Growers Study Tour to Europe 2004

Val Hilton
Apple and Pear Australia Ltd

Project Number: AP03029

AP03029

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

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

ISBN 0 7341 1054 5

Published and distributed by:
Horticultural Australia Ltd
Level 1
50 Carrington Street
Sydney NSW 2000
Telephone: (02) 8295 2300
Fax: (02) 8295 2399
E-Mail: horticulture@horticulture.com.au

HAL

Know-how for Horticulture™

HAL PROJECT AP03029

Growers Study Tour to Europe 2004

FINAL REPORT

Val Hilton

Industry Development Manager
Apple & Pear Australia Ltd
39 O'Connell St
North Melbourne
Victoria 3055
Australia

CONTENTS

Media Summary……...3

Introduction……..4

Outcomes of the study tour
1. Summary of the main points identified by tour participants..5
2. Recommendations……..8
3. Contacts……..8

Evaluation……...11

Technology transfer program undertaken……..12

Recommended next steps……..…12

Recommendations for future tours……12

Budget……12

APPENDIX 1: Copy of Evaluation form……13

APPENDIX 2: Copy of a series of three articles published by Val Hilton in the industry magazine "Tree Fruit"……...15

APPENDIX 3: Pictures from the four regions visited…….24

MEDIA SUMMARY:

Different approaches to tree training, irrigation management techniques, a method to estimate desired crop load and fruit per branch, the widespread use of presizing equipment in packhouses, the availability of high quality nursery trees, the benefits of a strong extension service and some unusual machinery were just a few of the areas that stood out amongst the many things seen during the recent apple and pear industry study tour to Europe.

The purpose of the tour was to expose industry members to leading edge orchard management techniques and packing shed management and technology. High density orchards on dwarfing rootstocks offer many benefits to growers, as it is easier to pick, prune and thin fruit taking less time and labour, and early high productivity (commercial crops of 30t/ha by third leaf at least) can be achieved. Most European growers have their fruit stored and packed through cooperatives or large commercial businesses, with benefits from economies of scale, marketing power and services to growers including orchard advisory services.

Four major growing areas were visited by eight growers and the apple and pear Industry Development Manager – the Bodensee area on the shores of Lake Constance in southern Germany, Bolzano in the South Tyrol region of Italy, the Lleida and Girona areas in southern Spain and southern France around Nimes and Avignon. Most European apple-growing areas have been using high density growing techniques for 30-40 years and have it down to a fine art. Spain and France were included on the tour because their climates are hotter and light levels are higher and more similar to many of Australia's growing areas.

Tour participants were very impressed by the uniformity of the tree training in orchards and the fruit quality, the knowledge of the consultants who acted as guides, the effort tour hosts put into the programs organized and their hospitality.

The information participants brought back will be put into practice in their own operations, particularly in planting density, nursery tree specifications, training systems and packing shed layouts. The level of European knowledge of Integrated Pest Management (IPM) pushed by restrictions on chemical use in the EU also impressed participants.

INTRODUCTION:

A group of eight growers and the apple and pear Industry Development Manager visited four major apple-growing regions in Europe in July 2004, just before apple-picking started.

The purpose of the tour was to expose industry members to leading edge orchard management techniques and packing shed management and technology, and to help them gain an appreciation of what is accepted practice in other world growing areas and what may be required to become globally competitive.

High density orchards on dwarfing rootstocks offer many benefits to growers, including being easier to pick, prune and thin fruit taking less time and labour, and offering early high productivity (commercial crops of 30t/ha by third leaf at least).

Most European growers have their fruit stored and packed through cooperatives or large commercial businesses, with benefits from economies of scale, marketing power and services to growers including orchard advisory services.

Four major growing areas were visited – the Bodensee area on the shores of Lake Constance in southern Germany, Bolzano in the South Tyrol region of Italy, the Lleida and Girona areas in southern Spain and southern France around Nimes and Avignon.

Most European apple-growing areas have been using high density growing techniques for 30-40 years and have it down to a fine art. Spain and France were included on the tour because their climates are hotter and light levels are higher and more similar to many of Australia's growing areas.

Tour participants

Ian Burns, Pickering Brook, WA
Ron Fry, Pickering Brook, WA
Mark and Jackie Paganoni, Moorooduc, Victoria
Norm Jeanine Priest, Pakenham, Victoria
John and Kerry Wiadrowski, Pakenham Upper, Victoria
Val Hilton, APAL Industry Development Manager

OUTCOMES OF THE STUDY TOUR:

1. Summary of the main points identified by tour participants:

Overview of areas visited –

- The Bodensee area in Germany had a mix of large cooperatives and growers who had decided to take up niche marketing and direct supply. Cool, wet climate compared to Australia with lower and more diffuse light levels, Advisory services were very effective and innovative.
- The Bolzano area in the South Tyrol leaves a lasting impression of what is possible with adoption of intensive orcharding – over 18,000ha of highly uniform, dwarf intensive apple plantings, all operating through large cooperatives and consultancy and advisory services used by 95% of growers. Individual farms were tiny and land costs were measured per square metre (estimated at US$50/square metre).
- Spain had many things in common with many Australian regions – hot summers, sunburn, hail, similar varieties (Cripps Pink, Cripps Red, Gala) and less of the northern varieties, a large pear industry but different varieties and a strong focus on irrigation management. They had a range of sizes of cooperatives (some were very large) and properties ranged from a few ha to several hundred ha. Very active, enthusiastic and innovative research and advisory systems, and have just begun a breeding program with HortResearch NZ to develop apple varieties suitable for hot climates.. Growers were involved in the setting up, funding and operation of research stations.
- France was probably closest to many parts of Australia in terms of range of property sizes and climate but again everyone works through cooperatives or cooperating groups. Hail net is becoming common in almost all areas (assists in general quality control). Research stations visited were also set up, funded and operated with grower participation.
- Subsidies are likely to decrease in the long run but much support is still present eg interest rate subsidies for hail net up to a maximum limit, packing shed equipment is subsidized for cooperatives to 50%, the cost of advisory services in Bolzano were subsidized by government to 50%.
- Generally water is more freely available and cheaper than in Australia, but Spain in particular with its hot climate had a strong focus on irrigation management.

Orchard trees –

- Plantings of 3m x 60cm-1m on M9 have been standard practice in Europe for more than 30 years. Different clones of M9 are specified for different vigour requirements or for use in replant situations.
- Tree quality is extremely important as early high production is dependent on planting a large, well-feathered tree.
- There is some debate over whether to use trees with one or two years in nursery development. Two-year trees (Knip Baum) have better limb angles but one-year trees (limbs developed with cuts and Cylex application) may be easier to control and slightly more economic in the long term but the jury is still out (trials in Spain and France).
- Training first year – branches are held down but in many ways – allow one fruit/branch, no fruit allowed but tie down or tuck under wire or use weights of some sort to hold down

- Commercial crops (30t/ha or more) are expected by the third year in the ground with mature crops of 45 to 80-90t/ha expected, depending on variety, management for size requirements and price premium for variety.
- Most orchards use variations on central leader systems with some V systems.
- Many of the French favour a system called Soleaxe or 'extinction'. Buds are rubbed off by hand distribted over the tree rather than much pruning, branches tend to be longer than in central leader systems and a zone is cleared of foliage up the centre of the tree to allow light entry. It looked more like a way of managing trees that had too much vigour in many cases.
- The French and Spanish are experimenting with a training system called the 'fruiting wall' that can be mechanically pruned, thinned and perhaps harvested, as labour costs continue to rise.
- The emphasis in tree management is understand the tree physiology to know when to prune to achieve specific results, in managing the crop load and fruit maturity to achieve the desired fruit size and quality.

Orchard and packing shed technology –

- Many different technical items were seen – plastic wire used for trellis wire, crinkly wire so ties don't slide, many different ties (tubing, tape, notched), lightweight hail netting, concrete posts for trellis and netting, harvesting machinery (Pluk-O-Trak), 2-man elevating platforms, bin trolleys, hydraulic levelling platform, presizing systems, sprayers with roller fans, mechanical pruning and thinning machinery, MAF disc tool as an aid to calculating crop load through measuring limb diameter, etc
- Technical information collected – copies of German spray program, French pruning systems for several varieties, russet reducing spray program from Spain, Spanish guides to apple and pear growing, articles on sunburn management from Spain, …
- Presizing systems are present in every packing shed (smallest seen had 45 lanes) with some presizing done at harvest. It helps sheds know the structure of the crop and how to market it, meet orders quickly and is used to pay growers on their packout. Base models sort by size, shape, colour. Additional parameters are brix and pressure and blemish identification is under trial
- In Europe, spray equipment has to be tested and calibrated, even tractor speed and spray output by nozzles. Peter Triloff said there is machinery to test spray distribution.
- Mechanical aids to harvesting are used where possible – 6-8 person Pluk-O-Traks were common in Germany and Italy, but in Spain and France there was more interest in 2-person elevating platforms. One team picks from the ground – the platform team only picks the tops. A similar system is used for pruning and pheromone dispenser placement.
- Plastic bins are used widely because they are more hygienic. They will become the norm in Europe in time.
- Hail net - No problems in Europe apparently with lighter systems. Net and support systems are much heavier built and tighter strung in Australia. Bees can get through because hail net is only spread out after blossom, and is folded up each year above the trees. Posts were spaced at 9mx3m - 3m rows with post every 9m in the row. There were several different systems of fastening above the rows. Some had clips holding sheets together above the alley. Others used

overlapping sheets with octopus clips – hail load stretched them and hail was dumped in the alley rather than stretching the net.

Orchard management –

- All areas had similar problems to Australia, such as cost of labour, QA regulations increasing, too few young people entering the industry, high land costs in some areas, chemical access steadily decreasing (meaning a greater focus on IPM and use of alternative substances).
- Sources of cheap labour are the only thing keeping the industry going in Europe (Polish in Germany and Italy, Portuguese in Spain, France has difficulties – North Africa in the past, then Polish, but some are now bringing contract labour on limited visas (6 months) from Venezuela and Ecuador) so the French are very interested in developing low labour input orchards (the fruiting wall training system allows mechanical pruning and ultimately harvesting)
- Australia seems to have much more stringent OH&S requirements than Europe as several smaller sheds visited would not pass an Australian WorkCover audit in the opinion of tour members.
- Most growers used technical advisors, either paying independently or provided as part of the service from cooperatives.
- With many restrictions on chemicals, Europe is ahead on Integrated Pest Management (IPM) and information on effect of chemicals on predators, parasites, etc of pests. There is a strong push to eliminate all post harvest treatments.

Cooperation –

- Cooperate or go under. Working as co-operating groups gives economies of scale for marketing; storage and packing costs; benchmarking and technical services for growers; bulk purchase of goods; accreditation to food safety and other QA schemes, etc.

Marketing –

- If you have an identifiable market and/or a good position, niche marketing and direct selling offer lucrative returns for smaller growers, eg farm markets, farm shops, upmarket smaller supermarkets, and offering such things as wide variety, organic produce, value-adding, heritage varieties, something different or unusual, service, freshness, pick-your-own, etc.
- In Europe this is easier because of the high population density compared to Australia and large numbers of smaller towns and villages close together.

Cherries –

- Growers saw some of the best cherry orchards they had ever seen in the Bodensee, including Lapins on Gisela and a new Czech rootstock called PHLC managed by Sempra.
- Rain covers were common. Some were in place permanently (could be furled above the row after the season) and others were temporary (moved as each variety ripened).
- An innovative cluster cutter was seen in Germany using jets of water (Fachaux, France, costing 100,000Euro).

Pears –

- In Spain there were some impressive blocks of early producing pears on various Quince rootstocks trained as central leader style on trellises.

- The Spanish are trialling a Portuguese pear called Rocha for the UK market – small, round, sweet.
- (On holidays later in the Loire Valley at La Moriniere Research Station, Val Hilton saw a new pear called Angelys bred in France, which is sweet, russeted and fireblight resistant. A successful marketing trial was held in Orleans last summer and it is being widely planted in France.)

Organic –

- For the best results, choose your climate and location carefully to have the lowest pest pressure possible. Don't just try it anywhere.
- There are still price premiums but costs of alternative chemicals can be high in some places. Any loss of premium would make it less attractive as a niche market.

2. Recommendations:

High density orchards on dwarfing rootstocks offer many benefits to growers, as it is easier to pick, prune and thin fruit taking less time and labour, and early high productivity (commercial crops of 30t/ha by third leaf at least).

The cooperative systems had big positives (economies of scale, provision of technical services, combined market power) but also drawbacks as they are locked in to the fruit handled by their cooperative and EU rules say 80% of their produce must go through the cooperative to remain a member.

It is recommended that uptake of high density orchards be encouraged and speeded up, which will require working with nurseries and APFIP to produce the right kind of nursery tree for growers, improved availability of virus-tested rootstock types and more information and education for growers on intensive orchard management and setup and encouraging growers to see for themselves, either by going overseas or visiting the demonstration blocks in SA and Tasmania, or visiting other Australian growers who are leading the way into high density orchards.

3. Contacts from the tour:

CONSULTANTS/HOSTS:

Germany:

Peter Triloff
Address: 88009 Friedrichschafen, Albert-Maler-StraBe 6, Friedrichschafen
email peter.triloff@t-online.de, p.triloff@mg-bodenseeobst.de
Phone:+49 (0)7541/5010-30
Fax:
Mobile:+49 (0)171/8298032

Italy:

Kurt Werth
Email: kurtwerth@sk-suedtirol.it
Fax: +39 0471 256428
Mobile: +39 335 839 1124

Spain:

Joan Bonany
Address: IRTA-EEA Mas Badia, 17134-La Tallada, Girona (Spain)
Email: joan.bonany@irta.es
Phone: 00 34 972 780275
Fax. 00 34 972 780517

France:

Lise Pichon
Address: STAR FRUITS Diffusion, Route d'Orange, F - 84860 CADEROUSSE
Email: lise.pichon@wanadoo.fr
Phone: + 33 (0)4 90 11 93 50, + 33 (0)6 30 22 41 71
Fax : + 33 (0)4 90 11 93 51
Renaud Pierson –
Email: renaud.pierson@wanadoo.fr
Phone: 33 (0)4 9011 9352
Fax: 33 (0)4 9011 9351
Mobile: 06 77 04 31 79

VISIT SITES:
Germany
Monday, July 12:
Klaus Strodel, Rothkreuz 2, 88138 Weissensberg
Peter Stoppel, Kümmertsweiler, 88079 Kressbronn
Hermann Gessler, Prälat-Lutz-Str., 88048 Friedrichshafen Hirschlatt
MABO, Albert-Maier-Str. 6, 88045 Friedrichshafen
Tuesday July 13:
Reinhard Honsel, Zum Obstgartenhof 1, 78465 Konstanz-Litzelstetten
Gottfried Mayer, Oberhof, 88662 Ueberlingen Lippertsreute
Salem Frucht Großmarkt, Bahnstr. 125, 88682 Neufrach
Thomas Loehle, Kanalweg 5, 88690 Uhldingen- Muehlhofen
Italy:
Thursday July 15 and Friday 16th : A range of orchards chosen by Kurt Werth.
Geos Packing shed and cooperative: Werner Schuler in charge of quality
Spain:
Monday July 19:
IRTA-Estació Experimental de Lleida , (www.irta.es Experimental Research Station of IRTA), Mollerussa , meeting Dr. Ignasi Iglesias and Dr. Simó Alegre
NUFRI (www.nufri.com), Mollerussa – packing shed and orchards with Josep Maria Benet, Technical Director of NUFRI
BRUFAU Fruits, Mollerussa –Robert Brufau
Tuesday July 20:
IRTA-Estació Experimental Agrícola Mas Badia (www.irta.es), La Tallada (see map) with Joaquim Carbó, Pere Vilardell.
Costa Brava Fructicultors, SL (www.costabrava.coop), Ullà – packing shed with Albert Ferrer, Director, Alex Creixell: technical director.
Costa Brava Fructicultors, SL orchards at Sant Pere Pescador
Girona Fruits Cooperative andorchards (www.gironafruits.com) with Francesc Raset, technical staff of the Cooperative.
France:
Wednesday July 21:
Cardell Export - 34 403 Lunel, with M. Jean-Marie CARDELL
Chateau de Nages, 30 132 Caissagues, M, Bertrand Gassier and M Christophe Ripolles
Thursday July 22:
CEHM Centre Experimental Horticole de Marseillargues- Mas de Carrière- 34 590 Marseillargues with M. Gérard Ferre.

Pepinieres Toulemonde (Star Fruits member) with M Phillippe Toulemonde and M … Toulemonde – nursery.
Friday July 23:
Station Experimentale de la Pugere - Chemin de la Barques- 13 370 Mallemort with M. Jean-Michel Montagnon
Orchard visits with M. Bruno HUCBOURG, technical advisor of the GRCETA Basse Durance, Saint Remy.

EVALUATION:
(Copy of Evaluation form - see APPENDIX 1).
Evaluation comments:
Organisation:
Most of the tour group were very happy with the organization, the length of the tour, the accommodation (except one hotel booked by the travel agent), food and travel arrangements. Tour members were extremely impressed by the enthusiasm and knowledge of the host consultants and their hospitality.
Apart from the first couple of days in Germany, the weather was quite hot, especially in Spain and France and time spent in orchards became quite exhausting. One day organized by our Spanish host was particularly long (combination of several visits over a long distance, people talking to long on visits and having difficulty finding a hotel in the dark). Some tour members nevertheless were prepared to go with the long days as they did not want to miss anything and wanted to see as much as they could while they were in Europe.
Some tour members requested more time off, but it was difficult to put in more with the distances we had to cover and still keep the tour to a fortnight. So some of the days out of orchards were consumed in travel between countries (but very scenic travel) rather than a free day in a city. A city tour had been organized in Barcelona but that was optional.
Most members were very happy with the visits organized, although there were requests for more machinery and marketing in particular. Tour itineraries had been suggested ahead of time (and we did not coincide with the Bolzano machinery field days by several months), and participants were asked to put in requests for particular visits but nothing was raised. With a limited time for a tour, it is impossible to fit in too large a range of topics as markets and orchards are often in very different places. A separate tour would need to be operated.
Tour participants saw no need to have an Australian technical advisor accompany the group, although one pointed out that it would assist extension in Australia if one came as an education process for them rather than assisting the tour group.
Results of the tour on participants:
Most saw the tour as a real eye-opener in terms of what can be achieved in terms of high density plantings and intensive orchard management, with one wishing he had gone ten years ago. However despite EurepGap being in place for any do not market direct to consumers, many saw Australia as having stronger (or perhaps more put into practice) OH&S practices and perhaps even food safety in some cases (apart from chemical regulation).
Most signalled intentions to begin making changes in their own plantings and orchard management practices, based on what they had seen, with some changes immediate and others being more long term. These included hail netting structures, planting spacing, tree training methods and packing shed formats.
All would strongly encourage others to travel and see for themselves, as it has a much greater impact than just being told. Younger growers in particular should be encouraged.
Report contributions:
With a small group it was difficult to organize teams to write and report so the whole group contributed. Some were very happy with this as it made them concentrate during the day and reinforced their impressions when reviewed at the end of the day. Others would have preferred two teams with others commenting on their efforts.

Writing up reports at the end of each day was important rather than leaving it for a few days.

Grower presentations:

Some had already made presentations and others had them planned for the next couple of months.

Final report contributions:

These have been incorporated in the main points.

TECHNOLOGY TRANSFER PROGRAM UNDERTAKEN:

1. Immediate:

A series of three articles were published in the industry magazine (copy of the first attached in Appendix 2).

All participants either have made presentations or have them planned. The IDM has made presentations to growers at Batlow and Tasmania, but had to cancel one at Orange at short notice – to be completed later. A presentation will be also be made in Queensland when the opportunity arises.

2. Future:

Growers all plan to make changes to their orchards and management, and other growers will be able to observe their progress at farm walks organized in future years.

RECOMMENDED NEXT STEPS:

A national extension program is needed to try and accelerate uptake of the systems seen on the tour, as not enough people can afford the time or the money to go overseas (particularly younger industry members) even though that has the biggest impact on behaviour.

RECOMMENDATIONS FOR FUTURE TOURS:

Organisation:

Very long days in hot weather to be minimized.

If a hotel can't be checked on the internet, don't use it;

Topics:

With reduced tour funding available, tours will need to have a tighter focus, or group participants will need to be chosen with closer interests. Very disparate interests can lead to discontent on the part of some members at not seeing as many things as they wanted or visiting things others are interested in but they are not.

BUDGET:

Item	Airfares + tax	Travel Insurance	Ground costs (accommodation, transport)	Food, driver tips and sundries	Total
Actual costs	23098	1896	35,098	7300	67,392

* No GST included.

APPENDIX 1:
COPY OF EVALUATION FORM:

TOUR REVIEW:
To help in the organization of future tours organized by APAL, some feedback on the format and organization of the 2004 Europe tour would be very useful.

Organisation :
Was enough information supplied before the tour?
Were there any gaps in organization before the tour?
Suggestions for improvement?
Was organisation during the tour good/indifferent/bad and why?
Was the time of year for the tour good and why, or would you prefer another time (suggestion please) and why?
Was the length of the tour too short/just right/toolong? Comments?
Was the length of days too short/just right/too long? Comments?
Were the distances traveled too short/just right/too long? Comments?
Were the number of visits in one day too few/enough/too many? Comments?
Was the time allowed at each place too little/just right/too much? Comments?
Was there enough time off? Should there be more or less tourist stops/days off? Comments?
What was the best tour visit and why?
What was the worst tour visit and why?
What would you want to see more of?
What would you want to see less of?
Please comment on the physical aspects of the tour – hotels, buses, food, etc.
Lunches – prefer meals organized and paid for as part of the tour cost or prefer to pay for meals yourself?
A technical guide/translator from the country visited is essential. Would having a technical advisor from Australia along to stimulate discussion be useful or not?
Any other comments?

Tour evaluation:
To evaluate the usefulness and impact of the tour, could you put down your own impressions of the tour and benefits from the tour:
How has the tour affected your view of your business in Australia?
How has the tour affected your view of the Australian industry in the world?
Have you learnt anything that you can apply in your business in the short-term? Longterm?
Has the tour been of benefit to you and/or your business? In what way?
Would you encourage others to go on a similar tour in the future? For what reasons?
Any other comments?

Report contributions:
Unfortunately for this group (of only 9 members), all members had to participate in recording and writing up notes every day. A larger tour would have several teams rotating the work.
Did the approach work to gathering information, taking photos and writing up notes?
Any suggestions for improvement?
Grower presentations:

Have you started planning where and how you will give a presentation to growers?
If yes, when and where?
If no, what are you planning to do to achieve this end? (Contact me if you need help.)

Final report contribution:
For the final report, a brief rundown of your own impressions and important or significant points/places seen/ things done from the tour would be most helpful.
This can be a series of dot points or an essay – up to you.
It can include anything - things from the orchards and packhouses, contrasts between countries visited, things learnt from co-travellers, relationships forged, personal happenings, tourist sights, just learning to understand a foreign culture, etc.

APPENDIX 2:
Copy of a series of three articles published in industry magazine "Tree Fruit" by Val Hilton

EUROPE TOUR HIGHLIGHTS AND IMPRESSIONS

Different approaches to tree training, irrigation management techniques, a method to estimate desired crop load and fruit per branch, the widespread use of presizing equipment in packhouses, the availability of high quality nursery trees, the benefits of a strong extension service and some unusual machinery were just a few of the areas that stood out amongst the many things seen during the recent study tour to Europe.
Organised by Val Hilton, the tour took eight growers through four major growing areas – the Bodensee area on the shores of Lake Constance in southern Germany, Bolzano in the South Tyrol region of Italy, the Lleida and Girona areas in southern Spain and southern France around Nimes and Avignon.
The areas in Germany and Italy have been using high density growing techniques for 30-40 years and have it down to a fine art. Spain and France were included on the tour because their climates are hotter and light levels are higher and more similar to many of Australia's growing areas.

Bodensee, southern Germany:

In this area, there is a mix of farm size. Family farms are typically small (about 4ha) but similarly to Australia, about 80% of the fruit is produced by the 30% of growers with larger holdings. Cooperatives are very strong and provide excellent extension services to their members. Poland is the source of most casual labour, with workers being given a 50-day work permit. Supply of accommodation is mandatory with minimum standards set by the EU. The land is protected for farming and a permit is required to build a house on farming land. Eurepgap is being complied with grudgingly.
Over two days, five growers and two packing sheds were visited with consultant Peter Triloff. The first farm visited was a typical small farm growing a mix of produce (apples, pears, strawberries, cherries, Christmas trees, pumpkins and green asparagus). Klaus Strodel has had to leave his cooperative because he has developed a successful farm shop and now sells 80% of his produce there and the rest direct to small local supermarkets. European law requires that no more than 20% of produce can be sold outside the cooperative. In addition they produce fruit juice and wine and have a licence to distil schnapps. Such licences are strictly regulated and difficult to obtain.
Cherrygrower Peter Stopfl puts plastic rain covers over his orchard from flowering because of the danger of frost. The covers not only reduces splitting from rain (1200mm a year) but allows fruit to be left on the trees longer for increased size. Irrigation is still needed at critical times to ensure good fruit growth. Size is all important – if not big enough for market demands, it is used for juice, jam, kirsch, etc. He has the oldest planting in Europe using Gisela rootstock (a block of 16 year old Lappins) and is currently trialling a new rootstock P.H.L.C. from the breeding program in Czechoslovakia. He also had an interesting cherry cutter from Fachaux, a French firm, which used two water jets to separate the fruit.
Hermann Gessler is a solo operator, who has tried to mechanise as many of his farm operations as possible to reduce labour costs, one of the biggest concerns for European growers. Being something of an inventor, he has built much of his own machinery and has patented some. He now mechanically prunes trees and thins fruit, and can spray three rows at once with a custom-built self-propelled device that

straddles the rows. In addition he has worked with Peter Triloff to develop the Elisa machine to remove leaf litter from the orchard to reduce black spot inoculum levels in the orchard as part of an IPM program for one of the biggest concerns for the area, particularly as chemical resistance is present for all chemicals and the range of chemicals available is being reduced. The whole program has been outlined in previous issues of Tree Fruit.

MABO is the cooperative that our guide Peter Triloff is employed by as an advisor (one of four). The advisory service is free and includes onfarm visits, newsletters, workshops and a crop warning system, but services such as soil tests are extra. The consultants are also responsible for checking chemical information and advising on their use and have developed a database of weather conditions to give better prediction ability for black spot infection periods.

Reinhard Honsel grows 12ha of fruit, mostly apples plus pears and stonefruit under IFP conditions but not quite to organic standards. He is still a cooperative member, but now markets much of his own fruit. He would like to remain in the cooperative to retain access to the advisory service, but has issues with the overall quality standards of the cooperative, and does not see the coop system rewarding quality growers. For him quality is paramount (defined in terms of flavour as well as physical appearance), and has modified his management of nutrition, crop size and load, and harvest to achieve that. He finds that his middle to upper class markets are interested in flavour and environmental friendliness of production and are responding to his produce.

Gottfried Mayer decided to go organic 3-4 years ago on his 15ha orchard of mostly apples. Most changeover growers find that everything is OK for a couple of years and then problems surface. Woolly aphid and apple sawfly have been Gottfried's main problems. He found Jonagold very susceptible to WA but Gala was not, and used a Quassia tea for sawfly control. Organic fruit had a premium of about half a Euro per kg, but costs for organic chemicals were higher than conventional ones he said.

Salem Fruit packing shed packs fruit from about 1300ha passing through the shed, equal to about 25-30,000 tonnes of fruit. Growers are paid according to packout. Fruit goes through a presizing machine (45 lanes) before packing, with part of the crop presized before storage. Price is negotiated weekly with supermarkets, but supermarkets have access to crop figures (collected by government compulsorily and made public) making negotiation difficult. The EU subsidized the cost of the packing shed by 25% but this subsidy is only available to cooperatives.

Bolzano, South Tyrol:

This German-speaking province does not really regard itself as Italian, and is now semi-autonomous. Its government is highly supportive of the apple growing industry which consists mostly of very small family farms averaging about 3-4ha. Many families have either at least one outside job, run a B&B or have a vineyard as well. The valley contains 18,000ha of apple orchards. The fruit is stored and packed by 36 local cooperatives packing 25-50,000t each. Fruit is marketed by two producer organizations, VOG (about 26 coops in the lower valley) and ViP in the north of the valley. The Laimburg research institute supplies government-funded research and advisory services are funded 50% by the growers and 50% by the government.

Today 90% of the valley is planted 3m x 1m on M9 (90% is T337 because it is less vigorous), all harvested into plastic bins. Land rarely changes hands and estimates of value were about US$50 per square metre! The top of the valley grows almost entirely Golden Delicious, but Gala, Braeburn and Fuji are also grown in the lower valley.

The most impressive thing besides the sheer area of apples was the uniformity of the trees and crop. The focus is on getting the nursery tree right, planting at high density,

and early production with as little pruning as possible. According to guide Kurt Werth, you need to understand the physiology of the tree to control growth and crop and when to prune in tree training. He said growers were guaranteed to pick 6-8kg in the second year after planting out, and expected up to reach 80t/ha, which is about 25-30kg/tree and 2-3000 trees/ha. At about 70 Euro cents/kg, this is a gross of about 56,000 Euros/ha or AUD$98,000/ha. However production costs were estimated at 30-33 Euro c/kg, packing and storage and marketing at 16-17 Euro c/kg (maybe as high as 20c/kg if marketing included). Growers do not pay income tax, but are subject to a small land tax related to orchard area, not the income earned from it.

The disadvantage of such single-minded focus is that small farms can't expand. Most farms are in the coop system and can't leave because it would cost money. They have no influence on their market and the coops won't let them do anything different eg club varieties, other fruit types, etc. Introduction of new varieties must be coordinated through coops and advisory groups.

Geos Coperative – brand Sudtirol Vinschgau – was typical of packing sheds in the valley. It has 370 individual members from nine coops, packs fruit from 880ha and handles 53-55,000t of apples. It can store 52,000t in 120 rooms, and handles 82% Golden Dels, 8% Jonagold, 2% Red Delicious plus others and can pack 250t/day. Their presizer has 51 lanes, with pressure and brix testing, electronic colour and size sorting. Defect detection has been added but leaves are a problem. It can handle 350t/day and processes 6fruit/sec/lane = 30t/hour. The line includes robotic bin labeling and stacking afterwards.

An advisory service in the lower valley was visited, which services 700 farmers across 1000ha with 2 advisors (30 in all in the valley). The cost is 100Euro/ha for the farmer plus the government puts in 100 Euro/ha. Services include a journal, newsletters, phone and email advice, conferences, fertilizer, pruning, onfarm visits, group meetings. 90% of growers pay for the service.

An organic grower was also visited at a property on the steep side slopes. There are only 500 ha organic in whole valley (4.2%), but it is difficult to maintain because of potential spray drift from so many non-organic neighbours. Mr Auer went into organics for the price premium, but says a 10% drop in price would cause him to rethink his commitment. He said he needs 30-40t/yr to break even. Good prices are needed because of lower yields and more damage, but there is more tolerance in quality.

Spain is a major apple and pear grower within Europe, growing 10% of the EU's apples and 29% of the pears.
Within Spain in 2002, there were 44,674ha of apples producing 739,000t (average 16.5t/ha) with over a third being grown in the Catalonia province with over 80% of these in the Lleida region of Catalonia (average over 19t/ha). Total apple production is falling as competition from East European growers rises. Stonefruit and plums are increasing rapidly because of advantages of climate, varieties and markets, and Eastern Europe is less suited to them. In Catalonia, Golden Delicious (60% in 2001) and Red Delicious (17%) are still the major varieties but are falling steeply in numbers, being mostly replaced by Gala (16%) and some Fuji (2%), while Granny Smith remains fairly steady (3%). Cripps Pink and Cripps Red are new entrants.
There were 32,356ha of pear trees in Spain in 2002, producing 636,000t (average 19.7t/ha). Pears are similar to apples – over 40% in Catalonia and over 90% of those in the vicinity of Lleida (average over 22t/ha). Conference is the main pear grown in Europe and Spain grows 33% of these. Blanquilla still makes up the largest area grown in Spain. Conference is rapidly overtaking it and has already done so in the Catalonia region. Others grown but in falling volumes are Williams, Llimonera (Jules Guyot), Red Bartlett, B. Luisa and Ercolini.
In the Lleida area the average farm size is 2.5 to 6 hectares. The Girona area has big and small farms but the average is about 10ha. To be economically viable they must be above 10 hectares.
Spain had a limited fireblight outbreak several years ago which spanned about three years. The government paid to pull out all of 3-4 affected orchards, all monitoring since and paid to replant the orchards.
IRTA (Institut de Recerca I Tecnologia Agroalimentaries) is the Institute of Food and Agricultural Research and Technology set up by the Catalan government. It provides R&D, technological transfer, technical assistance and specialized training and consultancy, and does research under contract.

Research Stations:

The tour group visited two facilities associated with IRTA – the Experimental Station near Lleida (a joint operation between IRTA, the University of Lleida, the Foundation of Caixa and other local organizations) and the Mas Badia Experimental Station near Girona (a joint operation between IRTA, the Girona local government, the cooperatives of the Girona area and the Agricultural School of Girona).

a. Lleida - The Lleida experimental station is government-owned but funded 50% from the government with the rest coming from growers and chemical companies. It operates four orchards in a 20-50km radius and has a staff of 20 (3 researchers, 2 technicians, 15 other staff). The station has a small laboratory, and runs research trials, demonstration areas, valuation trials for apples and pears, hail net trials and training system trials on 10 hectares.

b. Girona - The Fundacio Mas Badia – Estacio Experimento Agricola was established in 1994. Local growers decided to partly fund and set up a research station themselves. It was set up as a foundation for legal and tax reasons and has a board of trustees that includes growers, the agricultural department and local province government, the University of Girona and IRTA. The budget is made up of 20% from the growers and the rest from doing business for other stakeholders and some subsidies from the EU. They don't operate just as a research institute – they have a very close relationship with the co-ops, so feedback on the suitability of projects is very direct. Operations include crop protection, fruit information techniques, field

crops, quality programs, fast growing poplars, irrigation trials, transfer of technology, improvement in varieties and rootstocks.
Water is cheap in Spain, but new areas are putting in drip irrigation rather than flood. Tensiometers are used to give base information about soil moisture levels and when to start irrigation, but water budgets are calculated to finetune water use, using evaporation rates and a crop coefficient. The Lleida station is performing an experiment to calculate a crop coefficient suited to their hot climate, as they find standard FAO values give water estimates higher than are needed. Girona has done trials on fertigation, deficit irrigation and computer-controlled irrigation. A cheap data logger was being used tat can be connected directly to the irrigation controller or can be connected by radio (300 euro each, made in Spain, called Progress www.progress-spain.com)
Labour is one of the highest costs in fruit production throughout Europe, with all countries dependent on a cheap labour source outside their own borders (North Africa in the past, East European currently, increasing numbers of Portuguese peasants and most recently, Ecuadoreans and Colombians on 6-month visas to prune and pick). As a result, the Lleida station is trialling the French-developed "fruiting wall" which can be mechanically pruned and perhaps eventually mechanically harvested. Trees are trained into a palmette/espalier form but tall and flat (about 30cm through). It has proven of value at present for low value varieties.
The Girona breeding program is designed to counter the three main problems encountered by the main European varieties grown in Spain – lack of colour, fruit drop and texture. Areas include work on russeting in Golden Delicious and Fuji, firmness on Golden Delicious and techniques to manage harvest more tightly, using maturity measures such as starch scales and non-destructive testing of Fuji for sugar and maturity using NIR and trials of an acoustic tool for pressure.
The Girona station was trialling the Portugese pear Rocha for the UK market – a small, yellow and good tasting pear. Their Conference plantation was a really good-looking pear orchard, planted in 2001 at 3.75 x 1mt, central leader on rootstock Quince Sydo.
A research program has been started with the French to find a dwarfing pear rootstock. Even now with the training systems used (Tatura trellis, central leader) they can get production in the third year – 2nd leaf, 10 t/ha and 3rd leaf, 60 t/ha. In apples, four big co-ops got together and are working with NZ HortResearch to breed new apples and pears for a warm climate. Stone fruit are doing the same thing with a private breeder in France.
In orchard production, the Girona station is comparing the results from planting one or two year-old feathered apple trees. So far the one year-old feathered trees give a better investment and vigour control. Trials with Regalis are under way for vigour control - excellent result for apples but not pears.
Hail net trials are being conducted at both Lleida and Girona with a field day held at Lleida in October over two days, attended by 1500 growers. Black netting caused loss of colour in Galas and Cripps Pink but was good for reducing sunburn in Golden Delicious. White was preferable if good colouring was required (white decreased radiation 15%, black 30% but this didn't limit photosynthesis or production – just colour). The recommendation was to use hail net only on high value varieties.
The stations produce a variety list each year covering results of comparison trials run with recommendations for various areas.

Orchards in Spain:

Several orchards were visited ranging from about 35ha to 116ha, all being intensive plantings on almost entirely dwarfing M9 rootstock (various clones for different vigour requirements), and minimal pruning like northern Europe. Hail net is common, of the lightweight style seen in Italy and Germany and often present for sunburn reduction reasons as well.
Many aim to grow 50-55t/ha to get 80mm fruit, believing size problems result with 80-90t/ha. Surround is used by some to prevent sunburn with really good results on Fuji, and some have used Extenday for colour in Gala. Brookfield and Galaxy are being planted, but Fuji has problems with sunburn and biennial bearing.
Many growers are using the central leader systems seen in Germany and Italy, but many are also using the French-developed central axis system in combination with "extinction" - the removal of buds towards the centre of the tree on each branch to leave a "chimney of light" and managed bud distribution on the remaining length of the branch leading to minimal pruning, but longer, downward-drooping branches in general than seen in northern Europe. Early fruit load is often used to train the branches rather than tying down.
Cripps Pink has now been introduced into Spain and seems to be producing good fruit. Growers are not worried about potential oversupply as demand is still growing in Germany and France and the variety has not even been marketed in Spain yet.

Co-operatives and packing sheds:

There are no packing sheds or storage facilities on individual properties, with cooperation required for groups of individuals to achieve the economies of scale and to afford the technology now used.
All packing sheds visited now run presizer machines which can sort according to weight, shape and colour at a minimum, but brix, pressure and blemishes can be included. A percentage of the crop is presized at harvest where possible and put into store, but the bulk is sized out of storage, restored temporarily and then run though the packing line as needed to fill orders.
The cooperatives also have very strong extension services to their growers to make sure fruit quality is up to standard through good production management.
One of the largest visited was NUFRI, near Lleida, with a throughput of 45,000 tonnes of fruit per annum and 201 cold rooms – 99% ULO. Apples make up 66% and the rest is pears. Fruit is drawn from 1500-1600 hectares and 250 growers. Of these, 70 are share-owners and the rest are associates that supply fruit under contract.
The cooperative is now closer to being a private company and has diversified into juice, fruit paste, jams, fruit pulp etc, and are also fruit wholesalers, and own wholesale businesses, nurseries and an energy producing company. Five years ago the company started Integrated Fruit Production (IFP) regulated by the Catalan government, with 90% of growers now under it. The packhouse is BRC-certified and is working to certify 30% of production for Eurepgap (8 of the big growers).
The Brufau packing shed was one of the smallest with 5-6 large members out of a total of 30 members. Total annual throughput was 10,000t with Robert Brufau supplying 3500t of that total from his 70ha orchard (50:50 apples and pears – Golden Delicious, Gala, Conference, Comice mainly).
Costa Brava cooperative near Girona was intermediate – 38 members of whom six grow most of the fruit and a throughput of 20,000t per year.
Girona Fruits by comparison drew fruit from 600ha with 35 growers of almost equal size. This group were using an electronic system for growers to record their spray usage, and once a week it connects to the cooperative website to download their records. Advice on spray regimes, pest warnings and harvest dates was sent out to

growers at the same time. The software was developed by the cooperative and is now being commercialized and is being used by several other Spanish cooperatives.
The UK is their premium market, but fruit is sold across Europe, with each country having distinct preferences in variety and size range.

FRANCE:

Overview:

The south east of France has a Mediterranean climate, with hot, dry summers and windy winters (the Mistral) with a 13.5°C average. The wind blows 110 days a year on average and there are 2800 hours of sunlight. The rainfall of 700mm occurs on about 80 days from Autumn to Spring. The region produces about 24.8% of national apple production, 67.8% of pears, 20% stonefruit. The total for the area is about 20.2% of France's fruit production with about 50,oooha of fruit grown. The average age of growers is about 50 years old.
Consultant Bruno Hucbourg is part of a group supplying advice for growers, extension services, etc. He said the very big producers have their own advisors in house so he mostly services smaller growers (who usually follow advice but generally watch the best producer and follow them).
Bruno also thinks SE France is not an ideal area for apples. The Loire, upper Rhone and SW France – Bordeaux – have more regular climates with less extremes he believes, with the Loire best.

Orchards:

Apple varieties grown include some local varieties such as Reinette that ripens over a long period between late July and late September, requiring7-8 picks. Although low cropping (30t/ha) it brings a good price. Braeburn was removed in one orchard because the climate was too hot. Other varieties grown include Granny Smith, Gala, Cripps Pink, Chanticleer (vigorous, hard to grow, but best profit) and increasing areas of Cripps Red.
The main problem with Cripps Red is that it is not a vigorous tree. Normal plantings have been about 1600 trees/ha, but Cripps Red may need 2000/ha. The Pajam 2 clone of M9 has been used (often used in replant situations) but Cripps Red is still small on it. One grower installed micro irrigation and fertigation to boost young tree development.
Cripps Pink is managed to produce 50-60t/ha to get 75-80mm diameter fruit. Vigour is controlled by avoiding pruning and using chemical and hand thinning to control crop load.
Trees are often planted into a hilled up mound to give an early boost. If too vigorous later, the earth is pulled back and scion roots pruned. In the first year, the only pruning is below the lowest trellis wire. If necessary, limbs are tied down in the first year then the fruit is used to bend the branches. The major work is done in autumn, adjustment in spring – no major work is done when leaves have started. The tops are bent and arched over to slow growth. If growth is too strong, branches are pulled off, not pruned.
Orchards visited ranged from 120ha to 15ha (part of a 90ha mixed orchard), all high density plantings with M9 clones. One averaged 60t/ha but suffered compaction because the ground gets very wet. They were planning to rip every second row.
Picking in many areas is straight into a bin on an elevating platform (two people) or from the ground. No ladders or picking bags are used for most of the crop in some orchards. Originally it was to avoid bruising of Cripps Pink but is now used for all. The same quantity is picked but pickers are less tired and stressed with no ladder and

no bag. Platforms are also used for pruning, thinning, and putting out mating disruption.

Packing shed:

Cardell, at Marseillargues near Avignon, was one of the larger companies in the region, handling 12000 tonnes apples (includes 4000t Granny Smith, 3000t Pink Lady, 2000t Gala, 1500t Braeburn). They have a 12 year old machine presizing machine still working well through good maintenance.

Nursery: Phillippe and Dominic Toulemonde

This nursery one of five members of Starfruit, and grows 600,000 trees per year - 400,000 apples, 200,000 stonefruit. New ground is used every year and rootstocks are bought in from Holland and Belgium.

The aim is maximum growth and maximum number of branches developed. Cytolin is applied at 235 litres per hectare at 2.5% with only one application – more only if needed. Cytolin should not be sprayed when it is hot - early in morning is preferable. Pinching tops works in some areas but not where they are. (Cytolin sprays works in some areas but not others according to our tour members). Ideally trees will have 6-8 branches per tree. Most growers only use 4 but this gives them more to select from. M9 rootstock is used for 95% of the apple trees. The rest is M7 (more vigorous and used for Red Delicious and pollinisers). Even in the nursery Cripps Red is growing 10% less than Gala.

Each tree is staked as it grows and is also grown up between two wires (high tensile plastic capable of spanning 220 metres between posts). The wires are moved up the post as the tree grows.

Research stations:

a. Centre Experimental Horticole de Marseillargues (CEHM):

This 41ha research station was funded 33% from the government (decreasing), 33% growers and associations and 33% must be found from outside sources (private consulting, selling fruit and vegetables and trials for chemical and fertilizer companies).

The station performs variety testing (second stage evaluation and working out technical management details), pest management trials (codling moth control with a virus spray – Carpovirusine 2000 from Calliope – and mating disruption , translated as “sexual confusion” in French), production system trials (fruiting wall and central axis), a comparison of nursery tree performance (better vigour control with one year-old trees compared to two year-old trees) and a trial of Cripps Pink on various rootstocks.

The laboratory is using a machine to measure starch and maturity objectively to decide when is the best time to apply Retain

The relationship between fruit load and tree training is being studied. Growing large fruit is important, so it is important to limit production per tree and per hectare to get big fruit and early colour development. MAFCOT , the consultants association in France, have developed a physical tool (a wheel-shaped device) to measure the size of branches and indicate the number of fruit to leave on the branch - a rough guide is 5 fruit per sq. cm of branch cross-sectional area. But this varies with tree system and does not work on the fruiting wall.

The MAFCOT wheel is called Equilifre – used to balance fruits and crop size by relating size of branch and fruit numbers. Yield/ha is a function of number of fruits/tree and number of fruits per branch.

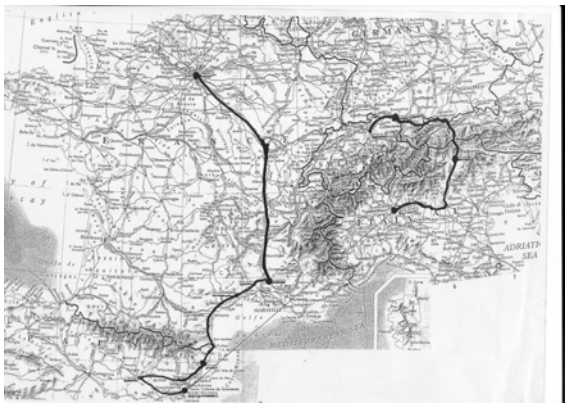
Eg. If you require 40t/ha @2000 trees/ha this means 20kg/tree

At 6 fruit/kg = 120 fruits/tree

Total branch diameter (use wheel) in tree = 15cm^2/tree
Therefore 120/15 = 8 fruit/cm^2 of branch diameter.
However, there are differences between areas, varieties, tree ages (works only on trees older than 4th leaf) and training systems, eg for the Cripps Pink orchard at La Pugere, the value should be more like 5-6 fruit/cm^2, Gala = 4/cm^2, Granny Smith = 6-7/cm2.
The wheel is used to train team managers and supervisors to calculate desired crop load or to check on thinning levels, not given to individual thinners.

b. La Pugere research station:
This 18ha station uses public funding but also gets money from growers - 60% government, 40% growers, private trials, etc. Its purpose is research for the local area only, and provides a place to meet and work together with consultants and growers. Field days and conferences are held regularly for growers and technicians to decide problems to be worked on.
Areas of study include trialling varieties and rootstocks, developing technical packages for them, orchard management techniques with an emphasis on IFP and alternate treatments and identifying maturity and harvest dates, trials of new chemicals, finding predators, 'sexual confusion' trials, Surround trials.
Services include a fortnightly bulletin, a website www.lapugere.com , and an annual Protection guide and Guide to varieties and services, etc (see Final Report for details).
Orchard trials included a Cripps Pink trial planted in 2000, now in 4th leaf, on Pajam 1, new ground, no fumigation. In 3rd leaf the crop was 35t/ha, expecting 40t/ha this year. The training system is the centrifuge system -
1st leaf – no pruning, no branches below 1m.
2nd leaf - bend down branches if upright. If horizontal or lower, fruit will pull them down.
3rd leaf – nothing on the trunk, remove buds close to the trunks (extinction method). No fruit in shadow.
4th leaf - use the MAFCOT wheel to guide fruit numbers/branch. Test branch diameter near the trunk. NB: Cripps Pink bud removal is in winter only, Gala in winter and just before bloom if needed but you have to be careful with strong varieties because extinction can stimulate growth.
The aim is for branches 25-30mm diameter maximum. If too big, remove the whole branch, rather than prune bits if it is too long. Removal of buds near the trunk leaves a "chimney of light" down the centre of the tree.

APPENDIX 3: SELECTION OF PICTURES FROM THE FOUR REGIONS VISITED IN EUROPE



Route taken through Europe: Zurich – Lindau – Bolzano – Barcelona – Lleida – Girona – Avignon - Paris

GERMANY:

Topaz apples (scab-resistant)
Compost used for moisture

Elise machine – vacuums up leaves to reduce scab inoculum and help minimise spray use.

Raincovers on cherries – pulled back in winter

Worker housing – converted containers

Pluk-O-Trak picking machine, modified to carry boxes for putting reject fruit in

GERMANY continued:

Modified tractor can spray 3 rows at once – a one-off by an inventive grower

Mechanically thinned and pruned trees

Tractors are usually small for use in 3m rows. Most sprayers use vertical roller fans. All must be calibrated annually.

Mechanical thinning machine – flicks the tip of foliage causing fruit drop later through tree response to damage

Mechanical pruning machine is attached below the modifed tractor

GERMANY continued:

Presizers are standard in all sheds – two main brands Maf Roda and Greefa. Sort by colour, size, shape brix, pressure and blemish. Robotic bin labelling, sorting and stacking are also common.

Farm markets are common, with many selling most of their produce direct. They are usually closed in winter.

Lightweight hail net construction – put up by hand and pulled back in winter until after flowering. This was also an organic orchard.

SOUTH TYROL, ITALY – 18,000ha of apples, 27 coops, average farm size 3-4ha.

Bolzano area – apples on the valley floor, vineyards on the slopes

Upper Vinschgau Valley – 90% Golden Delicious at this elevation

SOUTH TYROL continued:

6yo Fuji with 25-30kg/tree
Hail net with concrete posts

Same Fuji orchard showing 3m rows, uniformity of trees and hail net structure.

Cripps Pink planted in winter 2004 ie first leaf

Knipbaum trees with branches tucked under training wires

SOUTH TYROL continued:

1yo Fuji bent over to control vigour or promote branch development

Cripps Pink 3rd leaf, 3000 trees/ha, expecting up to 70t/ha

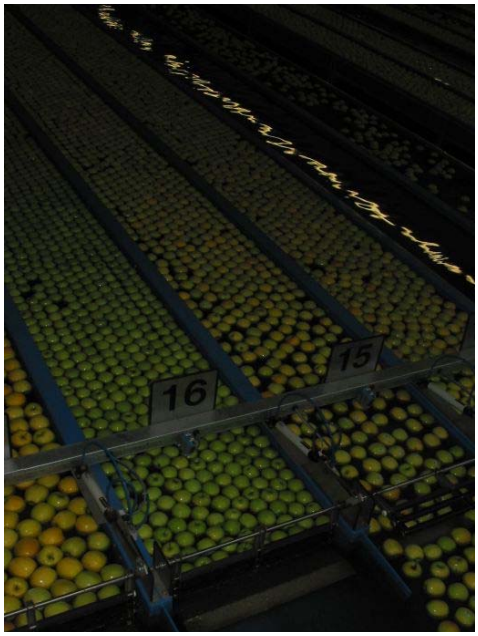
Striped Brookfield Gala – note the bird houseas part of IPM

Elevating, levelling platform for use on steep land

SOUTH TYROL continued:

Packing line at Geos cooperative – packs 250t a day. Coop stores up to 55,000t of apples

Presizer at Geos cooperative with 51 lanes – grading the last of the Golden



SPAIN:

System trials at Lleida research station for pears. Best is 2yo central leader so far. Tatura produces slightly more but setup costs are higher.

Fruiting wall trials at Lleida on reducing labour costs – mechanical thinning and pruning and perhaps harvesting. Height is not a problem as growers all use elevating platforms

SPAIN continued:

3yo Conference pears on Quince Sydo, 3.75mX1m, at Mas Badia research station, Girona

Triils of the 'extinction' training method (French) – remove buds in the centre of the tree and balance the remaining bud distribution

Portuguese Rocha pears being trialled for the UK market

Abate Fetel pears are favoured by the Germans.

SPAIN continued:

Brookfield Gala and Fuji, Lleida. Twin irrigation lines deliver extra water while trees are young. Fertigation is common.

4th leaf Brookfield Gala, 30t/ha, planted in replant soil on M9 clone 2337. No soil fumigation is allowed

Brufau Ecofruit packing shed – 8000t storage with one person packing for several.

Nufir at Lleida. Has 220 coolrooms, 99% ULO of which this is one corridor of 20 or so. Stores 45,000t from 250 growers ranging from 1-250ha.

Nectarines – Big Top planted in 1998. The Spanish market prefers very big fruit.

FRANCE:

2yo Granny Smith and Braeburn. Note grey net can be used above green varieties but white net must be used above red varieties or colouration is inhibited.

Cripps Pink producing 50-60t/ha. Note the longer branches often seen in France – part of the Soleaxe or 'extinction' training, justified as getting the fruit out into the light

1yo Cripps Red. Note the 'octopus clips' used in the hail net – allows net to sag and open, dumping its hail load rather than stretching.

Cripps Red expected to produce 45t/ha. Grass sward is encouraged as part of IPM provide habitat for predators, etc.

FRANCE continued:

Toulemondes' nursery grows 600,000 apple trees a year, mostly on M9. Rootstocks are imported from Holland and Belgium mostly.

The trees are supported by two wires and a stake as they grow to keep them upright. Wire is plastic and flexible. Branching is promoted with sprays rather than pinching tops, but areas differ in response.

Sprinkler can be lifted above trees to provide overhead frost protection if needed.

Continuity of supply is very important, so imported fruit is used to fill orders late in the season. Chilean fruit is being repacked here.