

EL PAPEL DE LOS NUEVOS PORTAINJERTOS. CRITERIOS DE ELECCIÓN

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El papel de los nuevos portainjertos

NARANJO AMARGO



TRISTEZA



PHYTOPHTHORA



NEMATODOS



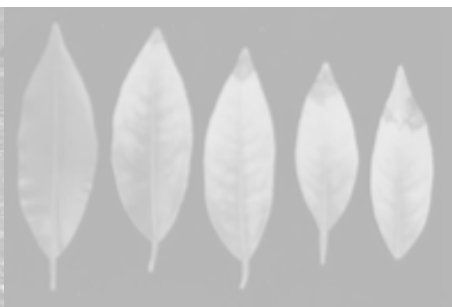
SEQUÍA



MALFORMACIÓN



CLOROSIS



SALINIDAD



ASFIXIA



PRODUCTIVIDAD



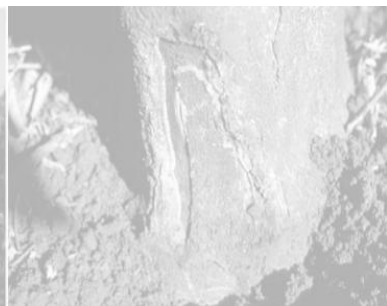
**ÉPOCA
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El papel de los nuevos portainjertos

NARANJO AMARGO ➡ **CARRIZO**



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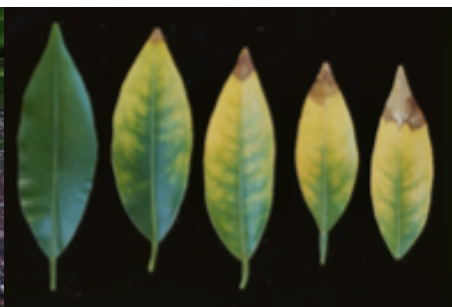
SEQUIA



MALFORMACION



CLOROSIS



SALINIDAD



ASFIXIA



PRODUCTIVIDAD



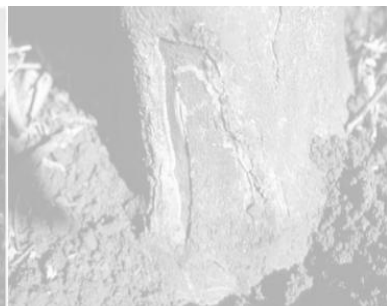
**ÉPOCA
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NARANJO AMARGO ➡ **CARRIZO** ➡ **FORNER-ALCAIDE 5**



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PHYTOPHTHORA



NEMATODOS



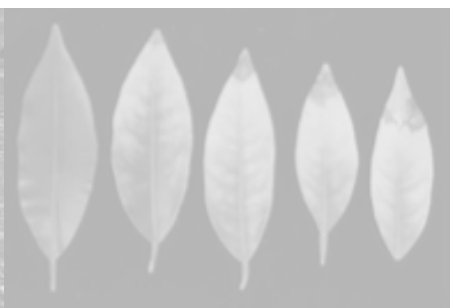
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MALFORMACIÓN



CLOROSIS



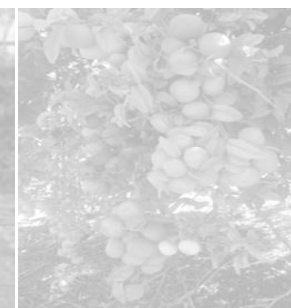
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PRODUCTIVIDAD



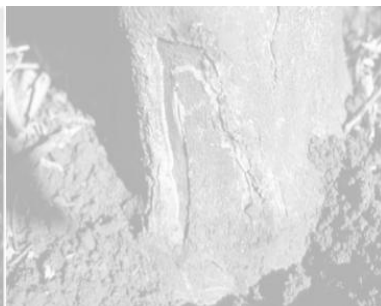
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FUTURO?????



TRISTEZA



PHYTOPHTHORA



NEMATODOS



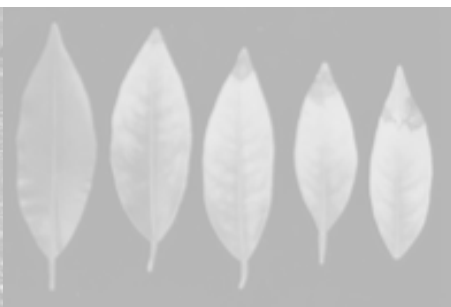
SEQUÍA



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El papel de los nuevos portainjertos



NUEVOS DESAFIOS

❑ ENFERMEDADES

❑ SOSTENIBILIDAD

❑ MERCADOS

El papel de los nuevos portainjertos



NUEVOS DESAFIOS

□ ENFERMEDADES-HLB



Tolerance of trifoliolate citrus rootstock hybrids to *Candidatus Liberibacter asiaticus*

Ute Albrecht, Kim D. Bowman*

U.S. Horticultural Research Laboratory, U.S. Department of Agriculture, Agricultural Research Service, 2001 South Rock Road, Fort Pierce, FL 34945, USA

HortScience 46(1):16–22, 2011.

Tolerance of the Trifoliolate Citrus Hybrid US-897 (*Citrus reticulata* Blanco × *Poncirus trifoliata* L. Raf.) to Huanglongbing

Ute Albrecht¹ and Kim D. Bowman

U.S. Horticultural Research Laboratory, U.S. Department of Agriculture, Agricultural Research Service, 2001 South Rock Road, Fort Pierce, FL 34945



Plant Pathology (2014) 63, 290–298

Doi: 10.1111/ppa.12109

Association of '*Candidatus Liberibacter asiaticus*' root infection, but not phloem plugging with root loss on huanglongbing-affected trees prior to appearance of foliar symptoms

E. G. Johnson¹, J. Wu, D. B. Bright and J. H. Graham

University of Florida, Citrus Research and Education Center (CREC), 700 Experiment Station Road, Lake Alfred, FL 33850, USA

OPEN ACCESS Freely available online



Transcriptional and Microscopic Analyses of Citrus Stem and Root Responses to *Candidatus Liberibacter asiaticus* Infection

Valente Aritua¹, Diann Achor², Frederick G. Gmitter³, Gene Albrigo³, Nian Wang^{1*}

¹ Citrus Research and Education Center, Department of Microbiology and Cell Science, University of Florida, Lake Alfred, Florida, United States of America, ² Citrus Research and Education Center, University of Florida, Lake Alfred, Florida, United States of America, ³ Citrus Research and Education Center, Department of Horticultural Sciences, University of Florida, Lake Alfred, Florida, United States of America

El papel de los nuevos portainjertos



NUEVOS DESAFIOS

ENFERMEDADES-HLB

HortScience 50(11):1731–1734. 2015.

Five New Citrus Rootstocks with Improved Tolerance to Huanglongbing

Kim D. Bowman¹ and Greg McCollum

U.S. Horticultural Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, 2001 S. Rock Road, Fort Pierce, FL 34945

Additional index words: orange, huanglongbing, cultivar, breeding, genetics

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Long-Term Field Evaluation Reveals Huanglongbing Resistance in *Citrus* Relatives

Chandrika Ramadugu, University of California Riverside, Riverside, CA; Manjunath L. Keremane, USDA-ARS, National Clonal Germplasm Repository for Citrus and Dates, Riverside, CA; Susan E. Halbert, Division of Plant Industry, Gainesville, FL; Yong Ping Duan, U.S. Horticultural Research Laboratory, Fort Pierce, FL; Mikeal L. Roose, University of California Riverside; Ed Stover, U.S. Horticultural Research Laboratory; and Richard F. Lee, USDA-ARS, National Clonal Germplasm Repository for Citrus and Dates

Florida Citrus Rootstock Selection Guide, 3rd Edition. William S. Castle, Kim D. Bowman, Jude W. Grosser, Stephen H. Futch, and James H. Graham

Accessions	Rootstock	Year of first avail.	Hort. / Fruit. traits					Tolerances					Pests and Diseases					Tristeza				
			Seed Prop.	Tree Size	Spacing	Yield per Tree	Yield per Acre	Juice Quality	Fruit Size	Salinity	High pH	Clay Soil	Wet Soil	Drought	Freeze	Hail	Blight		Phytoph. threats	If palmox. weed complex	Burrowing Nemat.	Citrus Nemat.
1	6-439 (Cies x Rubidoux T3)	1994	G	Lg	8-12	1	140	HM	1	G	(1)	(2)	(2)	7	3-4	L	7	T	(2)	(3)	7	T
2	C-35 (Phanerogma x T3)	1994	G	L	8-10	1	140	HM	1	(P4)	P	(P)	(1)	7	7	7	7	T+	(2)	(3)	8	T
3	Citrus orange	1932	G	Lg	8-12	1	140	H4T	14g	P	P	1	G	G	14	1	1	(2)	(2)	5	T	
4	Citrus mandarin	1932	G	Lg	8-15	1.4	1	HM	Sm	1	G	P	14	G	1	L	S	7	(2)	5	5	T
5	Citrus orange	1932	G	Lg	8-12	140	140	140	1	G	1	7	7	(2)	(2)	7	1	(2)	(4)	5	(T)	
6	Sour orange	Long established	G	Lg	8-12	140	140	140	1	G	G	G	G	1	G	L	T+	T	7	5	5	
7	Seville orange	1974	G	L	8-12	1	1	1	1	P	P	P	(2)	P4	G	1	T+	5	(2)	8	T	
8	US-602 (Phanerogma x T3)	2007	G	Lg	14	1	140	14g	7	(1)	(2)	(1)	7	G	L	G	T	7	7	7	T	
9	US-612 (Sunki x Rubidoux T3)	2007	G	L	12	1	140	HM	1	7	G	(1)	7	(2)	1	T+	T	(2)	7	7	T+	
10	US-562	2010	G	Sm-1	10	H	140	HM	1	7	(2)	(2)	(2)	(2)	(2)	L	T+	7	7	7	T+	
11	Volkamer lemon	1970	G	Lg	12-15	1	140	L4	Lg	1	T	1	14	G	P	7	5	T	(2)	5	5	T
12	Bitter orange	1986	G	Lg	8-12	1	140	14g	14g	P4	P	(P)	(1)	G	G	7	7	T	(2)	7	7	T
13	Flying Dragon T3	1976	G	Sm	5-7	L4	140	Sm-1	14g	P	P	4	1	P	G	7	P	T	(2)	5	8	T
14	Kinnow	1994	G	L	8-10	1	140	L4	Lg	7	(1)	G	(2)	7	7	7	5	(2)	(2)	7	T+	
15	Kinkab	1986	G	L	8-10	7	140	L4	1	7	(1)	(2)	(2)	7	7	7	T	(2)	(2)	7	T	
16	Rough lemon	Long established	G	Lg	10-15	1	140	L4	Lg	1	G	1	1	G	P	7	5	5	5	5	5	T
17	Bulk orange	1980	G	Sm-1	6-8	1	140	H4T	1	P	P	7	P	(P)	P4	7	(2)	T	(2)	5	7	T
18	Shiveh-e-masdar	1986	G	Lg	8-12	L4	1	140	Sm	14g	1+	G	P	14	G	7	7	5	(2)	5	5	T
19	Smooth Flat Seville	1988	G	Sm-1	6-8	L4	1	140	14g	1+	G	P	(2)	(2)	7	7	5	(2)	5	5	T	
20	Sun Chu Sha mandarin	1988	G	Lg	8-12	L4	1	140	Sm	14g	1+	G	P	(2)	(2)	7	5	(2)	5	5	T	
21	Sweet orange	Long established	G	Lg	10-12	1	140	14g	1	1	1	P	P	1	7	T+	S+	(2)	5	5	T	
22	Trifoliate orange	Long established	G	Sm	6-8	L4	1	140	Sm-1	P	P	G	G	P	14	7	(2)	T+	(2)	5	8	T+
23	US-602 (Changsha x T3)	1999	P	1	12	H	140	HM	1	7	(1)	(1)	7	7	7	1	G	T	(2)	7	7	T
24	US-612 (Sunki x Rubidoux T3)	2004	G	Sm-1	8-12	H	7	HM-1	1	7	G	7	7	7	7	7	1	(2)	7	7	T	
25	C-35 (Phanerogma x Seville T3)	2009	G	Sm-1	6-8	(1)	140	H4	1	7	7	7	7	7	7	7	1	7	7	7	5	1
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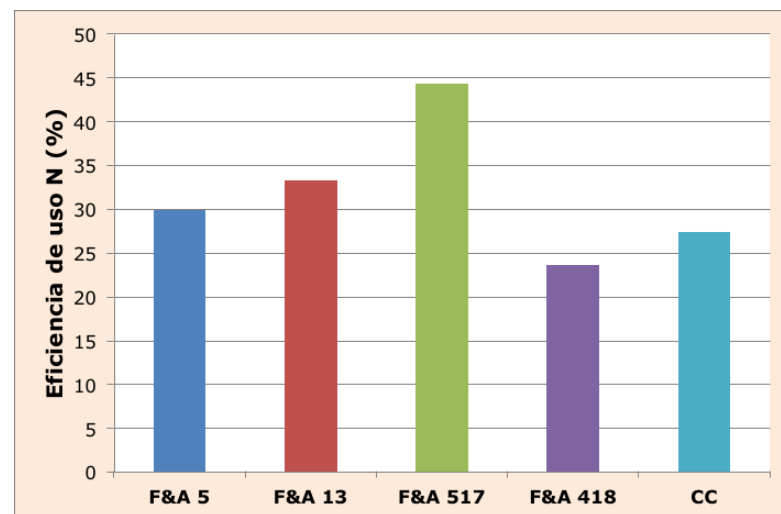
El papel de los nuevos portainjertos



NUEVOS DESAFIOS

□ SOSTENIBILIDAD

➤ Fertilización



El papel de los nuevos portainjertos

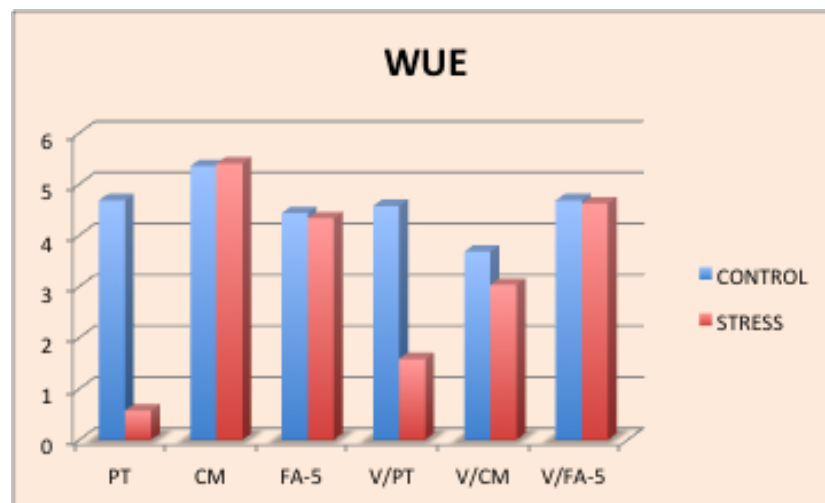


NUEVOS DESAFIOS

□ SOSTENIBILIDAD

➤ Fertilización

➤ Agua



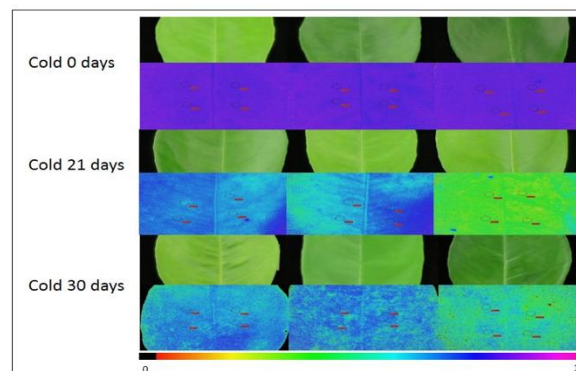
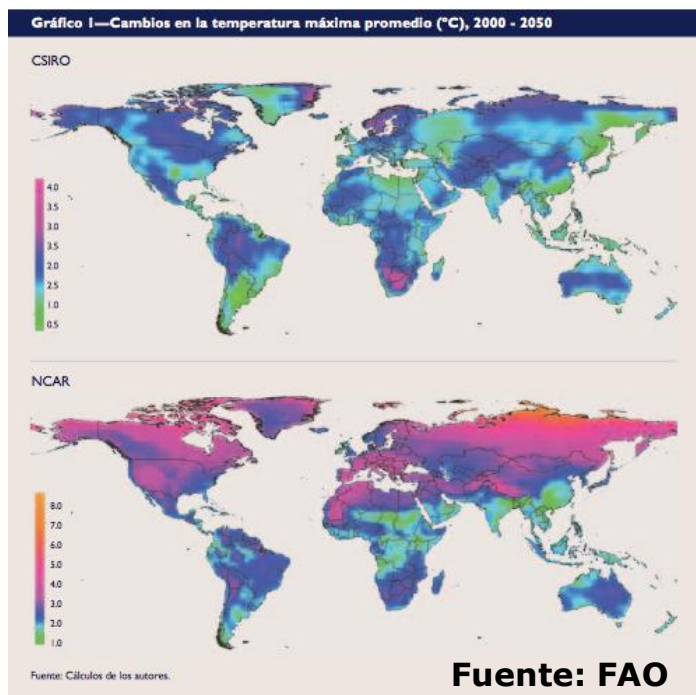
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NUEVOS DESAFIOS

□ SOSTENIBILIDAD

- Fertilización
- Agua
- Temperaturas

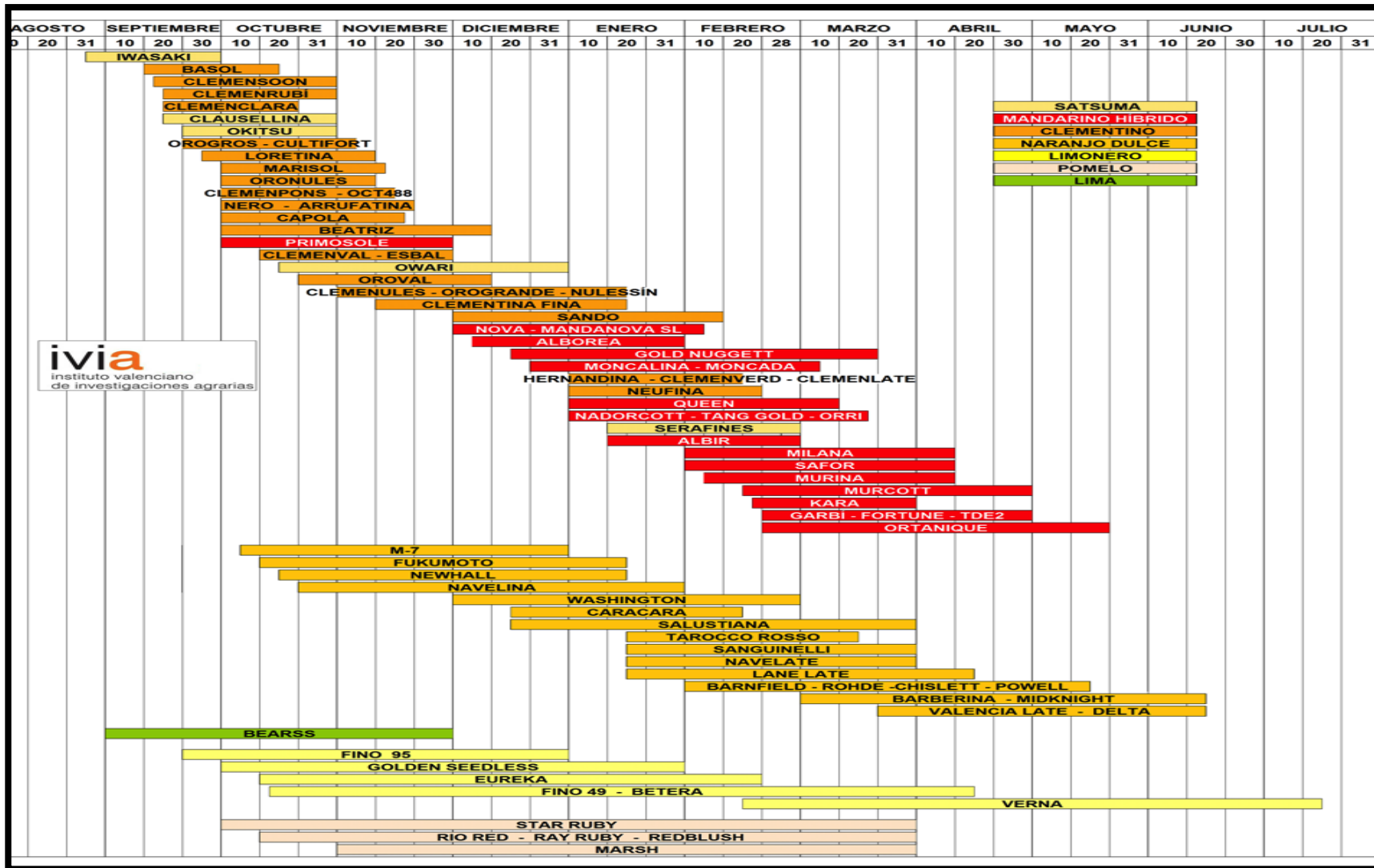




NUEVOS DESAFIOS

❑ MERCADOS

El papel de los nuevos portainjertos



El papel de los nuevos portainjertos

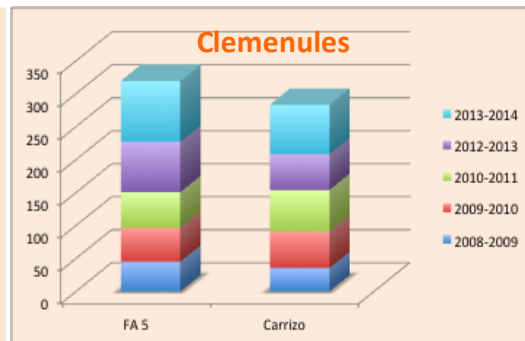
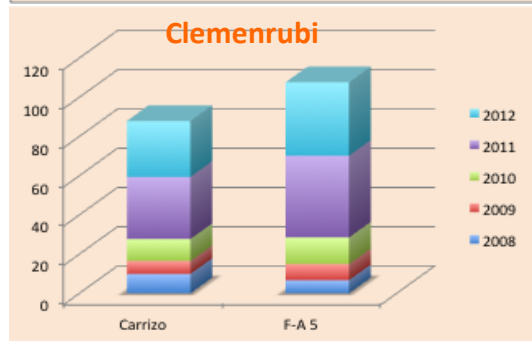
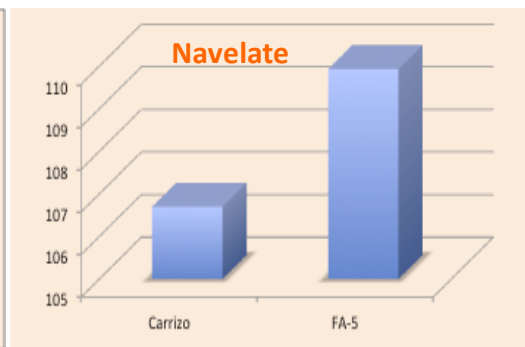
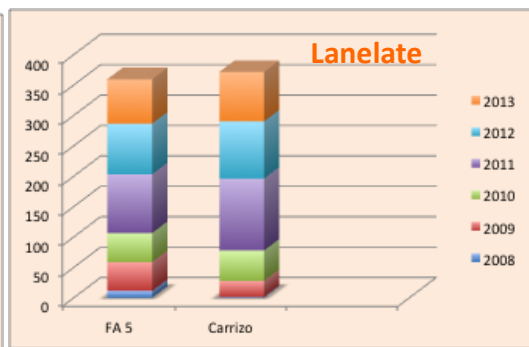
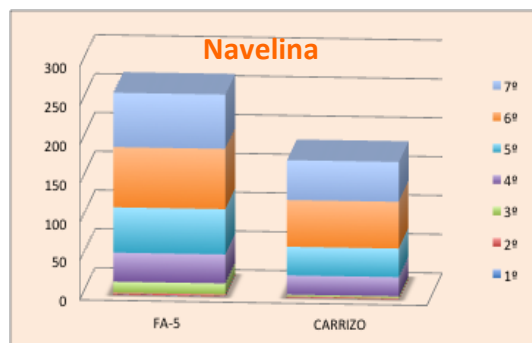


GENERALITAT
VALENCIANA

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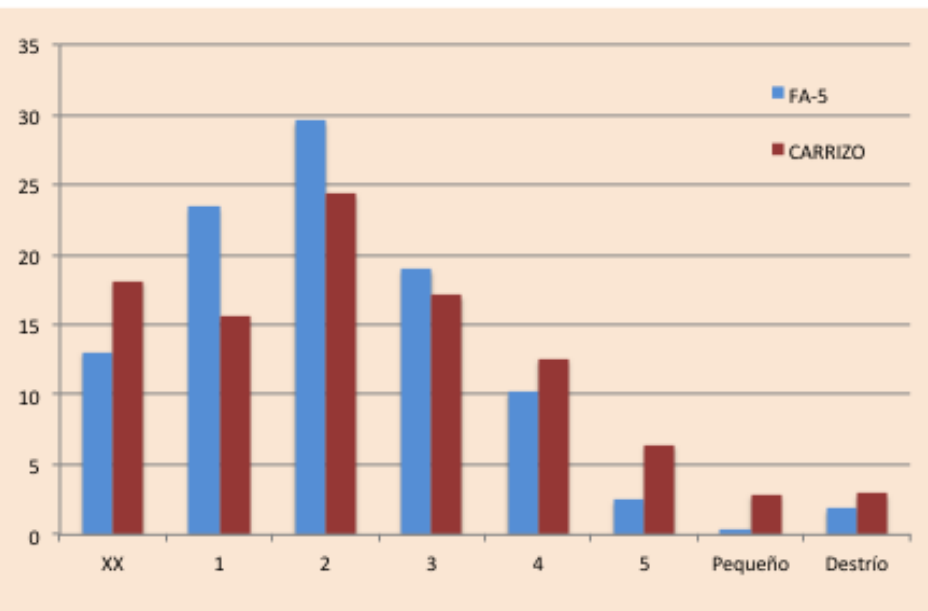
El papel de los nuevos portainjertos

➤ PRODUCTIVIDAD



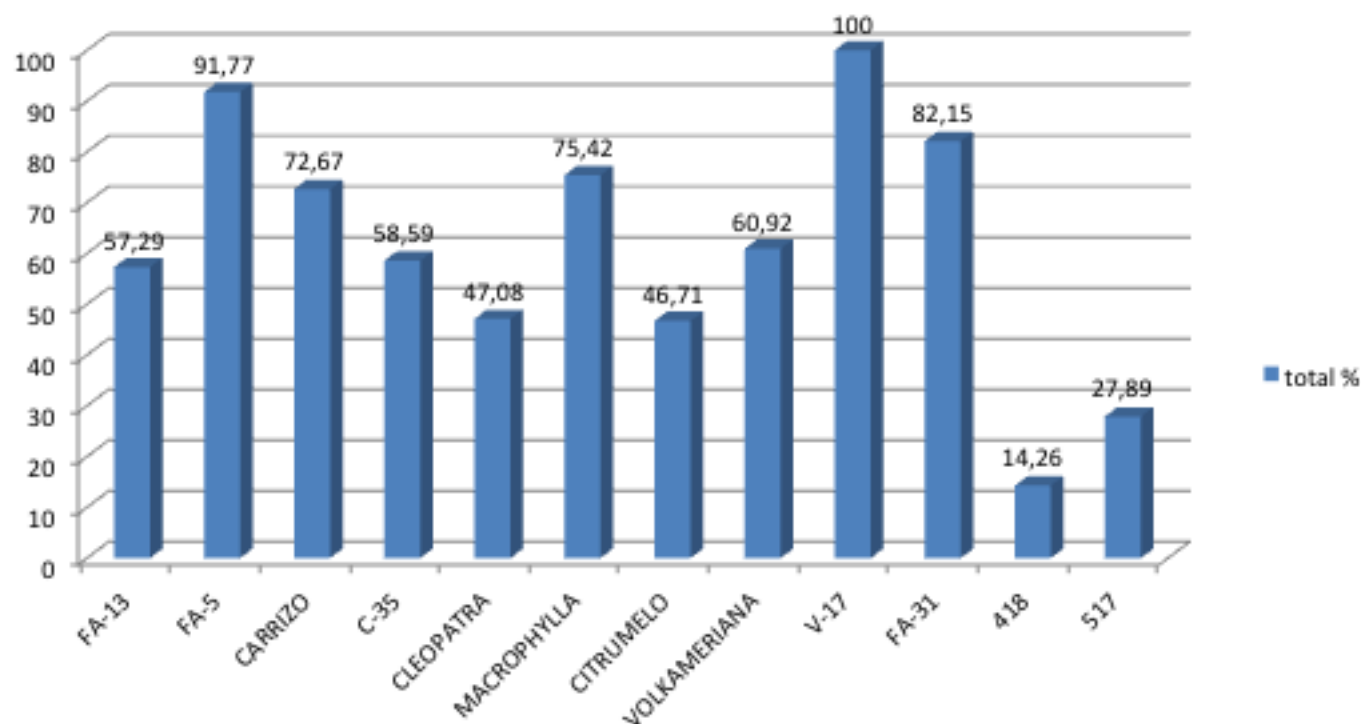
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➤ CALIBRE



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Rentabilidad acumulada relativa de Clemenules sobre diferentes patrones



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➤ MADURACIÓN

AZÚCARES	13-Oct	20-Oct	27-Oct	03-Nov	09-Nov	12-Nov	17-Nov	24-Nov	08-Dic
C. Carrizo	10,42	11,68	11,78	11,98	12,8	12,7	13,1	12,6	13,53
V-17	13,1	13,1	12,8	12,7	21,7		13,77	13,2	13,53
ACIDEZ									
C. Carrizo	10,5	10	9,5	8,3	7,9	8,1	7	7	7,5
V-17	9,5	9,5	9	8,9	7,5		7	8	7
I.MADUREZ									
C. Carrizo	7,75	9,13	9,69	11,28	12,66	12,25	14,62	14,06	14,09
V-17	10,7	10,77	11,11	11,15	13,23		15,37	12,89	15,1
COLOR									
C. Carrizo	0,42	0,88	1,18	2,3	1,32	1,1		7,27	13,43
V-17	1,19	1,82	3,78	6,58	3,9			11,77	15,75
ZUMO									
C. Carrizo	46,55	56,72	63,46	50,65	45	58	60,71	48,13	53,09
V-17	56,9	58,82	59,09	53,69	60		56,25	57,04	59,42

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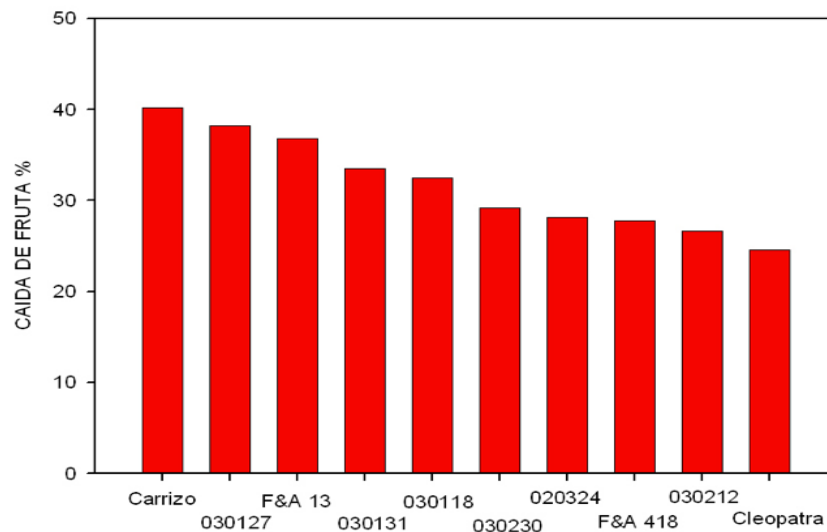
➤ DAÑOS POR FRÍO



PATRÓN	DAÑOS POR FRIO %
FA-13	12,5
FA- 5	15,63
Carrizo	18,75
C- 35	25
CLEOPATRA	12,5
MACROPHYLLA	37,5
CITRUMELO	9,38
VOLKAMERIANA	31,25
V- 17	15
FA- 31	21,88

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➤ CAÍDA DE FRUTA



Patrones	% Frutos en caídos ^(a)			Medias
	Cosecha			
	2014	2015	2016	
C-35	5.7 c	12.1 b	19.3 a	12.4 bc
CARRIZO	12.2 b	12.9 ab	18.2 a	14.5 ab
FA-5	10.5 b	12.1 b	12.1 b	11.5 c
MACROPHYLLA	17.3 a	15.7 a	14.0 b	15.6 a

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➤ SECA DE FRUTA



Variedades	Patrones	Frutos con vesículas secas (%)			Medias	Zumo (%)				Medias
		Cosecha				Cosecha				
		2011	2012	2013		2010	2011	2012	2013	
Clemenrubi	Carrizo citrange	30.4 a	19.0 a	25.0 a	24.8 a	48.8 b	45.0 b	50.3 b	48.1 b	48.0 b
	C-35 citrange	2.8 b	1.0 b	0.0 b	1.3 b	52.3 a	52.1 ab	58.6 a	57.7 a	55.1 a
	Fornier & Alcaide 5	1.4 b	0.0 b	3.0 ab	1.4 b	53.0 a	54.7 a	57.2 a	56.7 a	55.4 a
Orogrós	Carrizo citrange	7.0 a	23.0 a	28.0 a	19.3 a	50.8 c	53.6 b	52.7 b	47.1 b	51.0 b
	C-35 citrange	3.0 a	1.0 b	0.0 b	1.3 b	55.0 a	58.7 a	60.7 a	59.7 a	58.5 a
	Fornier & Alcaide 5	1.0 a	1.0 b	1.0 b	1.0 b	52.3 b	58.8 a	59.8 a	59.5 a	57.7 a

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Variedades	Patrones	Índice de madurez				Medias
		Cosecha				
		2010	2011	2012	2013	
Clemenrubi	Carrizo citrange	9.8 a	11.8 a	8.5 a	9.4 a	9.9 a
	C-35 citrange	9.6 b		C-35 citrange	9.6 b	
	Fomer & Alcaide 5	8.5 b		Fomer & Alcaide 6	8.5 b	
Orogrós	Carrizo citrange	8.6 a	Orogrós	Carrizo citrange	8.6 a	Orogrós
	C-35 citrange	8.8 a		C-35 citrange	8.8 a	
	Fomer & Alcaide 5	7.7 a	11.5 a	7.7 a	8.3 b	8.8 ab

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➤ ALTERNANCIA DE PRODUCCIÓN



Patrones	Eficiencia productiva	ABI
	Kg m ⁻³	%
C-35	17.0 a	25.5 a
CARRIZO	17.0 a	18.0 b
FA-5	17.4 a	17.0 b
MACROPHYLLA	17.9 a	11.6 c

Variedades	Patrones	Eficiencia productiva	ABI
		Kg m ⁻³	%
Clemenrubi	Carrizo citrange	33.4 a	34.3 a
	C-35 citrange	31.7 a	29.6 a
	Fornier & Alcaide 5	34.1 a	30.2 a
Orogrós	Carrizo citrange	29.2 a	32.4 a
	C-35 citrange	27.6 a	32.2 a
	Fornier & Alcaide 5	31.1 a	30.7 a

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➤ CLARETA



PATRON	RIEGO	% FRUTOS "BUFATS"	% FRUTOS CLARETA
CARRIZO	DEFICITARIO	6,3	13,75
	NORMAL	0,0	2,50
FA 5	DEFICITARIO	1,3	0,00
	NORMAL	0,0	3,75

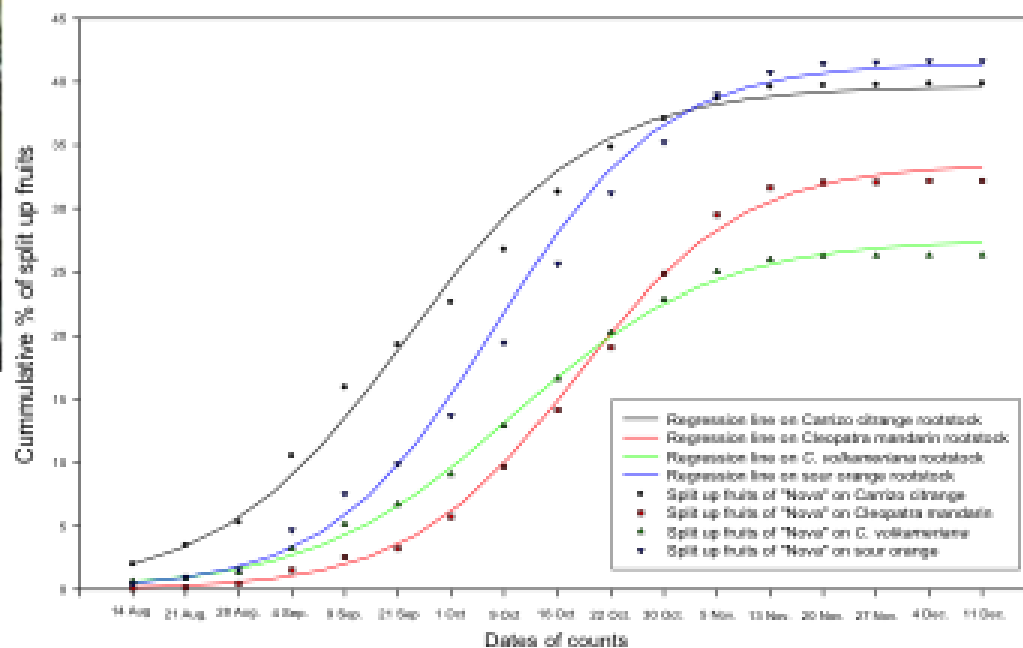
% Frutos clareta	
C-35	19,6
CARRIZO	13,4
FA-5	33,3
MACROPHYLLA	16,1

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➤ RAJADO



Fig 1. Regression of the cumulated split up fruits of "Nova" mandarin on four rootstocks



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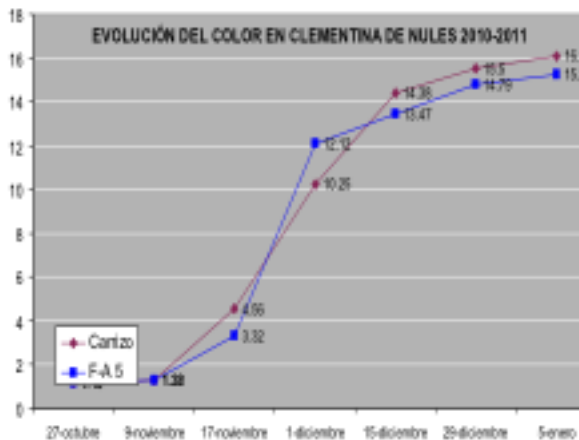
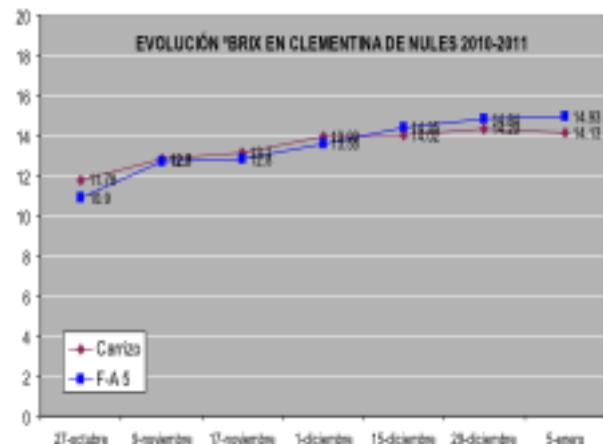
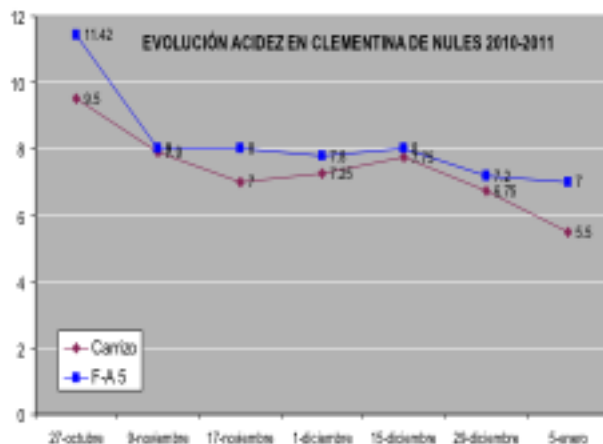
➤ PIXAT



PATRÓN	PIXAT %
FA-13	5
FA- 5	10-15
Carrizo	90
C- 35	10-15
CLEOPATRA	40
MACROPHYLLA	90
CITRUMELO	10-15
VOLKAMERIANA	50
V- 17	25
FA- 31	35

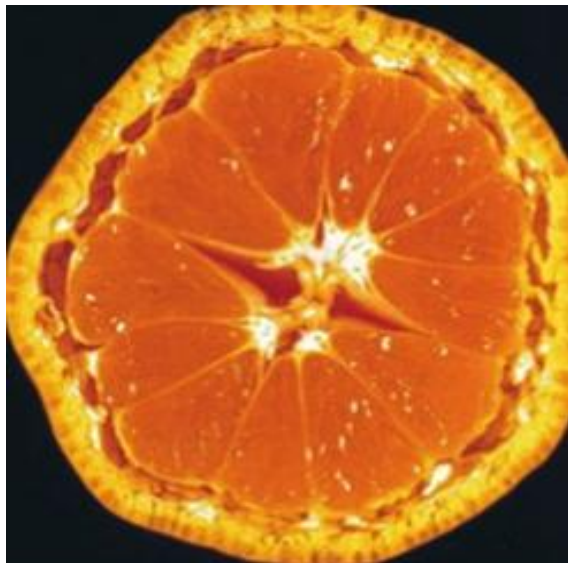
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➤ PÉRDIDA ACIDEZ



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➤ BUFAT



PATRÓN	BUFAT %
FA-13	40
FA- 5	60
Carrizo	60
C- 35	60
CLEOPATRA	65
MACROPHYLLA	65
CITRUMELO	70
VOLKAMERIANA	65
V- 17	80
FA- 31	70

MUCHAS GRACIAS