Horticultural Research Centre	Latvia	janis.lepsis@puresdis.lv
Lewandowski, Mariusz	Research Institute of Horticulture	Poland	mariusz.lewandowski@inhort.pl

Li, Tianhong	China Agricultural University	China	lith@cau.edu.cn
Lopez Velasco, Gerardo	IRTA	Spain	gerardo.lopez@irta.es
Losciale, Pasquale	University of Bologna	Italy	plosciale@agrsci.unibo.it
Lotzé, Elmi	Stellenbosch University	South Africa	elotze@sun.ac.za
Lotzé, Gustav	Stellenbosch University	South Africa	gfal@sun.ac.za
Louw, Esmé	Stellenbosch University	South Africa	esmelouw@sun.ac.za
Maas, Frank	Wageningen University	Netherlands	frank.maas@wur.nl
Mac an tSaoir, Seán	Agri-food and BioSciences Institute	N Ireland	sean.macantsaoir@afbini.gov.uk
Maguylo, Karen	North Carolina State University	USA	maguylo@gmail.com
Mansvelt, Lucienne	ARC Infruitec-Nietvoorbij	South Africa	mansveltl@arc.agric.za
Mayer, Newton	Embrapa Clima Temperado	Brazil	alex.mayer@cpact.embrapa.br
Meland, Mekjell	Bioforsk	Norway	mekjell.meland@bioforsk.no
Mena Neto, João	Fischer Frutas	Brazil	neto@fischerfrutas.com
Middleton, Simon	Department of Agriculture, Fisheries and Forestry	Australia	simon.middleton@daff.qld.gov.au
Muniz, Janaína	University of Santa Catarina State	Brazil	janainamuniz@gmail.com
Musacchi, Stefano	University of Bologna	Italy	stefano.musacchi@unibo.it
Nel, Buks	Tru-Cape Fruit Marketing	South Africa	ilset@tru-cape.co.za
Normand, Frédéric	CIRAD	France	normand@cirad.fr
North, Michael	ARC Infruitec-Nietvoorbij	South Africa	northm@arc.agric.za
PALMER, JOHN	Plant and Food Research	New Zealand	john.palmer@plantandfood.co.nz
Parker, Michael	North Carolina State University	USA	mlp@ncsu.edu
Perazzolo, Gianfranco	Proterra	Brazil	perazzolo@proterra.agr.br
Petri, José Luiz	Epagri	Brazil	petri@epagri.sc.gov.br
Piccioni, Richard	Cornell University	USA	rmp12@cornell.edu
Platon, Ioan	Bistrița Fruit Research and Development	Romania	scdpbn@yahoo.com
Pretorius, Mias	Two-a-Day	South Africa	mias@tad.co.za
Rabothata, Freddy	ARC Infruitec-Nietvoorbij	South Africa	rabothataf@arc.agric.za
Racsko, Jozsef	Valent BioScience Corp	USA	jozsef.racsko@valentbiosciences.com
Reckziegel, José Maria	Exclusivo Agrofloretal Ltda	Brazil	jmreckziegel@hotmail.com
Reginato, Gabino	Universidad de Chile	Chile	greginat@uchile.clRegicoll@vtr.net
Reighard, Gregory	Clemson University	USA	grghrd@clemson.edu
Reinten, Emmy	ARC Infruitec-Nietvoorbij	South Africa	reintene@arc.agric.za
Reynolds, Schalk	Philagro BioScience Corp	South Africa	schalk.reynolds@philagro.co.za
Robinson, Terence	Cornell University	USA	tlr1@cornell.edu
Rubauskis, Edgars	Latvia State Institute of Fruit Growing	Latvia	edgars.rubauskis@lvai.lv
Rufato, Leo	University of Santa Catarina State	Brazil	leoruffato@yahoo.com.br
Sadeghi, Hossein	Sari University of Agriculture	Iran	sadeghiah@yahoo.com
Sagredo, Karen	Universidad de Chile	Chile	ksagredo@u.uchile.cl
Schmeisser, Michael	Stellenbosch University	South Africa	schmeisser@sun.ac.za
Schmidt, Tory	Washington Tree Fruit Research Commission	USA	tory@treefruitresearch.com
Schumann, Arnold	University of Florida	USA	schumaw@ufl.edu
Serra, Sara	University of Bologna	Italy	sserra@agrsci.unibo.it
Shange, Sthandiwe	ARC Infruitec-Nietvoorbij	South Africa	shanges@arc.agric.za
Simões, Fabiano	University of Santa Catarina State	Brazil	simoes.f@gmail.com
Soldá, Celito	Hiragami's Fruit	Brazil	producao@hiragami.com.br
Stampar, Franci	University of Ljubljana	Slovenia	franci.stampar@bf.uni-lj.si
Stănică, Florin	University of Agronomic Sciences and Veterinary Medicine	Romania	fistanica@yahoo.co.uk
Stanley, Jill	Plant and Food Research	New Zealand	jill.stanley@plantandfood.co.nz
Stassen, Piet	ARC Infruitec-Nietvoorbij	South Africa	stassenp@arc.agric.za
Stehr, Rolf	Fruit Research Station Jork	Germany	rolf.stehr@lwk-niedersachsen.de
Steyn, Wiehann	Fruitgro Science	South Africa	wiehann@fruitgro.co.za
Syvertsen, Jim	University of Florida	USA	jmsn@ufl.edu
Taylor, Nicky	University of Pretoria	South Africa	nicolette.taylor@up.ac.za
Theron, Karen	Stellenbosch University	South Africa	kit@sun.ac.za
Trandafirescu, Marioara	Ovidius University Constanta	Romania	mtrandafirescu@yahoo.com
Tustin, Stuart	Plant and Food Research	New Zealand	stuart.tustin@plantandfood.co.nz
Van Dyk, Burgert	SAPO Trust	South Africa	burgerw@saplant.co.za
Van Hooijdonk, Ben	Plant and Food Research	New Zealand	ben.vanhooijdonk@plantandfood.co.nz
Van Rooyen, Tobie	Techways	South Africa	tobie@techways.co.za
Van Rooyen, Zeldá	Westfalia Technological Services	South Africa	zeldavr@westfalia.co.za
Veberič, Robert	University of Ljubljana	Slovenia	robert.veberic@bf.uni-lj.si
Vercammenn, Jef	Pcfruit-Proeftuin pit- en steenfruit	Belgium	jef.vercammen@pcfruit.be
Voigt, Frederik	SAPO Trust	South Africa	frederik@saplant.co.za
Volschenk, Teresa	ARC Infruitec-Nietvoorbij	South Africa	volschenk@arc.agric.za

Wang, Xiaowei	Institute of Forestry and Pomology	China	wangxia9766@sina.com
Wei, Qin-ping	Institute of Forestry and Pomology	China	szliu1978@163.com
Weibel, Franco	Research Institute of Organic Agriculture, FiBL	Switzerland	franco.weibel@fibl.org
Yao, Yuncong	China Agricultural University	China	yaoyc_20@126.com
Zanato, Cesar Luiz	Proterra Engenharia Agronomica	Brazil	cesar@proterra.agr.br
Zhang, Qiang	Institute of Forestry and Pomology	China	wangxia9766@sina.com
Zhang, Xinzong	China Agricultural University	China	zhangxinzong999@126.com
Zurawicz, Edward	Research Institute of Horticulture	Poland	edward.zurawicz@inhort.pl