

# Meeting the Challenge of the Asian Citrus Psyllid in California Nurseries

*A two-day workshop in Riverside, California*

**June 11-12, 2009**

## Organizing Committee:

- T. Delfino**-California Citrus Nursery Society  
**A. Eskalen**-Dept. of Plant Pathology & Microbiology, University of California Riverside  
**R. Lee**-USDA- ARS, National Clonal Germplasm Repository for Citrus and Dates  
**G. Vidalakis**-Citrus Clonal Protection Program, Dept. of Plant Pathology & Microbiology, University of California Riverside



Florida-Foundation Block



Brazil-Citrus Nursery



## Invited Speakers:

- J. Ayres**-Fundecitrus, Brazil  
**J. Bethke**-UC, CA  
**G. Baze**-Golden Pacific Structures, CA  
**T. Delfino**-CCNS, CA  
**F. Dixon**-Wells Fargo, CA  
**D. Elder**-American Ag Credit, CA  
**T. Gast**-Southern Gardens Citrus, FL  
**P. Gomes**-CHRP, USDA -APHIS, NC  
**E. Grafton-Cardwell**-UCR, CA  
**D. Howard**-AgraTech, CA  
**N. Jameson**-Brite Leaf Nursery, FL  
**R. Keijzer**-KUBO, The Netherlands  
**P. Llatser**-AVASA, Spain  
**S. McCarthy**-CDFA, CA  
**G. Vidalakis**-UCR-CCPP, CA

Registration: <http://ccpp.ucr.edu> & <http://eskalenlab.ucr.edu>

## Location:

Sunkist Center  
Citrus State Historical Park  
9400 Dufferin Avenue  
(Corner of Van Buren Blvd)  
Riverside, California

## Sponsored by:



**CALIFORNIA CITRUS NURSERY BOARD**

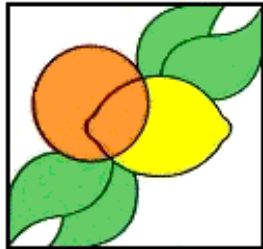


**Bayer CropScience**

Information on line at: <http://eskalenlab.ucr.edu>

# **Citrus nursery Certification in Spain (1968-2008)**

**AVASA, Foundation and certified  
budwood production under natural  
isolation and protective screen**



AVASA

Francisco Llatser  
Technical Manager  
Agrupación de Viveristas de Agrios, S.A.  
AVASA®

# Historical review of the Spanish Citrus Industry



- 15th & 16th century
  - Introduction of the first citrus, from Asia through the North of Africa.
  - Distribution in the Americas, by the first Spanish explorers and missionaries
- 18th century
  - Beginning of the commercial citrus expansion in Spain. Exports to U.K.
- 19th century
  - Citrus varieties: Common oranges, mandarins and blood oranges. Seedy fruits
  - Rootstocks: Sweet orange and Common mandarin
  - 1.862: Detection of the Phytophthora sp disease
- 20th century
  - 1.909: Introduction of the variety Washington navel (Bahia) from U.S.A.
  - 1930-1935: CTV was introduced in Valencia, probably with propagation materials imported from California
  - 1.957: 1st epidemic CTV outbreak, after the severe frost in Valencia (1956)

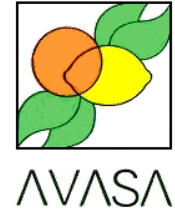
## Historical review of the Spanish Citrus Industry cont.)



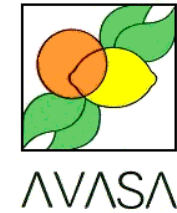
### •20-21th century

- Thousands of nurserymen use sour orange (*Citrus aurantium*), as rootstock. Low quality nursery trees
- 1.958-1.972: Legislative regulations for the nursery sector
- 1.968: The first 9 Authorized Nurseries are created
- 1.972: Supplying of the first 500.000 citrus plants of the Certification program. Rootstocks tolerant to CTV
- 1.975: Citrus improvement program in Spain
- 1.976: AVASA was created by association of the 9 authorized nurseries
- 1.979: ELISA / CTV application
- 1982-84 Obtention, patent and release of monoclonal antibodies for CTV detection (INGENASA – IVIA)

# Historical review of the Spanish Citrus Industry cont.)



- 1.983: National quarantine station in Valencia
- 1.994: Commercialization of CTV detection Kits by Tissue Print ELISA
- 1.996: AVASA Foundation Block and Increases Blocks protected under screenhouses. CTV analysis individual, tree by tree
- 2.008: More than 150 million of certified citrus plants grafted on CTV tolerant roostocks
- Increase of the production and the quality of plants and fruits
- Spain became the first world-wide exporter of citrus fresh fruit and the first world producer of clementines.



## The Spanish citrus industry today

- Acreage: 330.000 ha. (730.000 acres)
- Production: 6,5 milion M.T.
  - 4 th world citrus producer
  - 1st world fresh fruit exporter (55%)
  - 54% Sweet oranges, 34 % Mandarins (23% Clementines), 11% Lemons, 1% Grapefruits

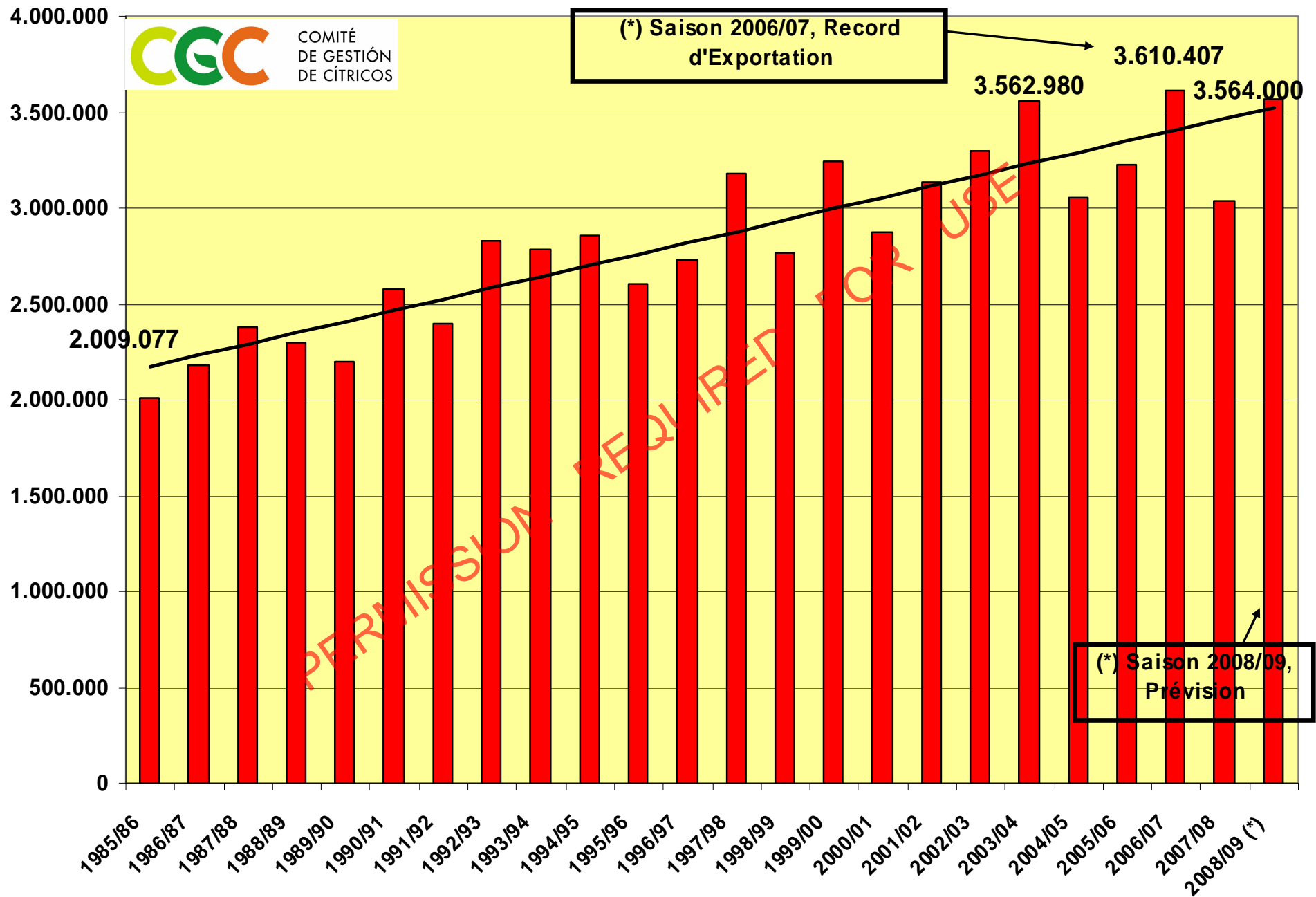
# SPAIN: Citrus crops evolution 1991/92-2008/09 (1.000 MT)

91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09(*)
<b>CLAUSELLINA/SATSUMA/MONREAL</b>																	
406	373	408	365	303	248	355	281	299	300	285	265	257	254	168	280	158	213
<b>CLEMENTINA/CLEMENVILLA O NOVA/HERNANDINA</b>																	
871	1.027	1.047	1.255	1.139	985	1.402	1.081	1.286	1.223	1.275	1.447	1.461	1.812	1.467	1.860	1.607	1.675
<b>TANGERINA/KARA/FORTUNA</b>																	
66	121	134	171	241	274	342	393	457	297	218	296	357	435	309	361	313	341
<b>TOTAL PETITS FRUITS</b>																	
1.342	1.521	1.589	1.791	1.683	1.507	2.099	1.754	2.042	1.819	1.778	2.009	2.075	2.500	1.945	2.501	2.077	2.229
<b>NAVEL- NAVELINA/SALUSTIANA/VALENCIA-OTRAS</b>																	
2.721	2.990	2.407	2.739	2.528	2.274	2.772	2.387	2.805	2.703	2.924	2.931	3.100	2.832	2.295	3.393	2.702	3.476
<b>SANGUINAS/SANGUINELLI</b>																	
15	13	10	8	8	8	14	5	6	6	5	4	2	3	2	3	2	5
<b>TOTAL ORANGES</b>																	
2.748	3.002	2.417	2.747	2.535	2.282	2.786	2.392	2.811	2.709	2.929	2.935	3.103	2.835	2.297	3.397	2.704	3.481
<b>TOTAL CITRONS</b>																	
589	737	570	563	433	666	968	827	893	938	1.018	962	1.071	810	951	879	550	704
<b>TOTAL GRAPEFRUITS</b>																	
25	30	26	28	29	20	32	27	23	25	26	29	33	36	33	39	43	45
<b>TOTAL AGRUMES</b>																	
4.704	5.290	4.601	5.128	4.679	4.475	5.886	5.000	5.770	5.491	5.751	5.935	6.281	6.181	5.226	6.815	5.375	6.459

08/09 (\*) Forecast

Effects of frost January-March 05

# SPAIN: CITRUS EXPORTS EVOLUTION( MT )





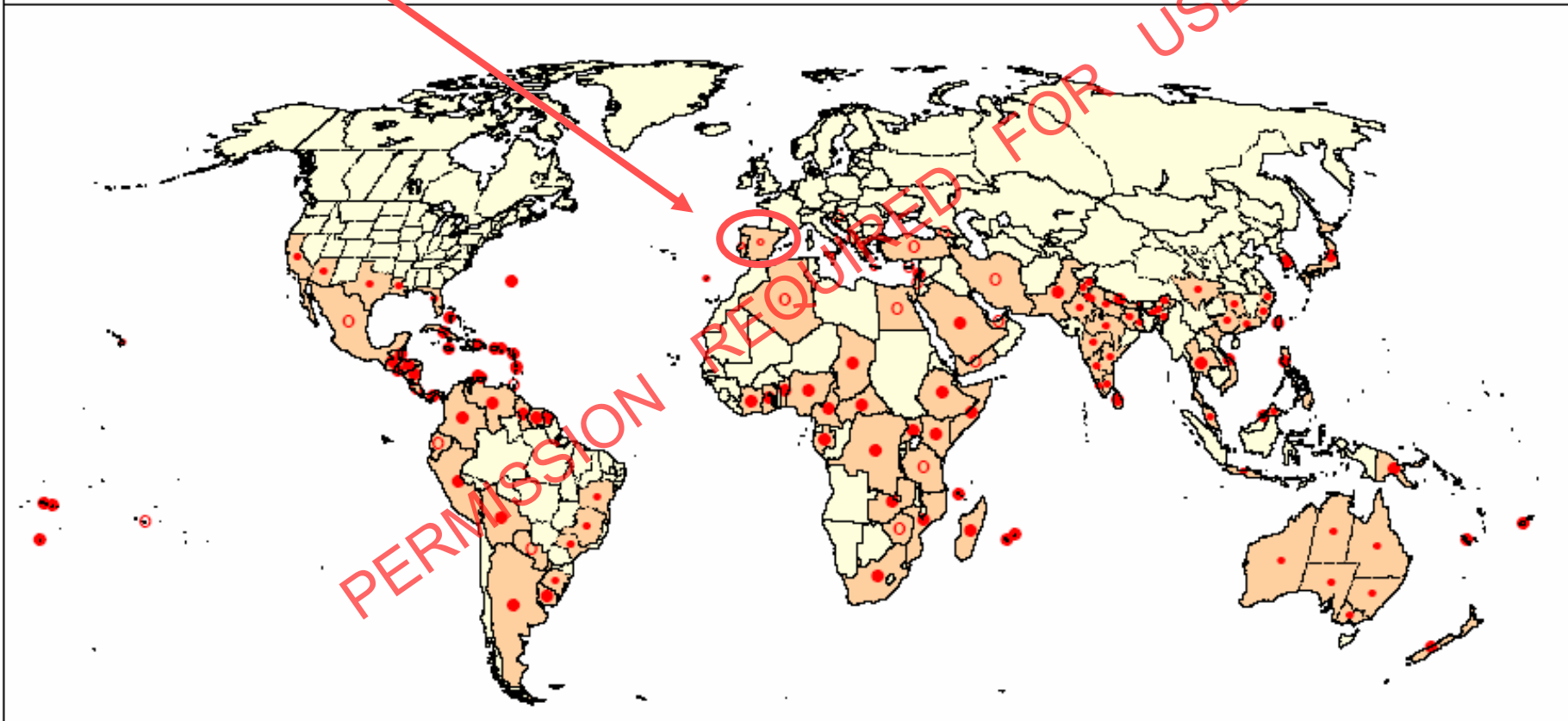
# Citrus Tristeza Virus in the world



Distribution Maps of Quarantine Pests for Europe  
Cartes de Répartition Géographique des Organismes de Quarantaine pour l'Europe

**SPAIN**

*Citrus tristeza closterovirus*



National record/Signalement national



Subnational record/Signalement infra-national



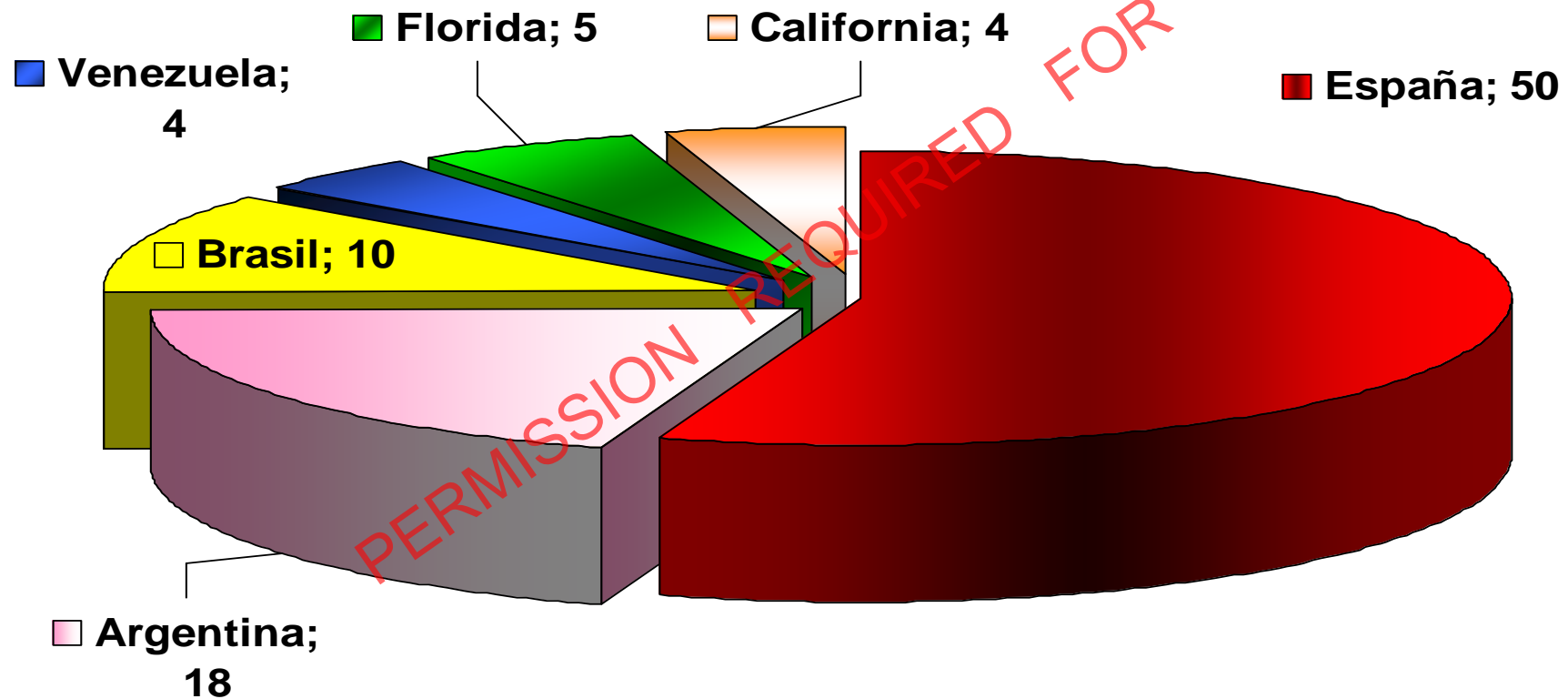
Present/Présent

Present only in some areas/Présent seulement dans certaines zones

EPPO 2005-03

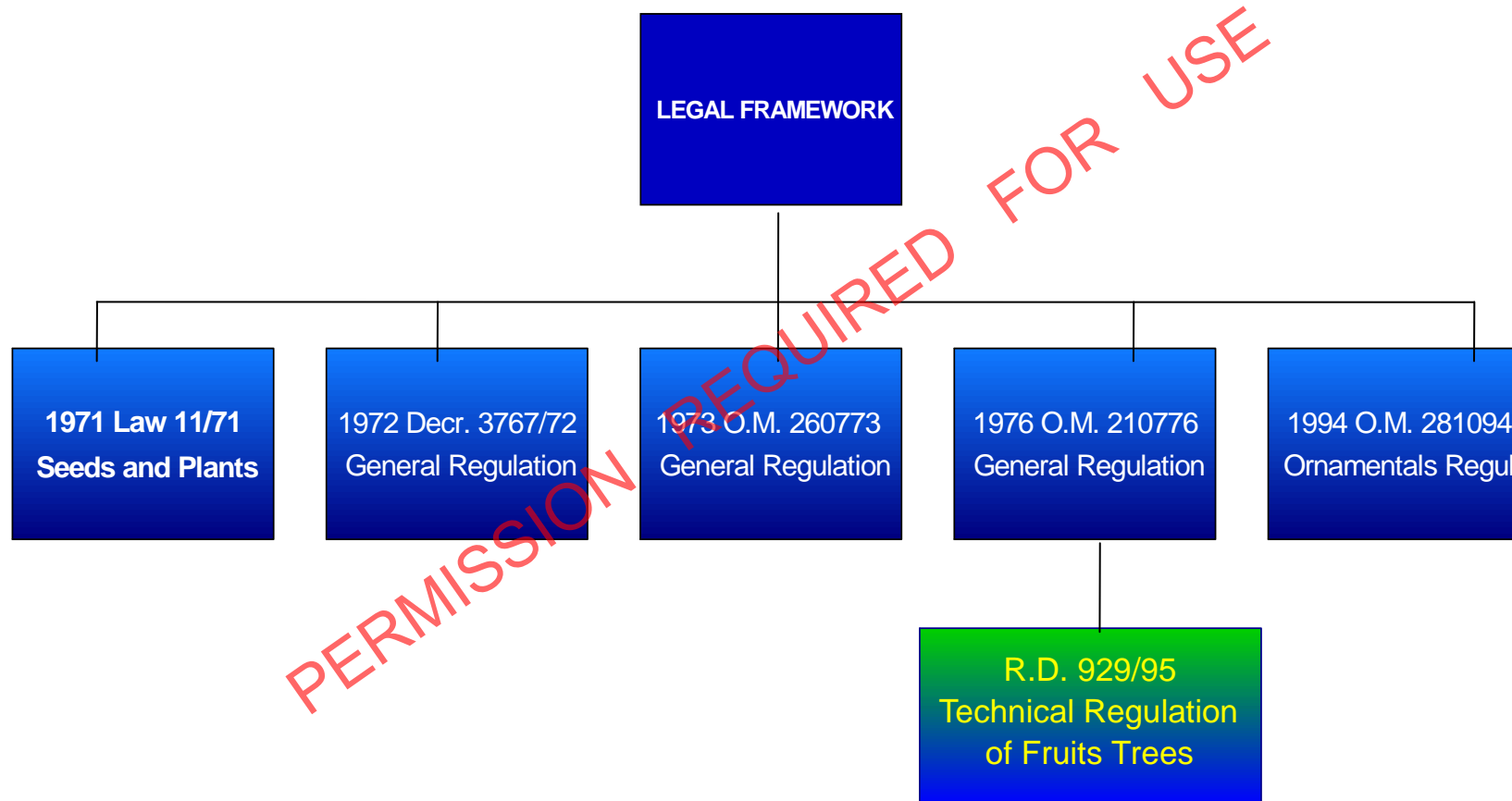
Source: OEPP / EPPO

# CTV: A disaster of 100 million trees



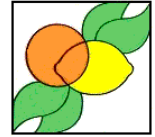
Source: IVIA - Pedro Moreno, stimated

## Regulations of Authorized Citrus Nurseries in Spain



# Spanish Certification Scheme. Accredited Nurseries

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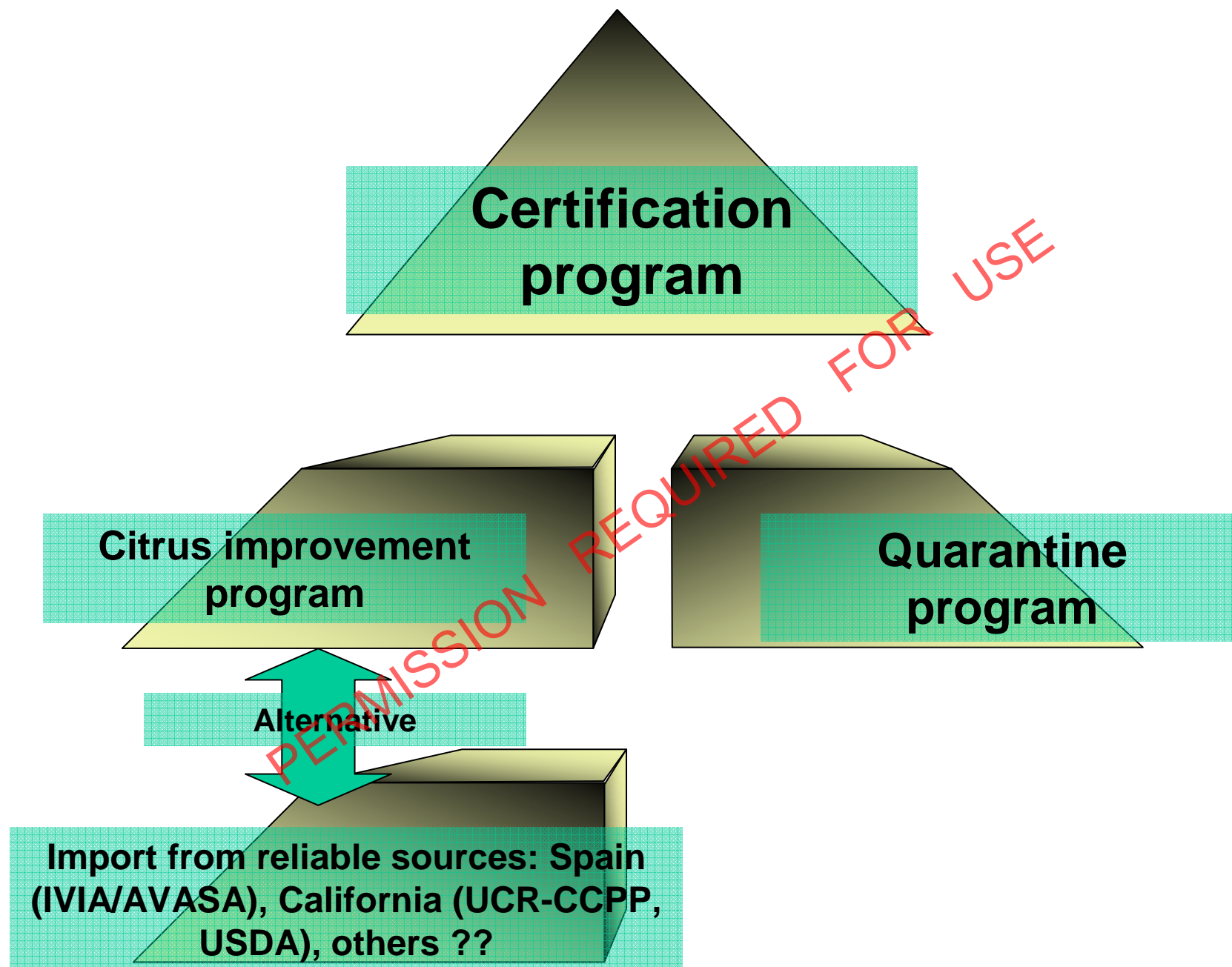
- Legislative development
- Transitory period
- Existing material at the time
- Introduction of materials from other certification schemes
- Use of varieties with a nucelar origin
- New techniques for obtaining free diseases materials
- Germplasm Bank
- Creation of Foundation (“Base”) Nurseries

PERMISSION REQUIRED FOR USE

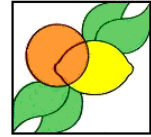
# Main objectives of the Spanish citrus improvement program in Spain 1970

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- The obtention of pathogen free propagating material of the Spanish citrus cultivars by shoot-tip grafting *in vitro* (STG)
- To maintain mother trees patogen free in a germplasm bank
- To release healthy materials to the growers



# Production in the Spanish certification scheme



AVASA

- Production of parental material - Agrotechnological Center of reference (IVIA-Instituto Valenciano de Investigaciones Agrarias)

Introduction (Quarantine Station) and maintain of citrus vegetal material with the maximum sanitary and variety guarantee.

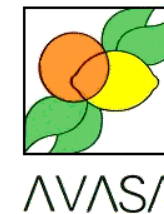
- Production of foundation material - Foundation nursery (AVASA-Agrupación de Viveristas de Agrios, S.A.)

Maintenance and multiplication of citrus vegetal material of foundation category with the maximum sanitary and variety guarantee.

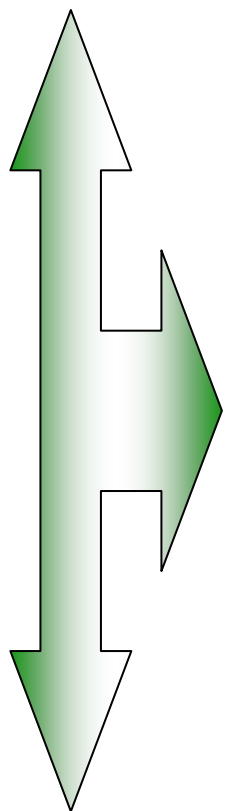
- Production of certified material - Authorized nurseries

Multiplication and final distribution of citrus vegetal material of certified category with sanitary and variety guarantee.

# Certification scheme

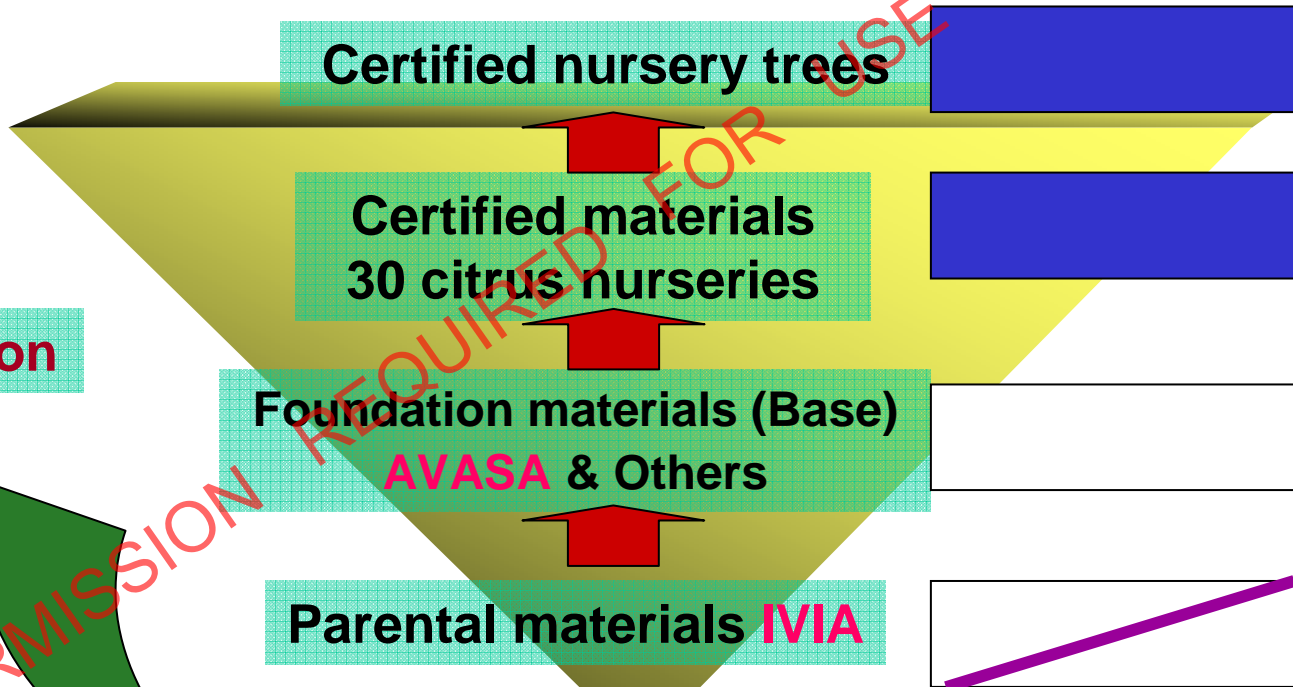


**Sanitation**



**Certification**

**Varietal improvement**

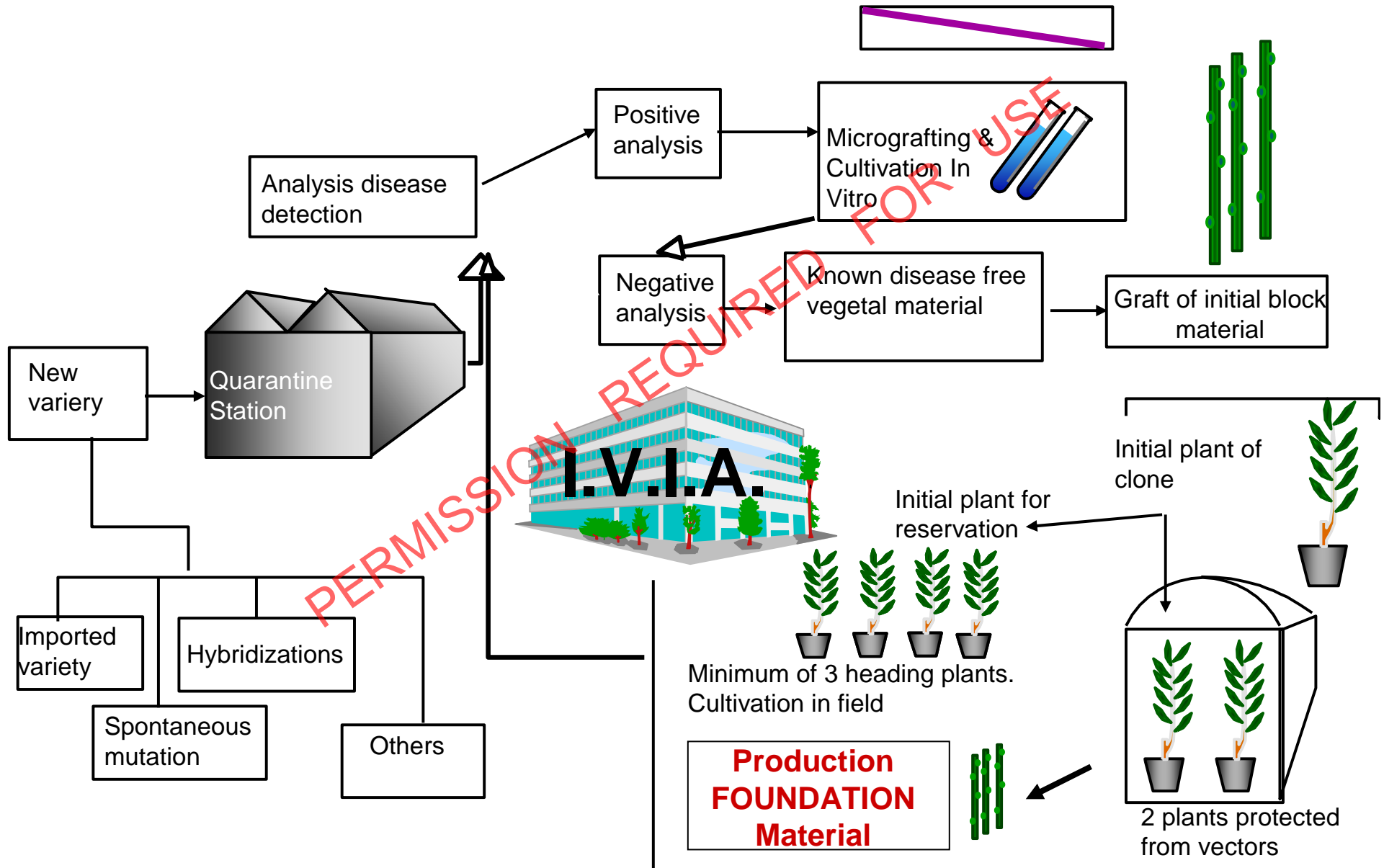




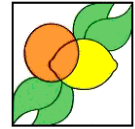
# Rules for citrus certification



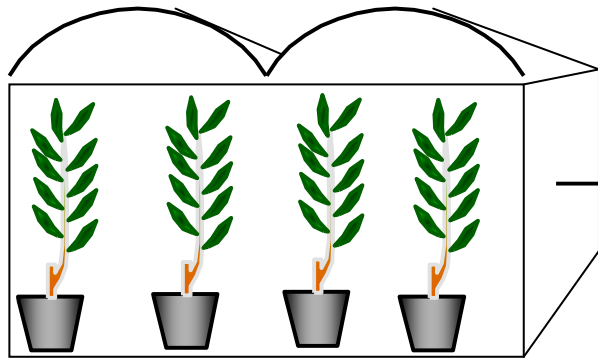
## Production of initial block material



# Production of *FOUNDATION (base) materials*

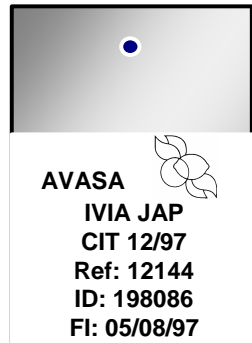


AVASA

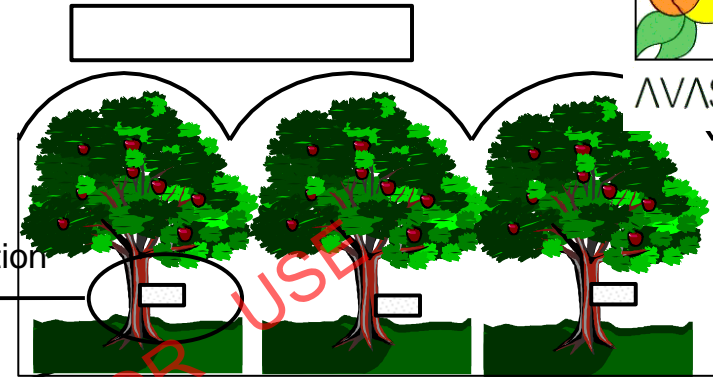


HEADING plants to establish fields of FOUNDATION plants

Development



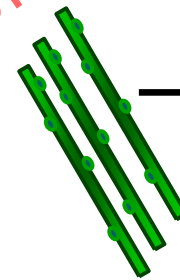
Identification



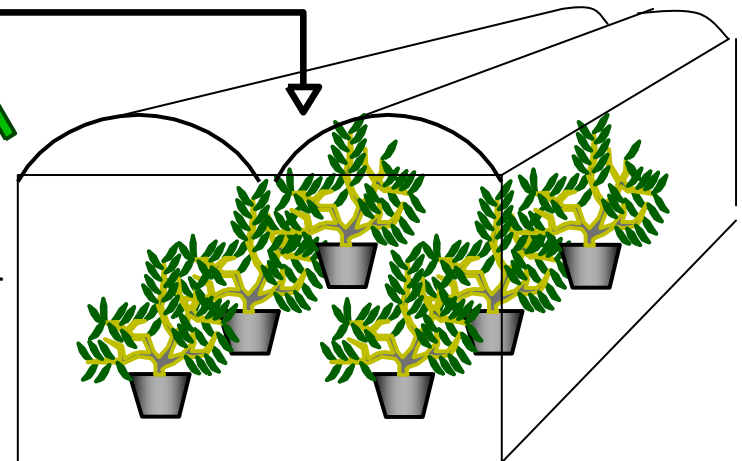
The HEADING plants are considered FOUNDATION if they maintain their sanitary state after their development and the study of their production during more than 2 crops



PERMISSION REQUIRED FOR USE



Buds coming from Foundation Mother Trees



Previous multiplication phase

**Foundation multiplication fields**

Optional phase, under previous authorization of the Responsible Official Institution

**Production Certified materials**

Buds coming from Foundation Plants or Foundation multiplication fields

# A very isolated production

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- **Strategic location of the production:**
  - Remote from citrus orchards
  - With natural isolation
  - No citrus tradition
  - Excellent weather conditions, and suitable for citrus growing
  - Restrictive regulations that do not allow citrus plantations inside the influence area.

1978 AVASA Initial activity

PERMISSION REQUIRED FOR USE

1.980: Certificate of the first budwood diseases free delivered from AVASA to its 9 associated nurseries

PERMISSION REQUIRED FOR USE



**AVASA**



MINISTERIO DE AGRICULTURA  
INSTITUTO NACIONAL DE SEMILLAS Y PLANTAS DE VALENCIA

TOTAL INTERTOS CORTADOS POR AVASA  
EN LOS TUNELES DE VIVERCID Y REPARTO DE LOS  
MOS POR VARIEPADES Y VIVEROS (8-9 SEP.-1980)

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INTERTOS CORTADOS

NAVELATE	2-7	13.590
MESERO(FINO)	49-5	15.150
CLAUSELLINA	19-3	15.150
VERNA	50-2	22.980
NEWHALL	55-1	70.200
NAVELINA	78-0	143.910
<b>TOTAL</b>		<b>269.070</b>

*Veteran control en junio/80  
br de viveros  
(U. Valencia)*

REPARTO

VARIEPADES	ALCANAR	J. GIL	MASFARRA	LA PLANA	VIVERCID. ETASA	MONSERRI	SEVILLA	VALENCIA
NAVELATE	1.510	1.510	1.510	1.510	1.510	1.510	1.510	1.510
MESERO	2.530	-	2.530	2.530	2.530	-	2.530	2.530
CLAUSELLI	350	-	350	350	350	350	350	700
VERNA	3830	-	3830	3830	3830	-	3830	3830
NEWHALL	7800	7800	7800	2000	7800	7800	7800	13600
NAVELINA	15990	-	15990	4000	15990	15990	15990	43970
<b>TOTAL</b>	<b>32010</b>	<b>9310</b>	<b>32010</b>	<b>14220</b>	<b>32010</b>	<b>25560</b>	<b>32010</b>	<b>59780</b>

BENICARLO 9-IX-1980

Por EL I.N.S.P.V.

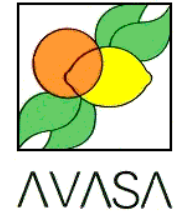


Por AVASA



Navelina: ETASA → U.VAL.  
Newhall: ETASA → U.VAL.  
Mesero: ETASA → U.VAL.

## First certified multiplication fields in the Foundation Nursery AVASA, in Alcalá de Xivert (Castellón) Spain



- 1980: The first increase blocks were grafted in the current headquarters of AVASA (12 varieties)

Navelina Sw O	Newhall	Navelate Sw.O.	Clemenules Cl
Oroval Cl	Verna L	Fino L	Fina Cl
Bruno Cl	Arrufatina Cl	Guillermina Cl	Valles Satsuma

- 10.751 rootstocks are grafted with healthy material of local varieties that have been obtained in the IVIA (Valencia) by first time through the technique of “shoot grafting *in vitro*”

# AVASA Evolution



Foundation  
Block



Increase  
Block

AVASA today

PERMISSION REQUIRED FOR USE

Since 1996:  
100% under  
screenhouses  
24.500 m<sup>2</sup>



### ACTA N° CV-23073EM

En virtud de las atribuciones conferidas al Servicio de INSPECCIÓ FITOSANITARIA, según lo establecido en el R.D. 929/1995 de 9 de junio por el que se aprueba el Reglamento técnico de control y certificación de plantas de vivero de frutales, el personal del mismo que suscribe la presente Acta se personó en la localidad de Moncada (Valencia) el día 4 de julio de 2007 al objeto de comprobar entrega de material de propagación de cítricos procedentes del Instituto Valenciano de Investigaciones Agrarias IVIA a Viveros Avasa de las variedades, categoría y cantidades de injertos siguientes:

VARIEDAD	CLON	CATEGORÍA	TIPO MATERIAL	NUM.	OBSERVACIONES
SANTOMERA	IVIA 85	PARENTAL	INJERTOS	10	
MAPO	IVIA 190	PARENTAL	INJERTOS	10	
PARSON BROWN	IVIA 29	PARENTAL	INJERTOS	10	Convenio 45/2000
SUCREÑA	IVIA 228	PARENTAL	INJERTOS	10	Convenio 102/2003
RICALATE	IVIA 231	PARENTAL	INJERTOS	10	Convenio 45/2000
BARNFIELD	IVIA 351	PARENTAL	INJERTOS	10	Convenio 79/2002

Según manifiesta el vivero el material vegetal citado se destina a sustituir plantas madre de base de las mismas variedades/clones que por diversas razones hubo que eliminar del cultivo. La presente Acta se firma en prueba de conformidad con su contenido quedando una copia en poder de cada uno de los firmantes

Por el Servicio d'Inspecció  
Fitosanitària

D. José A. Pina Lorca

Por el Instituto Valenciano de  
Investigaciones Agrarias

D. Luis Navarro Lucas

Por Viveros Avasa

D.

Current certification  
for the delivery of  
parental material

PERMISSION REQUIRED FOR USE

# FOUNDATION (base) materials in Spain: Controls

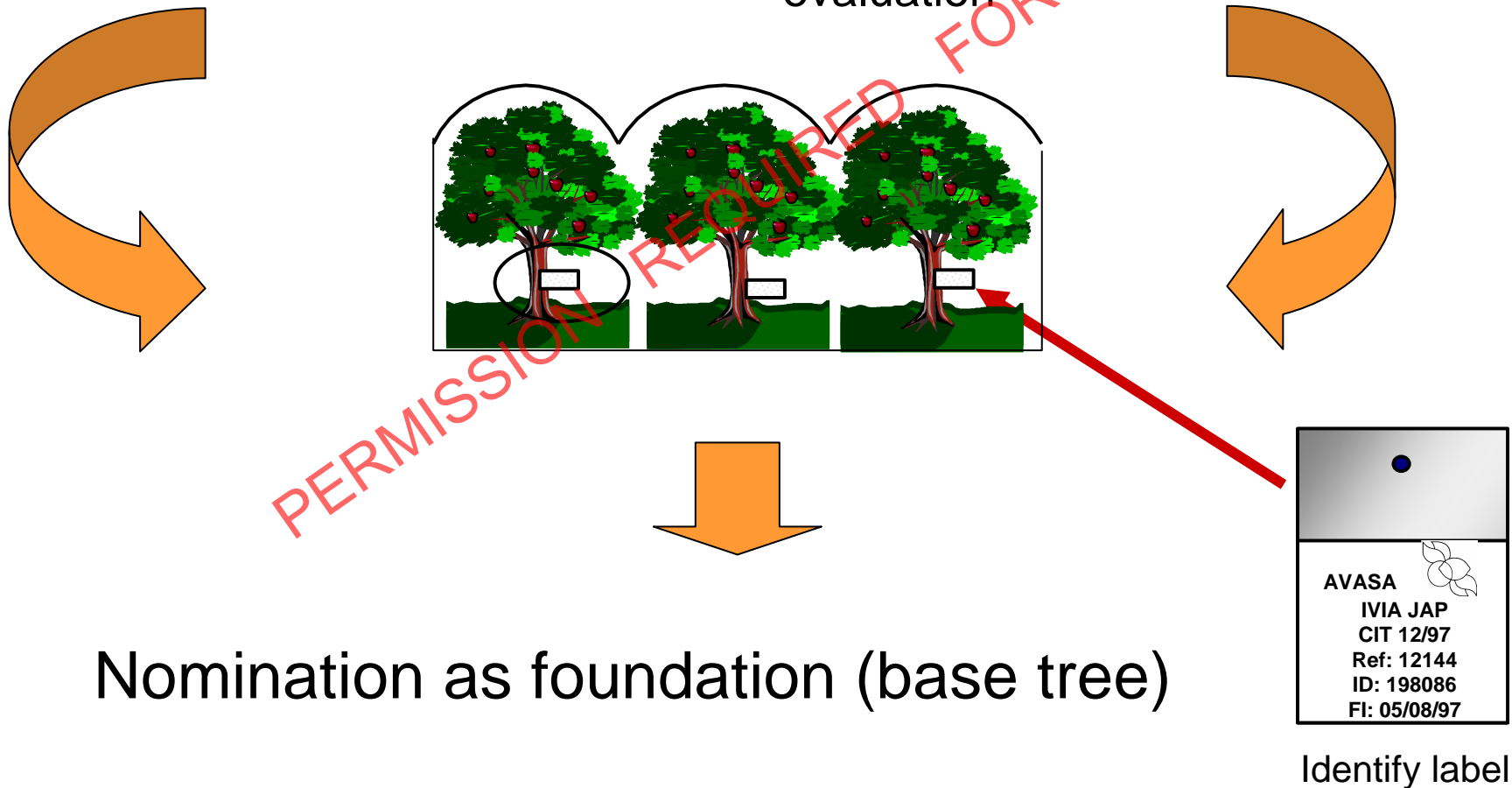


## Sanitary evaluation:

Indexing for detection of citrus diseases

## Variety evaluation:

Fruit quality analysis and production and agronomical evaluation





## Sanitary evaluation:

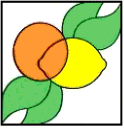
- Exocortis and others  
viroids, Cachexia,  
Ringspot, Psoriasis,  
concave gum, Cristacortis,  
Impietratura, Citrus leaf  
blotch (CLB), Psoriasis,  
concave gum, Cristacortis,  
Impietratura,
- Dweet mottle,  
Mosaic, Leaf blotch,  
Tristeza, Vein  
enation, Leaf  
rugose, Witches'  
broom, Tatter leaf,  
Crinkly leaf-  
Infectious  
variegation,  
Satsuma dwarf,

ACTA N.º 12/23/011/08-09.11.

En virtud de las atribuciones que tiene conferidas el Sección de Sanidad Vegetal, el personal del mismo que suscribe la presente Acta se personó en el vivero AVASA en la parcela y/o instalaciones Alcala Xivert al objeto de comprobar el cumplimiento de las disposiciones vigentes Arboles madre Base en plantas de vivero de Arboles madre Base. Con esta finalidad se tomaron las siguientes muestras:

SUB-PARCELA	FILA Y/O ARBOL Y/O LOTE	ESPECIE Y/O VARIEDAD Y/O PATRON	UNIDADES REPRESENTADAS	MUESTREO		REF.	RESULTADO
				%	UNDS		
		<u>Relaciones adjuntas en acta original.</u>					

A. D. LA FOTOCOPIA... 96 339 18 30 96 333 14 68



AVASA

AVASA  
Apartado 20  
12570 ALCALA DE XIVERT  
CASTELLON

Adjunto se remite resultados de los controles sanitarios efectuados en los árboles madre de Base de ese vivero durante 2007 correspondientes al Acta CV240705, CV/23-07-01, CV/23/12/009/07M y CV-2407-004

Dicho resultados deben trasladarse a la ficha correspondiente que, de cada árbol de Base, mantiene el vivero.

Valencia, 21 de diciembre de 2007  
EL JEFE DE NEGOCIADO DE PLANTAS DE VIVERO

*[Handwritten signature]*

**Foundation (Base) mother trees sampling according to the Certification Scheme, biological analysis and results communications**

Alcala Xivert a las 14 horas del día 24 de Febres de 2009  
POR LA SECCIÓN DE CERTIFICACIÓN VEGETAL POR EL VIVERO AVASA

*[Handwritten signature]*  
D. José A. Linares

*[Handwritten signature]*  
D. José A. Linares

GENERALITAT VALENCIANA  
Dirección General de  
Investigación, Desarrollo e Innovación Agropecuaria  
Servicio de Inspección Fitosanitaria  
Fecha 7-01-08  
SALIDA 76

# Data base of foundation trees, and biological analysis to be practiced



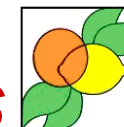
**Análisis Biológicos**  
 José Folch Beltrán  
 08/05/2009 14:13:26

Nº Análisis: 0903      Rf Oficial:      Observaciones:      Año: 2009  
 Fecha: 16/04/2009      Fecha Rdo:      Año: 2009

	CLON	Rf 4,5	Rf 5	Fecha MTR	GRP	VARIEDAD	CTV E	CTV I	CTV B	VE	VR	PS	CLSV	R
▶	439	22104A	22104A	16/04/2009	1.3	AVASA PRI 15	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	439	22104D	22104D	16/04/2009	1.3	AVASA PRI 15	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	439	22105A	22105A	16/04/2009	1.3	AVASA PRI 15	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	439	22105B	22105B	16/04/2009	1.3	AVASA PRI 15	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	440	22106A	22106A	16/04/2009	1.3	AVASA PRI 16	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	440	22106D	22106D	16/04/2009	1.3	AVASA PRI 16	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	440	22107A	22107A	16/04/2009	1.3	AVASA PRI 16	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	440	22107B	22107B	16/04/2009	1.3	AVASA PRI 16	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	405	22111A	22111A	16/04/2009	1.3	AVASA PRI 09	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	405	22111D	22111D	16/04/2009	1.3	AVASA PRI 09	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	69	2214A	2214A	16/04/2009	4	Villafranca	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	69	2214D	2214D	16/04/2009	4	Villafranca	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	69	2215A	2215A	16/04/2009	4	Villafranca	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	69	2215D	2215D	16/04/2009	4	Villafranca	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	297	2216A	2216A	16/04/2009	4	Eureka	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	297	2216D	2216D	16/04/2009	4	Eureka	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	297	2217A	2217A	16/04/2009	4	Eureka	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	297	2217B	2217B	16/04/2009	4	Eureka	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	95	2221A	2221A	16/04/2009	4	Fino Largo	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	95	2221D	2221D	16/04/2009	4	Fino Largo	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	95	2222A	2222A	16/04/2009	4	Fino Largo	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	95	2223A	2223A	16/04/2009	4	Fino Largo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	95	2223B	2223B	16/04/2009	4	Fino Largo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	124	2224A	2224A	16/04/2009	3	Lima Bearss	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	124	2224D	2224D	16/04/2009	3	Lima Bearss	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	124	2225A	2225A	16/04/2009	3	Lima Bearss	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Registro: 1 de 41

# Biological analysis of foundation trees



AVASA

## Estructura - Informe Analisis AB

José Folch Beltran

viernes, 08 de mayo de 2009

Muestras tomadas para Análisis entre 05/11/1998 y 4/05/2009

### 1.1 Clementinos

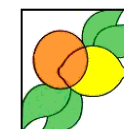
**Arrufatina(P)**

**58**

Ref nueva y ant. Injerto	Análisis	Parcela	MTR	CTV Bio	VE	VR	PS	CLBV	Año	CTV	VE	VR	PS	CLBV
5161   5161	28/05/1982													
		0900	5,1	17/02/2009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2009					
		0704	5,1	03/05/2007	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2007					
		0703	5,1	20/03/2007	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2007					
		0602	5,1	31/01/2006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2006					
		0403	5,1	09/11/2004	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2004					
		0404	5,1	05/02/2004	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2004					
		0304	5,1	19/02/2003	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2003					
		0104	5,1	16/10/2001	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2001					
		0001	5,1	06/07/2000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2000					
		9801	5,1	05/11/1998	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1998					

Analysis 2009:

- Forecast 880
- Realized 301
- Pending 579



AVASA

**Envío 0812      Campaña: 2009      16/12/2008**

Adjunto se remiten las muestras para análisis de CTV mediante el método E.L.I.S.A. Las muestras corresponden al ACTA CV **12/25/049/0809** y han sido tomadas conjuntamente entre el vivero y el Servicio de Certificación Vegetal. En breve se les remitirá la mencionada acta que actualmente permanece en poder del Servicio de Prevención Fitosanitaria.

Nº Envío	Referencia	Muestras	Resultado y observaciones
0812	9,2L2N191	154	- Tomadas 11/12/08
0812	9,2L3N191	69	- Tomadas 11/12/08
0812	9,2L4N191	81	- Tomadas 11/12/08
0812	9,2L5N191	168	- Tomadas 11/12/08

## Deliveries of samples for ELISA - CTV

0812	7,2L4N172	34	- Tomadas 12/12/08
0812	1,1	295	- Tomadas 15/12/08
0812	3,1	42	- Tomadas 12/12/08
0812	3,2	52	- Tomadas 12/12/08

Total muestras enviadas      2139

Registro: 30 de 34

Atentamente  
**José Folch**

Viveros AVASA

**Resultado recibido:**

*Nota: en la consulta "ETI - Consulta AVASA CMI" debe anotarse las líneas analizadas para conocer las líneas pendientes de análisis.*

registro: 62 de 64

**ACTA N.º 12/23/001/08-09 M**

En virtud de las atribuciones que tiene conferidas el Sección de Sanidad Vegetal, el personal del mismo que suscribe la presente Acta se personó en el vivero AVASA en la parcela y/o instalaciones Alcalá de Chivert al objeto de comprobar el cumplimiento de las disposiciones vigentes CTV - CPM de Citrus en plantas de vivero de citrus. Con esta finalidad se tomaron las siguientes muestras:

SUB-PARCELA	FILA Y/O ARBOL Y/O LOTE	ESPECIE Y/O VARIEDAD Y/O PATRON	UNIDADES REPRESENTADAS	MUESTREO		REF.	RESULTADO
				%	UNDS		
		<i>Relación conjunta</i>					

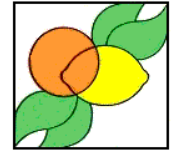
Se hace constar las siguientes observaciones:

La presente Acta se extiende por cuadruplicado y se entrega una copia al firmante por el vivero que declara haber recibido

Alcalá de Chivert a las \_\_\_\_\_ horas del \_\_\_\_\_ de \_\_\_\_\_ de \_\_\_\_\_  
POR LA SECCIÓN DE CERTIFICACIÓN VEGETAL

D. [Signature]

D. [Signature]



**AVASA**

Área de Protección Agroalim  
Laboratorio Diagnóstico: Virología  
Ctra. Alicante-Valencia, km. 46460 SILLA  
Tel.: 96 387 47 37 - Fax: 96 121 14 68

**BOLETÍN DE ANÁLISIS**

**DATOS DEL INTERESADO**

<b>Nombre:</b> Sección de Sanidad y Certificación Vegetal (A.V.A.S.A)	<b>Tel:</b> 963391830	<b>Fax:</b> 963931468
<b>Dirección:</b> Plaza Alcalde Domingo Torres n.º 2 1.º	<b>Provincia:</b> Valencia	<b>Código Postal:</b> 46020
<b>Localidad:</b> Valencia		

**DATOS DE LA MUESTRA**

<b>Cultivo:</b> Cítricos
<b>Fecha recepción:</b> 15-01-09
<b>Termino municipal:</b> Alcalá de Chivert
<b>Número de muestras:</b> 42 (Envío 0813)
<b>Identificación de las muestras:</b> CV-12/23/001/08-9-M

**DATOS DEL ANÁLISIS**

<b>Clave placa:</b> A,B,F/16-01-09
<b>Técnica analítica utilizada:</b> E.L.I.S.A.
<b>Virus analizados:</b> CTV

**DIAGNÓSTICO DEL LABORATORIO**

<b>CTV</b>
<b>Muestras positivas:</b> ninguna

Silla, 27 de enero de yyyy

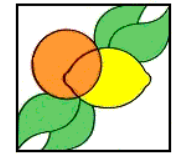
Vº Rº

Y LA TÉCNICO RESPONSABLE DEL LABORATORIO

Fdo.: [Signature]  
María José Muñoz Yerbes

**Results of ELISA – CTV analysis**

# CTV analysis made by E.L.I.S.A.



AVASA

Year	Foundat. trees	Results	Increase blocks	Results
2009	2.228	-2.228 + 0	14.032	-14.032 + 0
2008	1.625	-1.625 + 0	10.733	-10.733 + 0
2007	1.693	-1.693 + 0	16.073	-16.073 + 0
2006	1.882	-1.882 + 0	18.839	-18.839 + 0
<b>TOTAL</b>	<b>7.428</b>	<b>-7.428</b> <b>+ 0</b>	<b>59.677</b>	<b>-59.677</b> <b>+ 0</b>

# Evaluation of variety quality



## - Fruit quality analysis

Análisis	Grupo	Muestra	Clon	Patrón	Localidad	Referencia	F. Recolección	F. Análisis	Realización:	Campaña							
512	2.1	LANE LATE	198	CC	AX	71122	19/05/2005	20/05/2005		2004/05							
Texto584:		-0,00586															
Nº Frutos	8	Peso fruto	243,4	CLR_1	7,23	D1	81,14	H1	75,93	EPS1	7,62	SM1		DSP1	123,4	FRM1	
Peso muestra	1,947	Color	10,4	CLR_2	12,97	D2	80,09	H2	82,53	EPS2	6,88	SM2		DSP2	47,9	FRM2	
Volumen mtr		Ø Fruto	80,5	CLR_3	10,96	D3	89,31	H3	88,46	EPS3	5,98	SM3		DSP3	99,7	FRM3	
Peso desechos	1,184	H Fr:	78,3	CLR_4												FRM4	
Vol. filtrado	0,74	Ø/H:	1,03	CLR_5												FRM5	
Densidad zumo	1,039	Clr fruto	10,42	CLR_6	11,98	D6	82,43	H6	74,63	EPS6	7,54	SM6		DSP6	71,6	FRM6	
Tº	19,2	Acidez:	6,27	CLR_7	12,41	D7	82,56	H7	81,42	EPS7	6,82	SM7		DSP7	27,3	FRM7	
Sol. disueltos	9,9	IM:	15,8	CLR_8	9,74	D8	77,36	H8	76,67	EPS8	5,16	SM8		DSP8	0	FRM8	
Vol. Na OH	4,9	% Zumo:	39,489	CLR_9		D9		H9		EPS9		SM9		DSP9		FRM9	
Factor	1,28			CLR_10		D10		H10		EPS10		SM10		DSP10		FRM10	
OBSERVACION																	

**Data base of citrus varieties**

PERMISSION REQUIRED FOR USE



# Total traceability in the distribution of the material



**Origin of the material**

**Distribution**

**Sanitary state**

**PERMISSION REQUIRED FOR USE**

Fecha	Ref AB	Rf Cliente	Cliente	Cantidad	Cd Entrega	Rf Corte	Rf Clase
23/02/2009	51123	A	AVASA	900	09A01	B0901	
02/03/2009	51123	BNP	Beniplant, S.L.	900	09BNP01	B0901	PC09
28/04/2009	51123	BNP	Beniplant, S.L.	115	09BNP04	B0901	PB09
*							

Año	Nº Af	CTV	VE	VR	PS	CLBV	Rd	Rd	Rd	Rd	F
2009	0900	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2007	0704	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2007	0703	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2006	0602	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2004	0403	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2004	0401	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2003	0301	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2001	0104	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2000	0001	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1998	9801	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Registro: 1 de 3

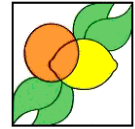
Registro: 1 de 10

Nota: debe trabajarse solo con filtro "clon" y "Ref Corte"

Subformulario Corte - Entrega Material AB

José Folch Beltrán  
08/05/2009 13:01:57

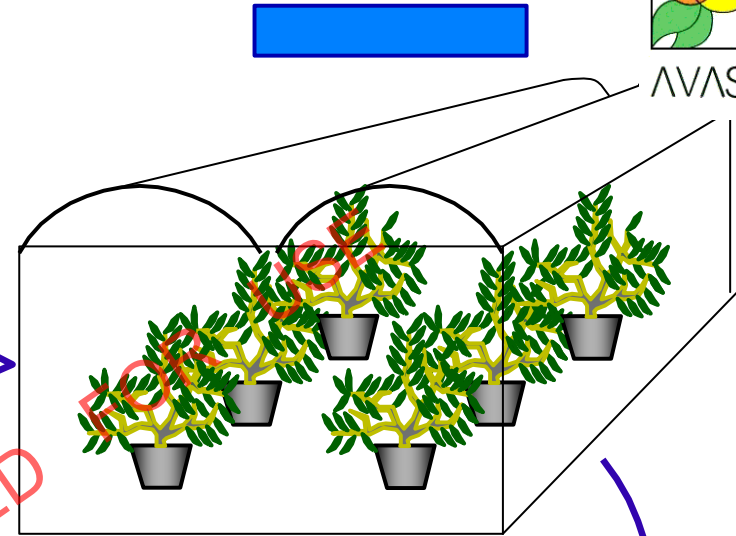
# Production of CERTIFIED material



AVASA

Buds coming from  
Foundation Mother  
Trees

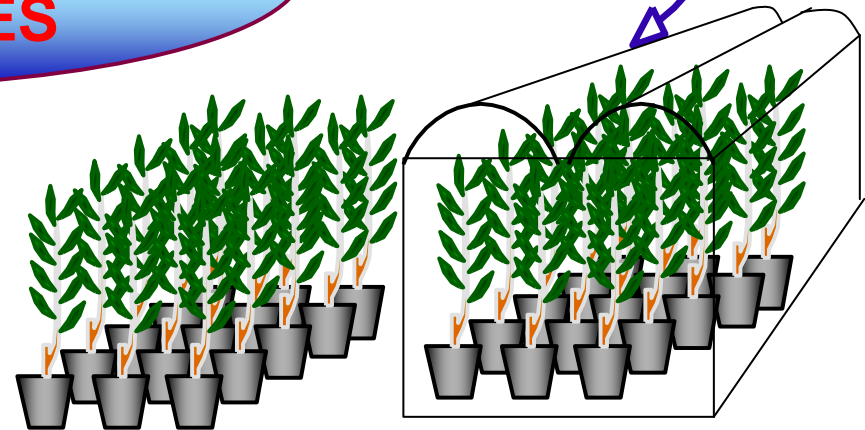
Buds coming from  
Foundation Multiplication  
Fields



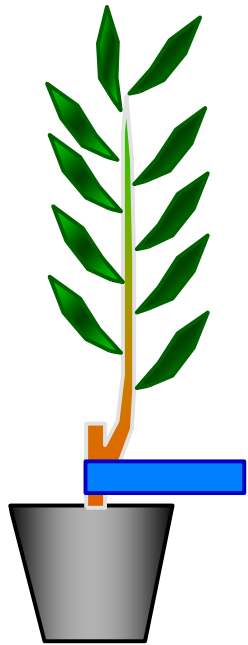
CERTIFIED multiplication  
fields

**AUTHORIZED CITRUS  
NURSERIES**

PERMISSION REQUIRED

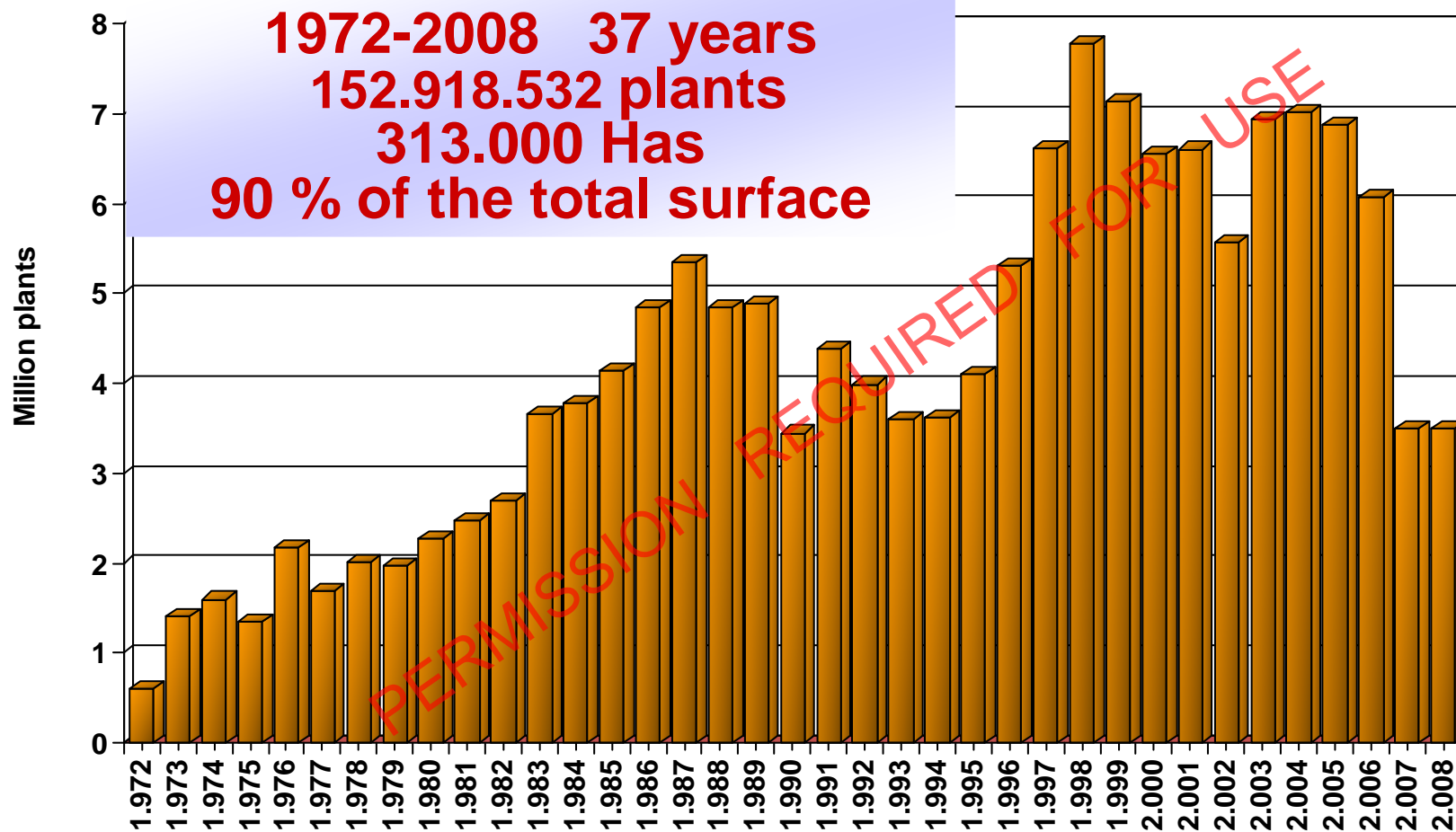


Fields of CERTIFIED plants

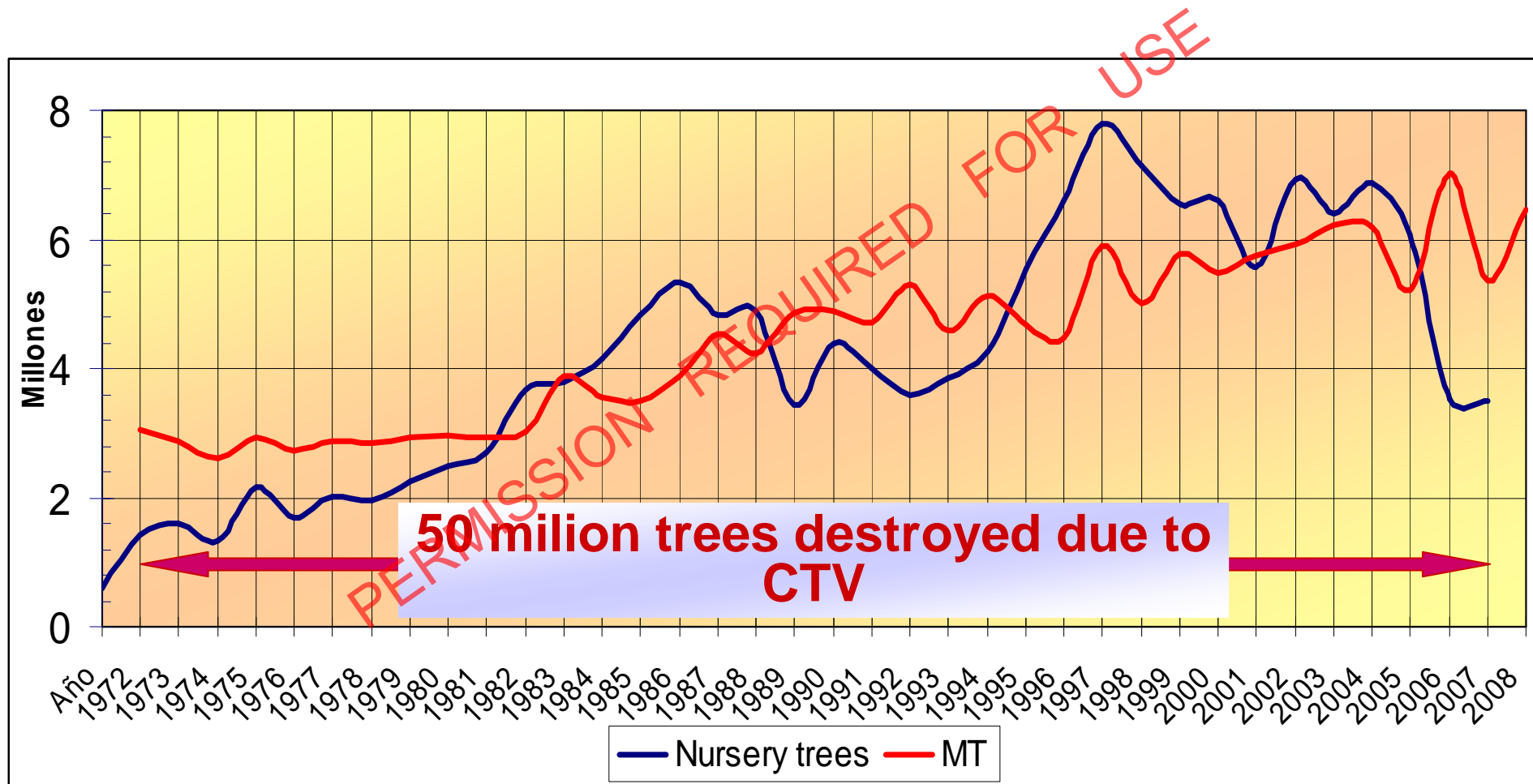
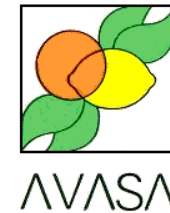


CERTIFIED PLANT

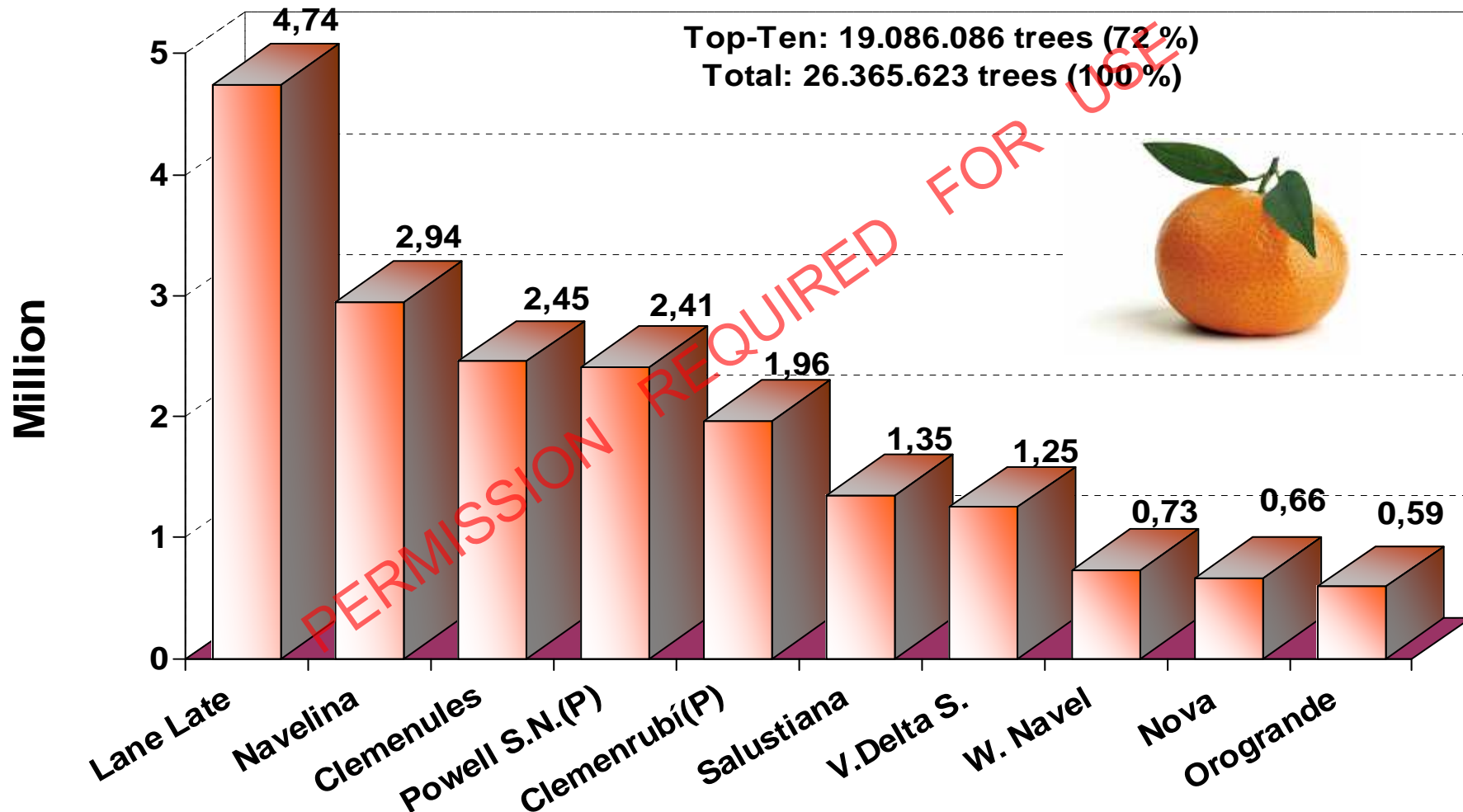
# Historical evolution of certified citrus trees



# Plants vs MT of citrus in Spain



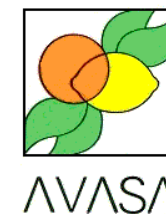
# Certified citrus trees sold in Spain Top-Ten 2004-2008



Source: AVASA, with information facilitated by the Spanish Ministry of Agriculture and the different Autonomous Governments

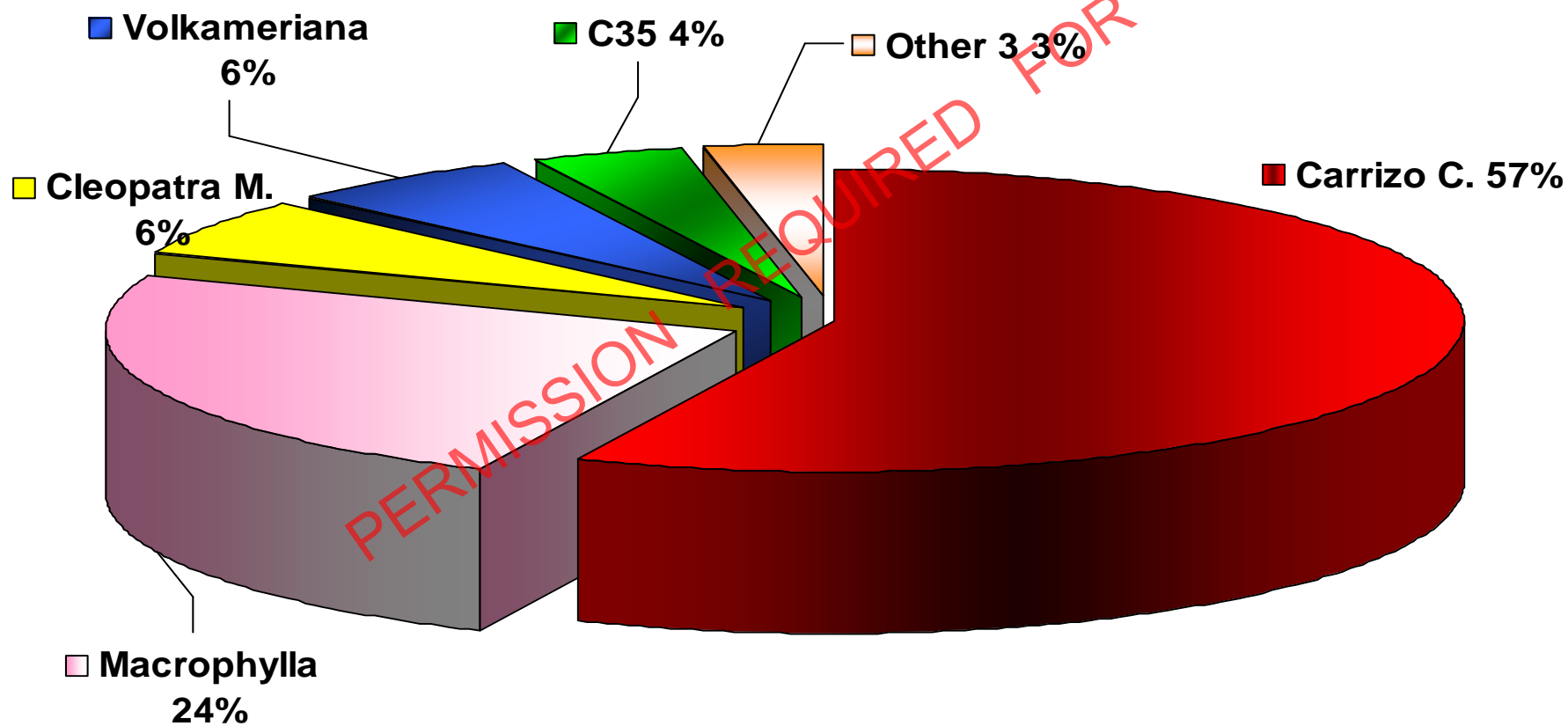
Updated: 04/June/2009

# Number of certified citrus varieties sold in Spain

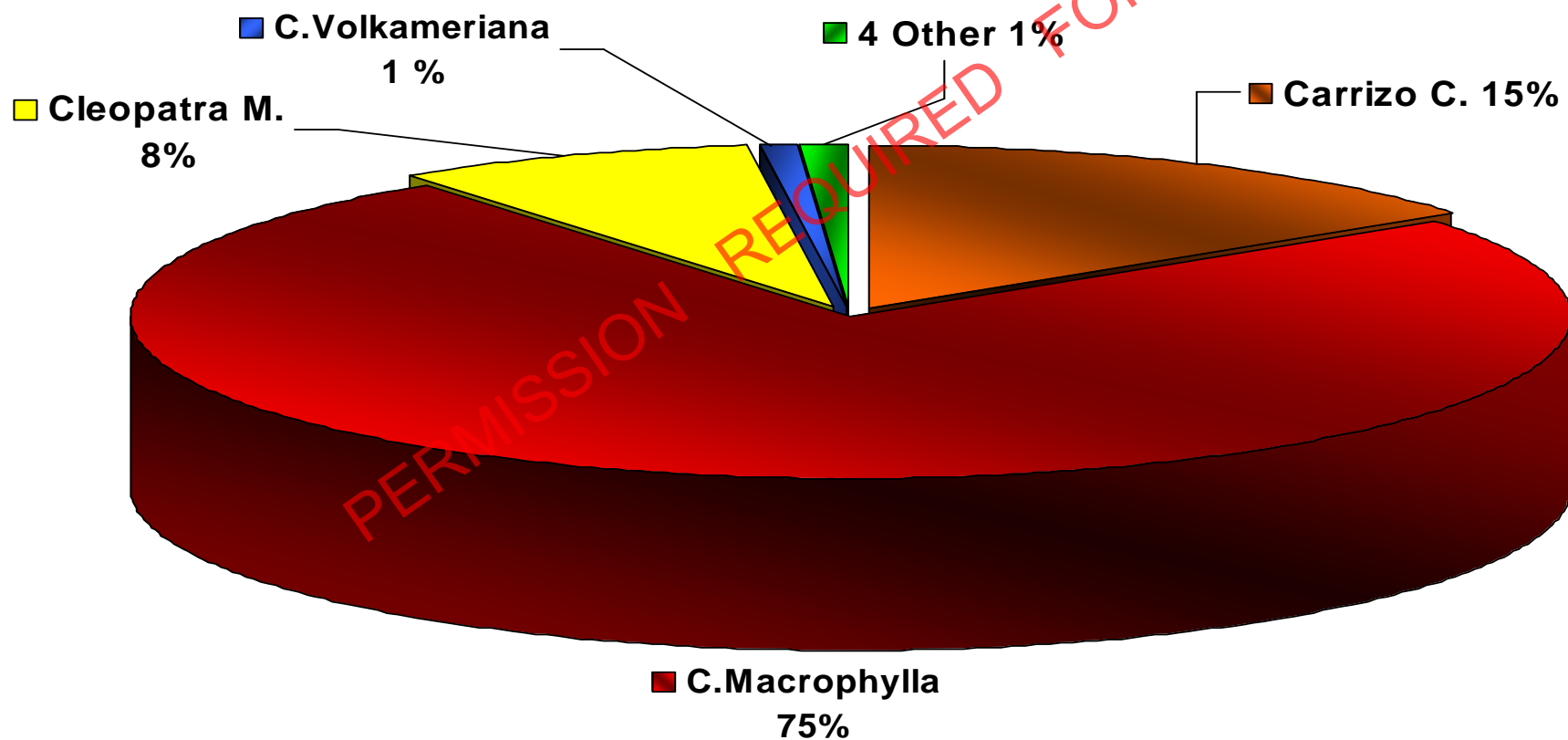


Group / Year	1972	2008
Mandarins	6	34
Sweet oranges	6	24
Lemons	5	6
Grapefruits	2	3
<b>TOTAL</b>	<b>19</b>	<b>67</b>

## 2.008: Rootstocks in Spain

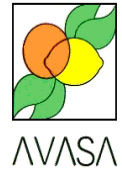


# Rootstocks in Murcia Region 2.008



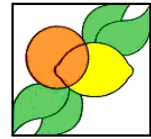


# Obligatory statement for propagating materials



- **Mother tree for seed production**
- **Seedbeds**
- **Rootstock nursery**
- **Increasing blocks of certified buds**
- **Certified nurseries trees**
- **Basic (foundation) mother trees**
- **Remaining plants of the last season**
- **Season summary**
- **Stock of identity labels**
- **Cultivation blocks**

# Structural organization of the Citrus Nurseries



AVASA

## Foundation (base) nurseries

Spanish example of the first Foundation (base) Nursery – AVASA®

- Associated nurseries

Alcanar, S.A.T.

Sevilla, S.A.

Gurbí, S.A.T

Valencia, S.A.T

Gregal, S.L.

Pascual Hnos, S.A.

Centrals, S.A.T.

Beniplant, S.L.

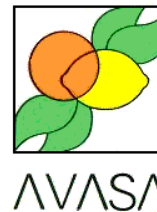
Citroplant, S.L.

Vivercitrus 2.000, S.L.

Vivemur, S.L.

- Location

- Installation



## AVASA: current facilities

- 24.500 m<sup>2</sup> screenhouses
  - Foundation mother tree: up to 990 (D40 container) in 2.700 m<sup>2</sup> & up to 400 ground plants in 12.000 m<sup>2</sup>
  - Multiplication blocks, ground: up to 30.000 in 9.800 m<sup>2</sup>

PERMISSION REQUIRED FOR USE

# Protected Foundation block in AVASA

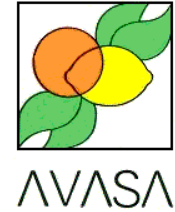
## Average production



- Foundation mother tree in container 50–500 buds/year
  - Between 50.000 & 500.000 buds/year
- Foundation mother tree in ground 1000–4000 buds/year
  - Between 350.000 & 1.200.000 buds/year

PERMISSION REQUIRED FOR USE

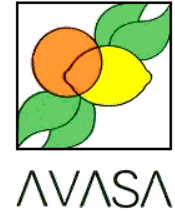
# Protected increase blocks in AVASA average production



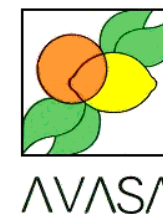
- Duration: 3 years up to 5 years, and they can produce each year:
  - 1st year: 15 buds/plant    -2nd year: 40 buds/plant
  - 3rd year: 60 buds/plant    - 4th year: 90 buds/plant
  - 5th year: 120 buds/plant
- 2000 m<sup>2</sup>/year (6000 plants) must be renew to maintain the cycle

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# AVASA protected increased blocks average annual production



Age (years)	Trees	Production buds/year
1	6000	90.000
2	6000	240.000
3	6000	360.000
4	6000	540.000
5	6000	720.000
<b>TOTAL</b>	<b>30.000</b>	<b>1.950.000</b>



## **Year**                      **Certified Budwood**

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2000                      2.450.500

2001                      2.289.903

2002                      2.234.335

2003                      2.117.150

2004                      2.326.398

2005                      2.635.409

2006                      2.380.145

2007                      2.470.226

2008                      1.865.081

2009                      1.741.656

**Total estimated  
production of  
certified budwood  
in AVASA**

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# AVASA: Budwood obtained during the last 5 years

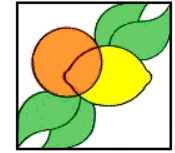


Material	2005	2006	2007	2008	2009
Base (F.)	131.307	100.995	27.500	96.665	114.665
Certified	1.854.000	2.096.000	1.405.000	1.187.000	1.150.000

These figures correspond with the distributed material (50 – 75 % of the total production)



# AVASA: Cutted budwood 1990-2009 (20 Y.)



AVASA

<u>Year</u>	<u>Base (F)</u>	<u>Certified</u>	<u>Total</u>	<u>Year</u>	<u>Base (F)</u>	<u>Certified</u>	<u>Total</u>
<b>1990</b>	57.230	511.000	568.230	<b>2001</b>	72.400	839.900	912.300
<b>1991</b>	492.400	487.200	979.600	<b>2002</b>	145.885	944.000	1.089.885
<b>1992</b>	176.000	519.300	695.300	<b>2003</b>	73.385	1.465.970	1.539.355
<b>1993</b>	154.165	881.400	1.035.565	<b>2004</b>	115.510	1.693.840	1.809.350
<b>1994</b>	169.775	1.073.250	1.243.025	<b>2005</b>	131.307	1.854.000	1.985.307
<b>1995</b>	440.100	1.043.800	1.483.900	<b>2006</b>	100.995	2.096.000	2.196.995
<b>1996</b>	170.205	1.341.000	1.511.205	<b>2007</b>	27.500	1.405.000	1.432.500
<b>1997</b>	267.450	1.636.400	1.903.850	<b>2008</b>	96.665	1.187.000	1.283.665
<b>1998</b>	219.030	1.382.800	1.601.830	<b>2009</b>	114.665	1.150.000	1.264.665
<b>1999</b>	243.100	1.181.200	1.424.300	<b>Total</b>	<b>Bas</b>	<b>Certified</b>	<b>Total</b>
<b>2000</b>	91.200	1.289.550	1.380.750	<b>1990-09</b>	<b>3.357.767</b>	<b>23.982.610</b>	<b>27.340.377</b>

# Cultivation under screenhouses



- Lower water allocation needed due to a lower evotranspiration
- Faster growth
- Exuberant vegetation, trees of bigger size
- Faster evolution of citrus pests (shorter cycles) an more difficulties to control them (mites in particular).
- Higher technical and control requirements to manage trees in container during large periods
- **Light** improvement of the internal maturity ratio and delay of the rind coloring (with lower intensity)
- Larger rind thickness in the fruit
- Fruits with lower hardness and storage capacity, with **lightly** shorter commercialization period
- In spite of these **light differences**, the fruit maintains the standard characteristics of the variety, and let its clear differentiation and pertinent analysis. The comparative evaluation is let, as all varieties are under the same conditions

# AVASA facilities

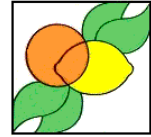


- 24.500 m<sup>2</sup> multichapel screenhouses of 3,5 to 4 m under gutter
- 45.000 m<sup>2</sup> of anti-trip mesh with 16x10 threads/cm<sup>2</sup>.
- 17 enclosures with a double door to accede
- Blocks are separated by anti-trip mesh

**TOTAL: 650.000 € + VAT**

# Structural organization of the Citrus Nurseries

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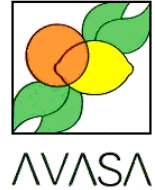
AVASA

## Advantages of the Association compared to the Individual Nurseries.

- Scale economy
- Location selection
- Dimension of the nursery
- Management and development of institutionals helps
- Agreements with IVIA to the maintenance of the parent material
- Analysis and evaluation of Foundation Trees
- Productive capacity and real need of buds:
  - Clemenules or clemenruby pattern
- Introduction of the new varieties “AVASA PRI”
  - Management of license agreements
- Obtention of new varieties

# Current situation

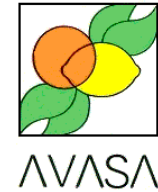
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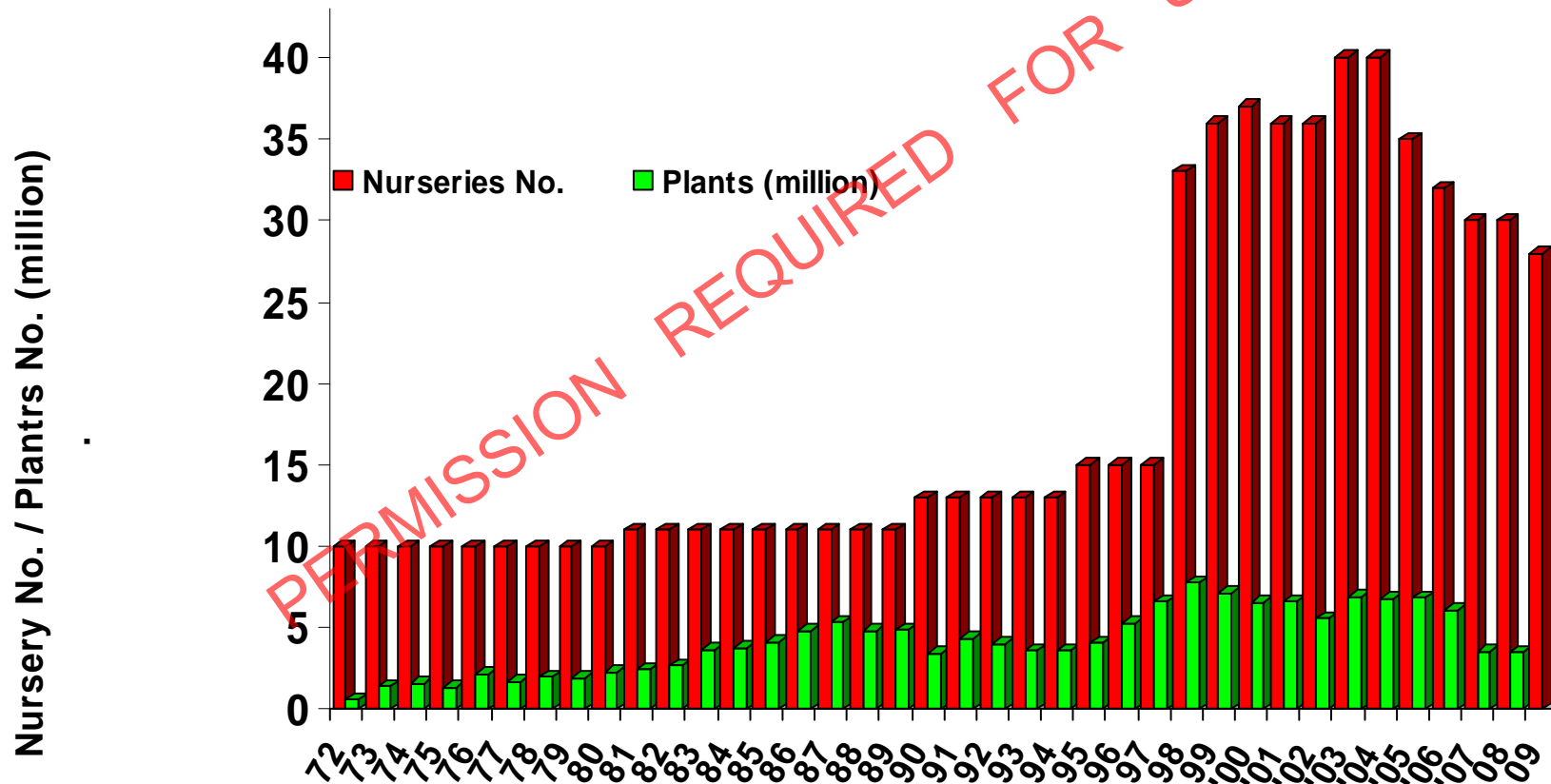
Creation of new companies and dispersion of the production. Evolution of:

- Number of Authorized Nurseries
- Commercialization of citrus plants
- Number of Foundation (base) Nurseries
- New production zones and official control organizations

# Current situation

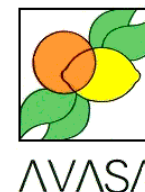


Evolution in the number of Authorized Nurseries  
Evolution in the commercialization of citrus plants

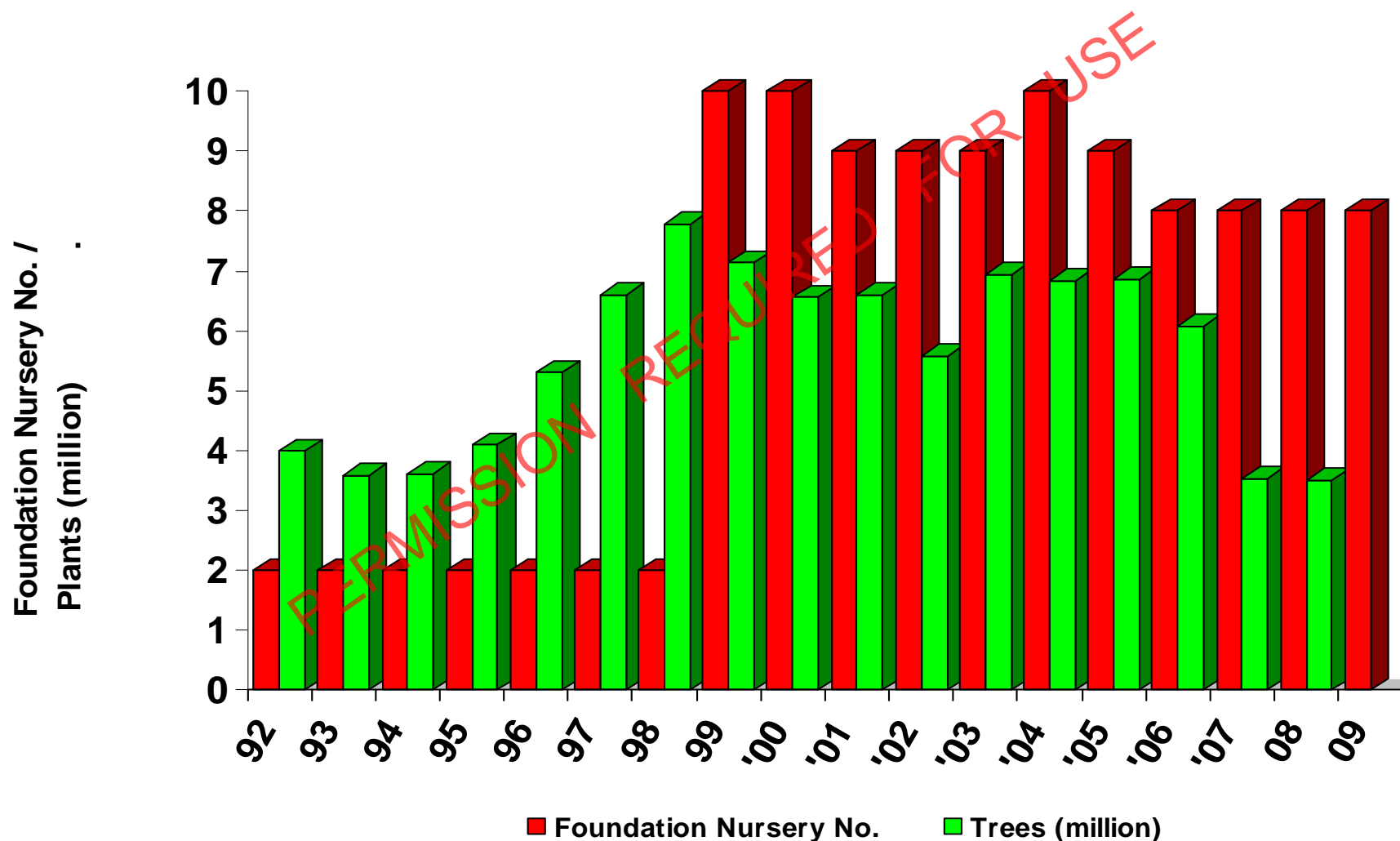


Source: AVASA, with information of the Spanish Ministry of Agriculture and the Autonomous Governments  
Updated: 10/june/2009

## Current situation



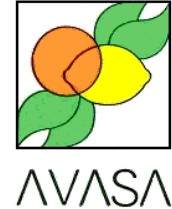
### Evolution of **Foundation Nurseries** and **nursery trees**



Source: AVASA, with information of the Spanish Ministry of Agriculture and the Autonomous Governments. Updated: 08/june/2009

# New work lines in AVASA

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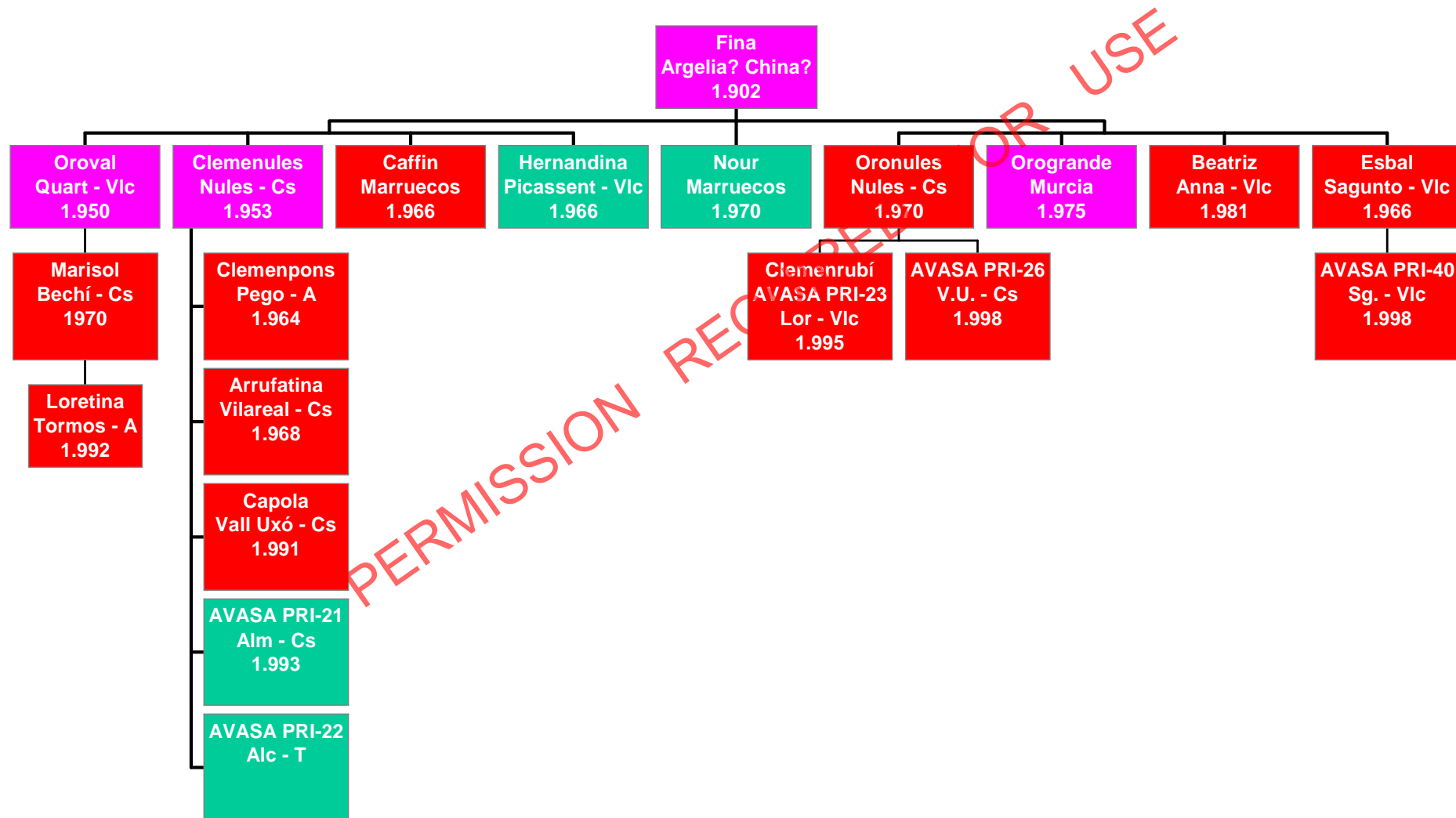


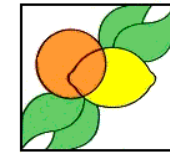
- Obtaining of news varieties
  - Selection of spontaneous mutations
  - Agreements with the IVIA for obtaining triploid hybrids
  - Agreements for obtaining irradiated varieties
- International management of license agreements for citrus patented varieties

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# 20 New improved clementine selections 1902 – 2006





AVASA

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**Selection and  
evaluation of  
improved natural  
mutations**

# Breeding of new varieties. Agreements AVASA / IVIA for obtaining late Triploid Mandarins



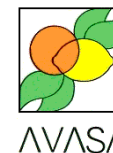
**+ 10.500 Triploids obtained in Spain,  
190 parental combinations**

**Preliminary result about a total of 1.615 evaluated triploid hibrids  
1.107 (2n x 2n) and 508 (2n x 4n)**

Quality	Rippening period			Total
	Middle	Middle – Late	Late	
Intermediate	24	0	13	37
Good	7	0	17	24
Very good	4	2	16	22
<b>TOTAL</b>	<b>35</b>	<b>2</b>	<b>46</b>	<b>83</b>

# Hybrids IVIA - AVASA

$2n \times 2n : + 4.000$



## Female parent

Fortune

Clemenules

Hernandina

Marisol

Fina

Monreal

## Male parent

Fortune

Nova

Murcott

M. Común

Ellendale

Kara

Ortanique

Freemont

N. Comuna

Clemenules

Loretina

Tang. Orlando y Mineola

IVIA

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# Hybrids IVIA - AVASA

**2n x 4n : 3500**

**4n x 2n : 3000**



## Female parent

Clemenules

Hernandina

Fina

Marisol

Fortune

## Male parent

Tangelo Orlando

Naranja Pineapple

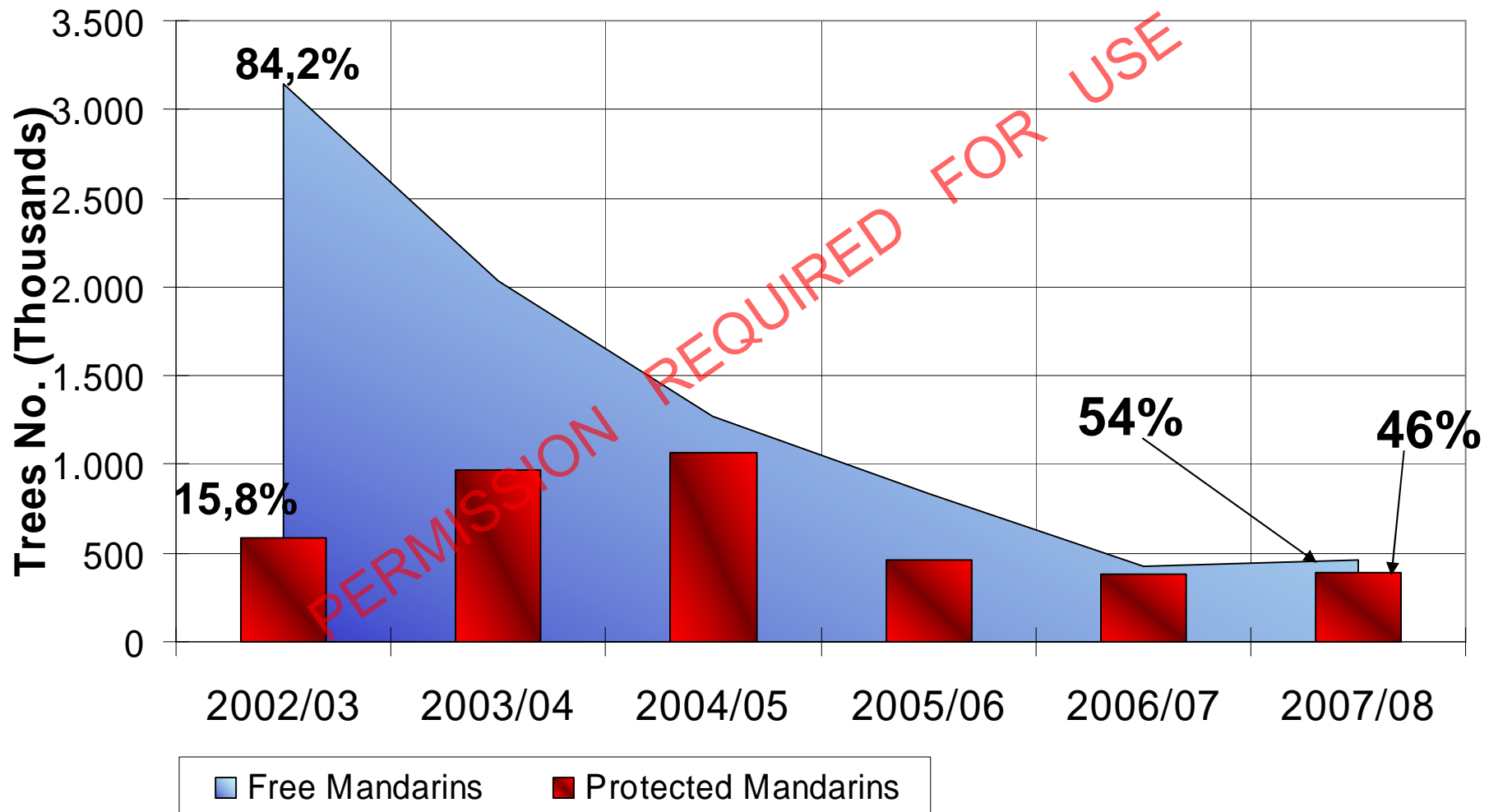
Nova

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IVIA

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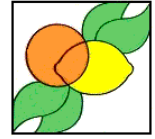
# Evolution in the commercialization of Mandarin versus protected/patented varieties. 2002 – 2008



Source: AVASA with with information of the Spanish Ministry of Agriculture

# Summary and conclusions

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AVASA

Problematic of the Spanish citrus nurseries before having available known diseases free varieties.

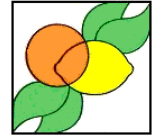
Consequences of the use of diseases free varieties by the Spanish nurserymen

Impact of the Sanitary and Certification Programs in the Spanish citrus industry.

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## Problematic of the Spanish citrus nurseries before having available known diseases free varieties

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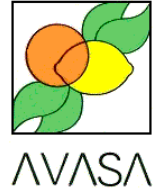
AVASA

- Production of plants with a low-quality
- High production costs. Infected varieties with a poor vigor.
- Rejection of the grower to pull up the plantations and to acquire new plants.
- Existence of small clandestine nurseries.

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# Consequences of the use of diseases free varieties by the Spanish nurserymen



- Association of nurserymen to the establishment and maintenance of pathogen free initial material.
- Production of certified plants with a high quality.
- Reduction of the production costs.
- High demand of certified plants by the grower.
- Important reduction of clandestine nurseries and an increase of authorized nurseries.
- Increase of the total sales
- Become more technical all the propagative processes.
- Possibility of export disease free propagation material (foundation and certified).

# Impact of the Sanitary and Certification Programs in the Spanish citrus industry



- Production and quality of fruit are increased between 15 to 20 % in new plantations
- Restrictions in the use of rootstocks, concerning the sanitary state, have been eliminated
- Increase in the number of high quality varieties, available for propagation.
- Adjustment between the production structure and the international market demand.
- Since 1.972, the beginning of the Spanish certification, more than 100 million of citrus plants have been established in Spain.
- These new plantations will increase their benefits, approximately 200 million € / year, when they reach full production.