Almond Industry in Spain and France

Neale Bennett
Almondco Australia Ltd

Project Number: AL07011

AL07011

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the almond industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of Almondco Australia.

ISBN 0 7341 1630 6

Published and distributed by:

Horticultural Australia Ltd

Level 7
179 Elizabeth Street
Sydney NSW 2000
Telephone: (02) 8295 2300
Fax: (02) 8295 2399

E-Mail: horticulture@horticulture.com.au

Final Report

Almond Industry in Spain and France

Study Tour

September, 2007

Project AL07011

Authors:

Neale Bennett
Ben Brown
Tony Spiers

November 4, 2007

Investigative team

Neale Bennett
PO Box 4
Merbein, Victoria, 3505

Ben Brown
PO Box 2246
Berri, South Australia, 5343

Anthony Spiers
PO Box 501
Renmark, South Australia, 5341

This report is to document the findings made on the study tour of Spain and France in September 2007. It will also document any recommendations to be pursued by the Australian Almond Industry.

Funded by

Almondco Australia Limited

Horticulture Australia Limited

Media Summary

The Australian Almond Industry had a history of following the Californian Research and Development program. In the mid 1990's, the Californians stopped sharing of R & D freely, forcing the Australian Industry to look elsewhere for help.

In 1999, a delegation went to Spain to explore the Spanish industry as the Mediterranean climate is very similar to that of Australia.

A major weakness of the Australian Almond Industry is its limited number of proven rootstocks. The 1999 tour found there were several new rootstocks that had potential for use under Australian conditions.

The Spanish Almond Industry is traditionally grown without irrigation in dry land conditions. The current drought conditions Australia is experiencing raises the question "can almonds be grown commercially with limited water".

Findings from the tour were as follows:

- Four rootstocks, two with resistance to nematodes, were identified as the most commonly used rootstocks in the Spanish industry and illustrated the greatest potential for Australian conditions.
- Dry land almond orchards are being abandoned or pulled out as they do not produce a financially viable crop. Newer orchards with irrigation are replacing the existing orchards slowly.
- Spanish almond production is declining but consumption is going up. There may be an opportunity for Australia to grow Spanish varieties to supply their market.
- Government funded desalination plants are being experimented with as a new source of water for irrigation.

The following recommendations are being made to the Australian Almond industry for consideration:

- Import the 4 rootstocks identified for evaluation under Australian conditions.
- Maintain communications with Spanish researchers to develop a working relationship and an exchange of knowledge.
- Establish a trial of Spanish varieties to evaluate quality and market acceptance.
- Establish communications with Australian Government bodies to explore the possibility of developing desalination plants for use in irrigated horticulture.
- Invite Spanish researchers to Australia to review the industry breeding program.

Introduction

The Australian Almond Industry has had a strong history of following the Californian research and development program. In the mid to late 1990's, the Californians stopped the sharing of R&D freely, forcing the Australian Almond Industry to look elsewhere for leads and support. In 1999, a fact finding tour which included leading growers and researchers wet to Spain to explore the possibilities of collaborative research with the Mediterranean almond industry. This proved to be a major turning point for the Australian Almond Industry as it not only launched a strong Australian-Mediterranean relationship but we leapt ahead of our international competitors in the production and R&D field.

The Australian Almond Industry must stay internationally competitive and to do this it must ensure; the production and processing of almonds remains efficient, the cultivars are agronomically sound and the produce meets market expectations. A major weakness for the Australian Industry has been the limited availability to only a small number of proven rootstocks that can handle the harsh Australian environment, a climate very similar to that of the Mediterranean. In 1999, a number of potential new rootstocks were being developed and trialed in the Mediterranean and they now need to be examined and evaluated in Australia.

Objectives

- To revisit the research centers and farms from the previous 1999 trip to review the progress that has been made regarding potential new cultivars and rootstocks.
- Identify which new cultivars and rootstocks which would strengthen the Australian Industry.
- To examine the processing and manufacturing industries and evaluate any potential new avenues for the consumption of almonds.
- To strengthen the relationship with key researchers who currently collaborate with our plant improvement program.
- To observe and research what strategies are used to grow almonds under drought-like conditions.
- Report to levy payers and researchers and provide an update on the findings of the overseas trip.

Study Tour Members

Neale Bennett
Grower
Elected member of Almond Board of Australia

Anthony Spiers
Grower
Elected member of Almond Board of Australia

Ben Brown
Industry Liaison Manager for Almond Board of Australia

Day 1 – 12th September, 2007

Alicante, Murcia, Grenada
Professor Rafael Martinez (PRM)

Almond Orchard - Murcia

- Varieties planted, 25% Ferragnes & 75% Ferraduel.
- Rootstock = GF677.
- 5m x 2m spacings.
- 1,000 trees/Ha.
- 9 years old.
- Estimated yield of approx 3-3.5 T/Ha.
- Water use of approx 3-4 ML/Ha.
- Irrigation water salinity of 2.5-3 dS/m.
- 100mm rainfall.
- Soil type = calcareous loam.

Outcomes for Australian Almond Industry

- The use of GF677.
- Higher densities, at least trial 5m x 2m but possibly 4m x 1-1-5m with a central leader training system. May need to look at suitability of the current harvest machinery.
- Higher densities may need tree vigour controlled by competition, growth regulators, herbicides (e.g. MCPA requires trialling at 10mL/1000L), dwarfing rootstocks, rootstocks with low chill requirements (there is apparently one Russian example), cincturing.

Finca San Antonio (San Antonio Farm)

- Citrus orchard trialling irrigation with desalinated water from the Mediterranean Sea. Water is being piped 25km from the sea and desalination plant.
- Trial is being funded by the European Union (EU) and PRM is one of the trial directors/consultants.
- Afourer mandarins.
- Rootstock = Macrophilla.
- 6m x 2m tree spacing.
- 833 trees/Ha.
- 3-4 years old.
- Estimated yield of approx 85-90 T/Ha.
- Water use of 6ML/Ha.
- 2 x 4L/hr button drippers per tree.
- Irrigation water salinity after desalination of 2.5 dS/m.

- Boron concentration is the problem with desalinated sea water, especially with citrus, not so much with prunus (almonds). Desalinated sea water has boron content of 248ppm.

Outcomes for Australian Almond Industry

- With prunus "reasonably" tolerant to boron this technology shows great promise to the Australian almond industry particularly if bore water is used as opposed to sea water. Bore water normally has significantly lower levels of total salts and boron.
- The greatest possibility is the use of the naturally occurring saline, ground water mound underlying the Murray Darling Basin. In South Australia there are several Salt Interception Schemes (SIS's) which are already installed and there are extensive plans for the installation of further schemes in the future. This infrastructure could be utilised to recover some of that water for irrigation following desalination and the effluent disposed in the existing evaporation basins.

Almeria Almendras - Grenada

- Almond cracker
- Visited some new orchards but still very traditional.
- Varieites planted, Guara (self fertile)
- Rootstock = GF677
- Standard tree spacings, approx 280-300 trees/ha
- One drip line with one button dripper placed between the middle of each tree
- Irrigation is minimal

Outcomes for Australian Almond Industry

- The use of GF677.
- The use of self fertile varieties.

Day 2 – 13th September, 2007

Alicante,
Professor Rafael Martinez (PRM), Juan & Jaime Puigcerver

INCUS Tech - Alicante

- Manufacturers of almond and spice processing equipment

Outcomes for Australian Almond Industry

- The use of this equipment already in place in Australia, the industry needs to keep up to date with any new technological advances.

Almond Processors – Manolet and Colefruss - Alicante

- Almond processors using INCUS Tech equipment

Almond Nougat Factories – Turrones Jose Garrigas - Jijona

- Visited an area where the population is approx 20,000 and the majority of which are involved in the almond industry in some form or another.
- Nougat recipes are secretive.
- Produce hard nougat and soft nougat and sometimes mixed with fruit, e.g. sweet and sour cherries, pumpkin.

Outcomes for Australian Almond Industry

- The importance of almonds in value adding. The nougat was very tasty and from our experience a lot better than Australian nougat. Nougat not a commonly eaten sweet in Australia but quite common in Europe may need some better marketing.

Hermisan

- Private company, who constructs, produces, manages and maintains equipment for water desalination.
- Two types of membranes used depending on the salinity of the water:
    - <25dS/m – Cheaper and easier
    - >25dS/m – More energy hungry and expensive
- Desalination of bore water or sea water.
- The main disadvantages are the power requirements and the effluent (i.e. salt) disposal.
- Effluent disposal is expelled from the plant under pressure (approx 10-13 bar).
- The plants normally use 25% of the water for disposal of the effluent. The other 75% is retained for water use.
- The effluent is normally disposed of back to the sea or lake from which it came.
- Hermisan are the most experienced company with desalination in Spain, they have numerous plants already operational.
- State governments are building "larger" plants against federal government's wishes. Federal government prefer smaller plants due to the quantity and handling of the effluent. Preferably, 25-50m3/hr as the effluent is smaller. Smaller plants for smaller growers suits.
- Approx energy costs are:
    - <25dS/m = 0.55kW/m3
    - >25dS/m = 5.00kW/m3
- Boron quantity is a concern, normally 1ppm in standard irrigation water, 3.5ppm in sea water and 1.8ppm in bore water. Boron levels in standard water and bore water are adequate but sea water too high.
- PRM is using special irrigation and nutritional solutions to block the uptake of boron in the plant. The leaf analysis is still indicating 240ppm but not affects on citrus tree or fruit.

- It was realised that in SA there was very good opportunity for desalination of the salt interception schemes.

Outcomes for Australian Almond Industry

- A very good option for almonds as per the above outcomes.
- A feasibility study required to determine the cost, relevance and suitability of this technology to the Australian irrigation industry as a whole.

Day 3 – 14th September, 2007

Alicante,
Professor Rafael Martinez (PRM), Juan & Jaime Puigcerver

Almond Orchards – El Manan Co operative - Pinos

Outcomes for Australian Almond Industry

- The use of GF677.
- The use of self fertile varieties.

Day 4 – 15th September, 2007

Travel to Reus.

Day 5 – 16th September, 2007

Reus.

Day 6 – 17th September, 2007

Mas de Bover – IRTA, Xavier Miarnau i Prim & Francisco (Paco) Vargas.

Almond Cultivar Breeding

- Please see Appendix 1 for more detail.
- Breeding aims include, late flowering for better frost control, high production capacity, easy training and pruning, better drought tolerance and minimisation of alternate bearing, high quality kernel (hard shell, absence of doubles, good pest and disease resistance and good visual appearance) and recently self fertility.
- Breeding crosses began in 1973 and program completed in 2005

- Two rounds of cultivar releases:
    - 1990 – Masbovera, Glorieta and Francoli
    - 2005 – Vayro, Marinada, Constanti and Tarraco
- In self fertile (sf) orchards it is still recommended to use bee hives and alternate rows of different varieties (sf or non-sf varieties) as sf's in isolation and without bees have a tendency for smaller and less fruit set and therefore yield.

Outcomes for Australian Almond Industry

- 2005 cultivar releases.
- The use of self fertile varieties.
- The use of hard shelled varieties for better bird control.
- The use of Spanish varieties (Italian parentage) in our breeding program to enable better cropping on wood older than 1 year and therefore build better drought tolerance.
- Later flowering cultivars for better frost control.

Almond Nursery, Field Grown – Arboreto Co-operative

- Main cultivar was Guara which is self fertile.
- Rootstock was GF677.
- Achieved growth of approximately 2cm per day.
- Two nurseries, this nursery produces approx 100,000 trees per year, the other nursery produces approx 500,000 trees per year.
- Procedure is to receive grafted cultivars on GF677 from Agromillora in small pots through Early June, transplant into the ground, grow tree and plant in the orchard through December.
- Water and fertigate every day with drip irrigation.
- Sell the trees to growers for approx 2.50 to 3.00 Euros depending on the cultivar, more expensive for the newer cultivars.

Outcomes for Australian Almond Industry

- The use of self fertile varieties.
- The use of GF677.
- The use their basic but effective training/trellis system to aid in the upright growth of the vigorous GF677.

Day 7 – 18th September, 2007

Lleida – IRTA, Xavier Miarnau i Prim & Dr Simo Alegre.

IRTA's New Almond Cultivars

- Randomised Block Design of Plantings.

- Please see Appendix 2 for more detail.
- Includes some reference trees.
- Tree spacings of 6m x 5.5m.
- Patch 1 (Masbovera, Glorieta, Francoli, Ferragnes, Guara, Lauranne) = 8years old.
- Patch 2 (Constanti, Vayro, Marinada, Tarraco) = 6 years old.
- 2.5ML/Ha plus 350mm rainfall.
- GF677 rootstock.
- Fert of 60:30:140 (N:P:K).
- Prune all trees every year to just clean them up, particularly the insides.
- All trees produce large amounts of crop on old wood.
- Practiced some RDI with 20% less water applied through summer than what would normally be required.

VARIETY	**BLOOM DATE**	**HARVEST DATE**	**YIELD (kg/ha)**
Constanti	28-30 days after Larguetta	Mid September	1,152
Vayro	28-30 days after Larguetta	End August	1,526
Marinada	38 days after Larguetta	Mid September	1,151
Tarraco	38 days after Larguetta	Mid September	989
Masbovera	21-3-06		1,400
Glorieta	21-3-06		1,900
Francoli	25-3-06		1,900
Ferragnes	24-3-06		1,450
Guara	22-3-06		1,070
Luarrane	24-3-06		1,400

- Guara is a very popular tree being planted in Spain, it is very vigorous, self fertile but is far from being the best tree due to high doubles (10-12%) and poor tree structure.
- Ferragnes has a problem of having two layers to its shell and therefore problems in the cracking factories.

Outcomes for Australian Almond Industry

- 2005 cultivar releases.
- The use of self fertile varieties.
- The use of hard shelled varieties for better bird control.
- The use of Spanish varieties (Italian parentage) in our breeding program to enable better cropping on wood older than 1 year and therefore build better drought tolerance.
- Later flowering cultivars for better frost control.

Day 8 – 19th September, 2007

Lleida – IRTA, Xavier Miarnau i Prim.

Almond Nursery – El Viverode Abel

- Potted nursery.
- 80% almonds, 20% peaches and olives.
- 70% of almonds is Guara.
- 70% GF677 rootstock, 20% Garnem, Felinem, Monegro, 10% Adesoto.
- Adesoto is a low vigour rootstock but has good tolerance to waterlogging and salinity.
- Believes the pot design is very important. They have to have vertical barriers to force the roots down and to stop the roots going around the pot. The pots also have to be well drained.
- Trees are grafted in May and sold in October.
- The trees are shipped off in boxes of approximately 80cm, smaller enough to fit in the boot of a station wagon.
- The pots can be laser planted.
- There is a nearby nursery which is a hydroponically grown nursery and achieves growth of 1-2cm per day.
- Trees are sold at 3-4 Euros plus a 0.30 Euro royalty if need be.
- 250,000 almond trees sold in 06/07.
- Spring and Autumn grafts are a chip graft.
- Winter graft is a wedge graft.

Outcomes for Australian Almond Industry

- The use of pots for laser planting in larger orchards.
- The use of self fertile varieties.
- The use of GF677.
- The use of other hybrid rootstocks, Garnem, Felinem and Monegro.
- The use of different grafting methods based on the season, not always a chip graft.

New Irrigated Orchard

- Two different aged plantings, 2006 and 2000.
- 100% Guara.
- GF677 rootstock.
- 2006 plantings were 5.5m x 3m.
- 2000 plantings were 6m x 4m.
- Young trees planted with laser planter, 18Ha in 5 days.
- Water use of 3ML/Ha.
- Yield of 1.5T/Ha.

- Harvested with a machine called "Tenias" which harvests by straddling the row like a grape harvester but not shaking with any wish bones. The Tenias still grabs a hold of the trunk and shakes it like a Californian shaker but the nuts are shaken onto a belt at the bottom of the machine and on both sides of the machine, not shaken to the ground. The nuts on the belt are transported to the back of the machine where there is a drum to de-husk the nuts. The Tenias can shake trees of 4-4.5 metres high. The Tenias is manufactured in Zaragoza, Spain and there are approximately another 12 in operation across Spain.
- Any nuts not caught by the Tenias are picked up with a small Italian made sweeper, the "Demasi" (www.demasi.it).

Outcomes for Australian Almond Industry

- Over the row harvester.
- Potted trees used in laser planting.

New Dryland Orchard

- Dryland orchard but will irrigated with a new irrigation trust being installed through the area. Irrigation water will be operational next season.
- Irrigation trust is 70% government funded and 30% user funded.
- Irrigation allocation will be 5ML/Ha.
- Different training system due to windy conditions. The trees are not feathered in the fist two seasons so that the trees do not become top heavy and fall or lean with the wind and to also achieve a thicker trunk. The lower limbs are removed in the winter between year 2 and 3.

Day 9 – 20th September, 2007

Agromillora – Mariangela Mestre Gras.

Agromillora Nursery

- Olives, stonefruit and almonds.
- Mostly GF677 rootstock.
- Supply rootstocks or rootstocks grafted.
- They used to deal with growers but now only deal only with nurseries.
- Export to Morocco, Germany, France and Italy.
- Produce 10,000,000 rootstocks.
- 1,500,000 rootstocks grafted to almonds.
- Chip budded with the "shield" left on to hold in the bud.
- New rootstocks, Rootpac 70 & 90, essentially a Cadaman x GF677.
- GF677 propagation process:
    - Clean jars (mechanised).
    - Inject media into jars (mechanised).

    - Plastic film over jar (mechanised).
    - Travels into next room via a heated/disinfection oven (mechanised).
    - In vitro propagation with plants evenly spaced around the media.
    - Transplanted to micro-pundit which is grown within a protected hot house.
    - Transplanted to larger pundit and grown out in the open hot house.
- Virus tests all material regularly.
- Grafting process involves a conveyor belt with individual grafting tables, computers, bar codes, laser scans.
- Happy to consult to Australia if an arrangement setup.

Outcomes for Australian Almond Industry

- The use of GF677 and in vitro propagation.

Day 10 – 21st September, 2007

Barcelona – free time.

Day 11 – 22nd September, 2007

Barcelona – free time.

Day 12 – 23rd September, 2007

Barcelona/Avignon – Travel.

Day 13 - 14 – 24th to 25th September, 2007

Avignon – INRA, Henri Duval and Ctifl, Muriel Millan.

Eurytoma Amygdali

- Wasp.
- Though to have originated from Asia.
- In France since 1980.
- Heading south to Spain, currently in Marseille.
- Can infect up to 80% of the crop.
- Larvae causes mummy nuts, adults emerge in spring to mate, Adults lay eggs in young fruit, larvae hibernate and eat young fruit and starts again.

- Treatment involves reshaking and burning of the nuts, 2 sprays with a Pyrethrinoid while adults are unprotected and mating. Organophosphates have been unsuccessful.

Armillaria mellea

- Soil inhabiting fungus.
- Causes root rot, different to phytophthora.
- No registered control.
- Rootstock tolerance but no resistance.
- Good ground preparation required in replant situations.
- Stag-horning can regenerate an infected tree.

New Rootstocks

- INRA Pre-selections (ZH4,5,6,8), Nemaguard x Davidiana Peach (P1908). Tolerance to rootknot nematode.
- EU Rootstock Breeding Program, Felinem x Plum (P2175) or Felinem x Plum (P2980). 1,000 progeny being screened to 150. Trying to produce a rootstock with a high resistance to root knot nematode, good adaptation to water logging, iron chlorosis, drought, good grafting compatibility and good rooting ability. Introducing a second gene of nematode resistance with the plum cross, however, compatibility is an issue with almond because of a larger genetic separation.

Ctifl

- Technical institute for fruits and vegetables
- French almond cultivar assessment. Cultivars; Lauranne, Ferraduel, Ferragnes and Mandaline.

Other rootstocks

- Myran – suitable for acidic soil, pH less than 7.5, good vigour, better graft compatibility with almond compared to plum, tolerant to heavy soils compared to GF677.
- Cadaman – good graft compatibility, vigour similarly high to GF677, better tolerance to water logging and nematodes compared to GF677.
- Ishtara – good all rounder for all prunus species, good for fruit size in peach and plum, brittle wood.
- Barrier – lower vigour but good for vigorous scion.

Outcomes for Australian Almond Industry

- Keep abreast for the eurytoma amygdale.

- With new almond areas heading towards some of the stonefruit areas need to keep a look out for armillaria mellea. Present in the Goulburn Valley.
- Keep abreast of the new two new rootstock groups coming out.

Day 15 – 26th September, 2007

Paris – Rungis International Markets, Patrick Marchandou

- 232 hectares
- Four entries
- 27 through roads recording on avg 26,000 vehicles/day, inc 3,000 trucks
- 18 million European consumers
- 12 million within a 150km radius around Paris
- Activity sectors:
    - Fruit & veg
    - Meat
    - Sea & river produce
    - Poultry produce
    - Dairy produce
    - Traiteur produce
    - Cut flowers
    - Gardening & decoration products
- Business centre
- Warehouse zone
- Represents:
    - 50% of Paris' sea & river produce
    - 45% of Paris' fruit & veg produce
    - 35% of Paris' meat produce
    - 50% of Paris' cut flowers & plants
- Sales of 7.1 billion Euros
- 20,400 regular buyers
- 7,261 wholesalers

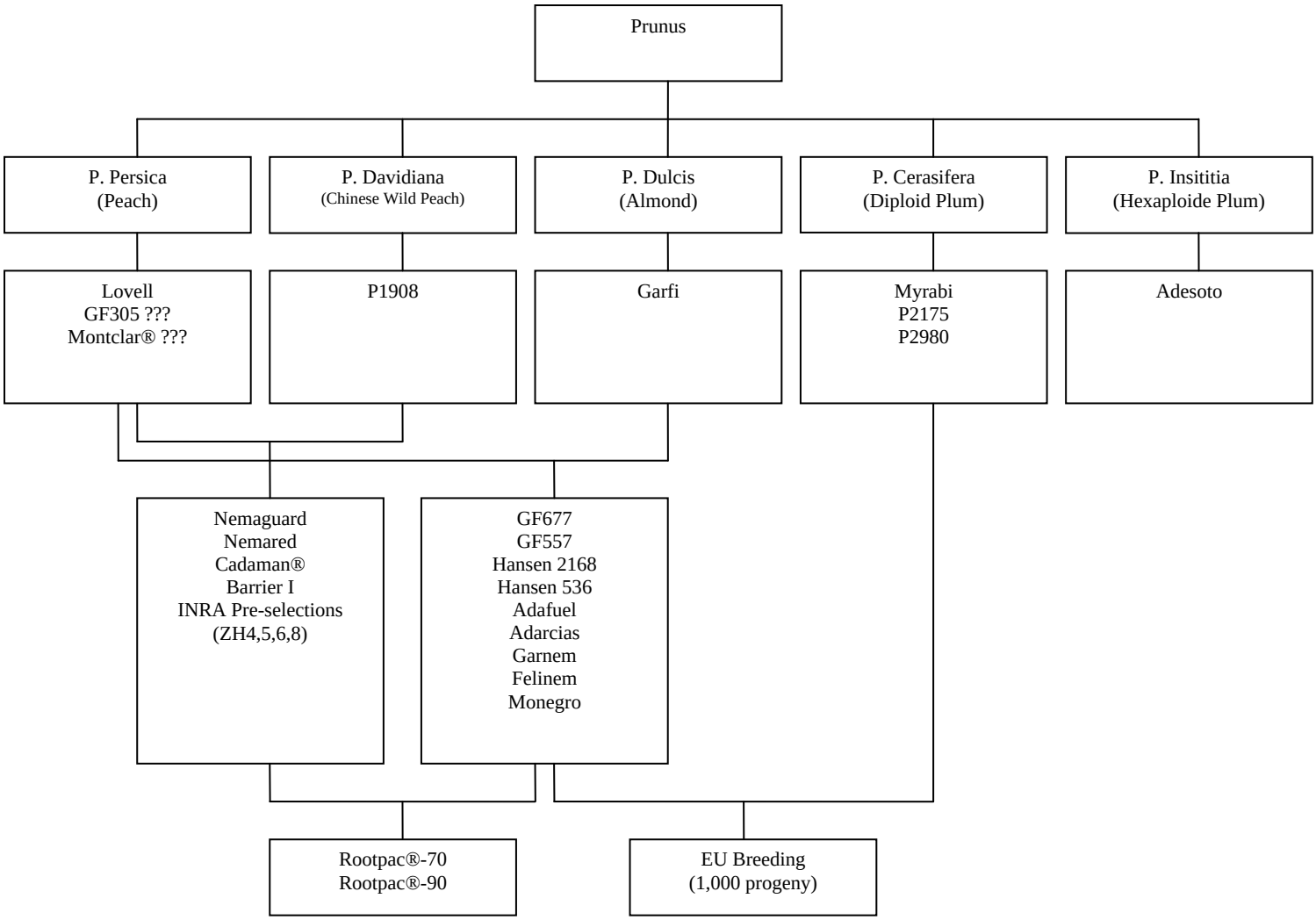
Outcomes for Australian Almond Industry

- Centralisation and efficiency of produce logistics.
- A greater importance placed on food as a way of life not just a commodity.

APPENDIX 1 – IRTA Cultivars, Released 2005.

Variety	Full Bloom	Self Fertile	Yield Potential	Precocity	Vigour	Growth Habit	Branching Density	Training
Vayro	Early Sept	Yes	VH	Early	VH	Med	Mid	V.Easy
Marinada	Early Sept	Yes	VH	V.Early	M	Med-Upright	Mid	V.Easy
Constanti	Early Sept	Yes	H-VH	Early	H	Med-Upright	Mid	V.Easy
Tarraco	Early Sept	No	VH	V.Early	M	Med-Upright	Mid	V.Easy

APPENDIX 2 - ROOTSTOCKS



Dissemination of Information

- This report will be made available through HAL to all members of the Australian Almond Industry.
- A presentation has been presented to the Australian Almond Industry at the Almond Board of Australia Conference held in Mildura on November 1 & 2, 2007.
- Presentations will also be made to smaller grower groups.
- This report will be made available to stakeholders through the members section of the Almond Board of Australia's website. www.australianalmonds.com.au .
- Copies of the report will be distributed to the ABA Executive and IAC.

Recommendations

The following recommendations are made for further discussion:

- That rootstocks found to perform in conditions similar to that of Australia be imported for evaluation. These include Garnem, Felinem, Monegro, Adesoto, Rootpac70, Rootpac90. Furthermore, the almond industry needs to keep abreast of the new rootstocks ZH4, ZH5, ZH6 and ZH8 and the new rootstocks coming out of the EU breeding program, as these have potential for Australian conditions.

- A stronger working relationship be continued and developed with IRTA and INRA to exchange knowledge and encourage future visits to Australia to meet Australian researchers.

- A high density orchard trial be started to evaluate it's performance under Australian conditions using vigorous rootstocks such as GF677 for maximum efficiency.

- Spanish cultivars be imported for evaluation in Australian conditions and also for evaluation by Australian Almond processors.

- The Almond Board of Australia lobby government bodies for an investigation into the use of desalinated water in irrigated horticulture.

Itinerary

September 10
Fly Adelaide – Alicante

September 11
Arrive Alicante

September 12
Professor Rafael Martinez

- Visit high density almond orchard
- Visit San Antonio farm – desalination trial on citrus
- Visit Almeria Almendras – almond huller

September 13
Professor Rafael Martinez

- Visit Incus – manufacturer of almond processing equipment
- Visit Manolet and Colefruss – almond processors
- Visit Turrones Jose Garrigas – nougat factory
- Meet with Hermisan – company specializing in desalination plants

September 14
Professor Rafael Martinez

- Visit El Manan Co-operative almond orchards
- Meet with Juan and Jaime Puigcerver – Agesfrusa (almond brokers)

September 15
Travel to Reus

September 16
Reus

September 17
Xavier Miarnau & Francisco(Paco)Vargas

- Visit IRTA – Mas de Bover -cultivar breeding
- Visit Arboreto Co-op Almond Nursery – field grown nursery
- Visit Borges – almond processing factory
- Visit older orchard
- Travel to Lleida

September 18
Xavier Miarnau & Dr Simo Alegre

- Visit IRTA – Lleida – cultivar trials and repository

September 19
Xavier Miarnau

- Visit El viverode Abel – Nursery and orchards
- Visit new orchards

September 20

- Travel to Barcelona
- Visit Agromillora Nursery – specialist in in-vitro propagation

September 21
Barcelona

September 22
Barcelona

September 23
Travel to Avignon (France)

September 24
Henri Duval

- Visit INRA - rootstock trials
- Visit Ctifl – trial orchard
- Visit Sud Amandes – almond co-operative and processing plant

September 25
Henri Duval

- Visit Nougat factory
- Visit almond orchards
- Visit INRA rootstock repository
- Travel to Paris

September 26
Paris

September 27
Patrick Marchandou

- Visit Rungis International Markets
- Fly to Hong Kong

September 28
Fly Hong Kong to Adelaide

Contact List

NAME	ORGANISATION	DETAILS
Professor Rafael Martinez	University Miguel Hernandez	Ctra. De Beniel,km. 3.2- 03312 Orihuela - Alicante Spain
Juan Puigcerver Doménech	Mieles de Alicante	c/ Mosen Pedro Mena 5 Bjo 03550 San Juan – Alicante Spain
	Incus Tech	c/ Rioja – Perpendicular, s/n 03006 Alicante Spain
	Hermisan	Urb. La Faont, 1-03550 San Juan de Alicante Spain
	Manolet	c/ Charles Darwin 13 03203 Elche (Alicante) Spain
Xavier Miarnau	IRTA – Lleida	Av.Alcalde Rovira Roure, 191.E-25198 Lleida Spain
Dr Simo Alegre	IRTA – Lleida	Av.Alcalde Rovira Roure, 191.E-25198 Lleida Spain
Francisco Vargas	IRTA – Tarragona	Mas de Bover.Ctra. Reus-ElMorrell,Km 3.8 E43120 Constanti (Tarragona)
	El Manan Co-Op, Manan Sociedad Cooperative	Pol.Ind “El Cabezo” 1 BA 03650 Pinoso (Alicante) Spain
	Arboreto	Ctra Alcolea del Pinar 123 – A bajos Arpatado de Correos 154 43206 Reus Spain
	Elviverodeabel	c/ Batan 8 50700 Caspe-Zaragoza

	Agromillora	El Rebato, s/n – 08739 – T.M. Subriats Barcelona Spain
Henri Duval	INRA	Domaine St Maurice,BP 9484143 Montfavet Cedex
	Ctifl	Centre de Balandran B.P. 32 30127 Bellegarde France

Acknowledgements

We would like to acknowledge the following people and organizations that without their help this study tour would not have taken place:

- Almondco Australia
- Eric Lacey Trust
- Horticulture Australia Limited
- Dr Michelle Wirthensohn
- Chris Bennett
- Almond Board of Australia
- Yandilla Park