



The world lemon market

The future—between limited growth and structural adjustment

Producer countries have been affected to varying degrees by the change in situation in recent years according to their positioning in terms of outlets or markets.

Turkey relatively unscathed

Turkey

Turkey is the country least affected by the slump. Production has increased strongly but, as the exporters themselves say, the Turkish chain 'is sitting on a gold mine', that is to say the Eastern European markets. Demand for fresh lemons has reawakened in recent seasons and Turkish exporters' comparative advantages allow them to gain market shares from their Mediterranean competitors. The most obvious advantage is geographic proximity. Production is concentrated in the Mersin region in south-east Turkey, on a narrow coastal strip on the Mediterranean. Exporters can supply Romania in two days, Ukraine in four days and even the most densely populated parts of the Fertile Crescent in Russia in five or six days. The special way in which export companies are organised is also an advantage. Their family structure and strong downstream integration makes payments secure on these markets where this is still a major problem. Thus a sales office run by a relation is often installed in Russia, Ukraine or Romania. In addition, the bottom of the range produce available matches present expectations of these markets well as price is very important.

Furthermore, the Turkish sector has been little affected by the recession in Western Europe. Only small volumes are exported to this destination. Turkey forms just a complement to supplies, taking advantage of its early 'Interdonato' variety to use the narrow market window between the end of the summer season and the beginning of winter operations.



Finally, the fall in prices of industrial derivatives has little effect. This sector is practically nonexistent as Turkish operators benefit from a growing domestic market with strong demand to sell most sorting rejects from packing chains working for export operations.

But the weakness of the sector should not be ignored

However, although the Turkish lemon sector has been fairly sheltered from the slump, professionals should not forget its weak points. The problem of pesticide residues has now been mastered although there has been a fresh alert—but more political than technical. The closing of the Russian frontier to Turkish citrus in 2004 encouraged growers to make real efforts on this point, in particular thanks to the remarkable extension and information work conducted by the rural development board. However, progress remains to be made by trade operators in other fields. Although all exporters claim traceability, how can this be guaranteed in practice when the production end of the chain is so fragmented (average field size less than 1 hectare) and the other end has such a low technical level and is so dissociated?



Cooperatives are non-existent and the producers' organisations formed have no power in questions of marketing. As a result, the upstream end of the sector that benefits much less from growth than the export sector lacks means for modernisation. Can the sector remain competitive in this context? Adapting to increasing international quality standards on markets in both Western and Eastern Europe requirement a minimum of investment capacity. The ongoing strengthening of the powers of producers' organisations is certainly a positive feature.

A strong profitability decrease in the sector in Argentina

Argentina

The situation is less rosy for Argentina, even though the sector benefits fully from the conjunctural market improvement. Growers in Tucuman, an administrative department in the north-east where most of the plantations are to be found, have been hard-hit by the fall in the price of concentrate and derivatives. However, although Argentinian professionals have been victims of the falling prices, they were also the main cause of it, with

the help of certain multinational soft drinks companies. The supply contracts that they signed with several large stakeholders in the sector resulted in a huge increase in production to cover a potential increase in soft drinks consumption in China, which turned out to be totally hypothetical. This resulted in a world market slump. The prices paid by the juice industry to growers had reached nearly USD90 per t in 1996 and then fell gradually before plummeting to USD25 per t in 2002. After a conjunctural increase in 2003 and 2004 caused by the production decrease in California and then in Europe, they returned to these low levels in 2005 and 2006.

Faced with this strong decrease in profitability, producers diversified their outlets from the mid-1990s onwards. The development of fresh lemon exports to the European market in the summer re-launched the sector. The quantities shipped to the EU and then to Eastern Europe grew quickly, exceeding 300 000 t in 2003. However, this outlet also faced difficulties. EU market demand has peaked at 200 000 t since 2004 (with variations for unforeseen circumstances and growth has slowed markedly in Eastern Europe. The reason is not competition from South Africa as most of its shipments are to the Middle East, with some smallish volumes exported to the UK. The other markets are marginal. The possible opening of the US frontier should not change the situation, given the limited potential of the US and the powerful lobby protecting domestic production.

In parallel, production costs have increased considerably. However, production structures with mainly commercial plantations and strong vertical integration enable substantial economies of scale. But pressure on plant health is strong, especially since citrus canker was detected at the beginning of the 2000s. In order to conserve their export positions, professionals have had to set up a programme—both rigorous and costly—to control the disease. Spraying accounted for nearly 75% of production costs in 2007 according to INTA, the Argentinian national research body. The consequences

Lemon - Spain & Turkey

Comparison of competitiveness on the Russian market

	Spain	Turkey
Cost		
production (ex-packing station)	0.29-0.40 euro/kg	0.20 euro/kg
logistics (full truck 21 t)	EUR 5 800 to 8 900	EUR 5 000 to 6 000
Others		
Delivery speed	5-12 days	5 days
Payment risk	little mastered	mastered
Level of certification and traceability	high	average

Professional sources

Competitiveness

World exporters all seek to profit from the growth of the East European markets (within and outside the EU). In the summer, Argentina has a near monopoly. Exports from South Africa totalled less than 5 000 t in 2007, of which 80% was shipped to Russia. In contrast, Spain and Turkey fight a vigorous commercial war in the winter season. Turkey is currently ahead, but its price-based development model could have limits in the future. Will Mersin growers be able to meet the increasing traceability and MRL requirements of customers, and especially those who have recently joined the EU?

Lemon - Eastern Europe - Consumption

	Consumption (kg/capita/year)	Population (million inhabitants)
EU-15	2.8	375.0
Poland	2.4	38.2
Czech Rep.	2.2	10.3
Slovakia	1.5	5.4
Hungary	1.5	10.1
Russia	1.5	143.4
Romania	1.4	21.6
Bulgaria	1.4	7.7

Sources: professionals and CLAM 2006-07

of the substantial increase in oil prices for inputs such as fertilisers have aggravated the problem. Likewise, exporters have been seriously hit by higher freight prices.

Other sanitary challenges on the horizon

The whole sector is mobilised to prevent the arrival of greening, whose consequences could be disastrous. In neighbouring Brazil, the disease is present in Sao Paulo and Parana states, 300 km from the Argentinian province of Mision, and one of the insect vectors has been detected in north-east Argentina.

Canker, greening... one can understand the lobbying carried out in particular by Spanish producers ('All's fair in love and war') to strengthen EU sanitary controls and protect their interests. The phenomenon has already resulted in an acceleration of the concentration of the export players operating and in a change of alliances. The logic of partnership with Spanish operators that had been one of the driving forces behind the development of Argentinian lemon in the EU is of decreasing importance. The flow has shifted to other points of entry such as Italy, Greece and the Netherlands with an ambition that is not necessarily that of a partnership. Thus certain Argentinian exporters have a sales office in the EU in order to contact retail distributors directly.

Finally, the lowering of MRLs and the reduction of registered active substances form another challenge to be addressed by Argentinian professionals on the very short term basis.

A serious problem of overproduction in Spain

Spain, the world's second largest producer and leading exporter of fresh lemon is undoubtedly the country that has been hardest hit. The overproduction crisis is visible when you travel through the lemon groves in Murcia, the province that accounts for 90% of Spanish production. The Llano de Brujas, or 'Witches' Plain', seems to be well-named, given the number of abandoned orchards and dead trees to be seen there. The sector was still profitable recently but now seems to be attacked on all fronts. The situation is particularly serious for fresh fruits. Demand is decreasing in Western



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Europe, the heart of the market for Spanish professionals. Furthermore, competition from Argentina is narrowing the sales window for Spanish lemons. First, retail distributors tend to favour switching as early as possible to 'Eureka' from South America, whose appearance is more attractive than the Spanish 'Verna', with coarser peel and less regular shape. Second, the extending of the Argentinian season tends to postpone the first referencing of 'Fino'. This delay at the start of the season has serious consequences, given the technical options chosen by producers during a good period, when the objective was to cover the rapid growth of markets. There has been a strong increase in the volumes to be sold during the first part of the season. 'Fino' grafted on *C. macrophylla*, forming about 55% of the production of this cultivar, must be marketed by the end of January at the latest. The use of this rootstock has resulted in a 15 to 20 t per ha increase in yield in comparison with sour orange rootstock, but keep quality is reduced.

A sector attacked on all fronts

Spain is also under attack on the eastern front. The Polish, Czech and Russian markets had become a major outlet for Spain in a single decade. However, Spanish producers have lost market shares in recent years to Turkish competition with the comparative advantages that have already been mentioned. The volumes shipped to these destinations had approached 200 000 t in 2003-04 before falling to 144 000 t in 2005-06 and then 126 000 t in 2006-07.

Furthermore, as if the slump in demand on the fresh lemon market were not enough, Spanish producers must also face up to the slump on the concentrated juice market. In spite of the large volumes that they handle (from 120 000 to 240 000 t in recent seasons), Spanish juice processors have little hold on the international market. In order to recover profitability, nearly



Spain

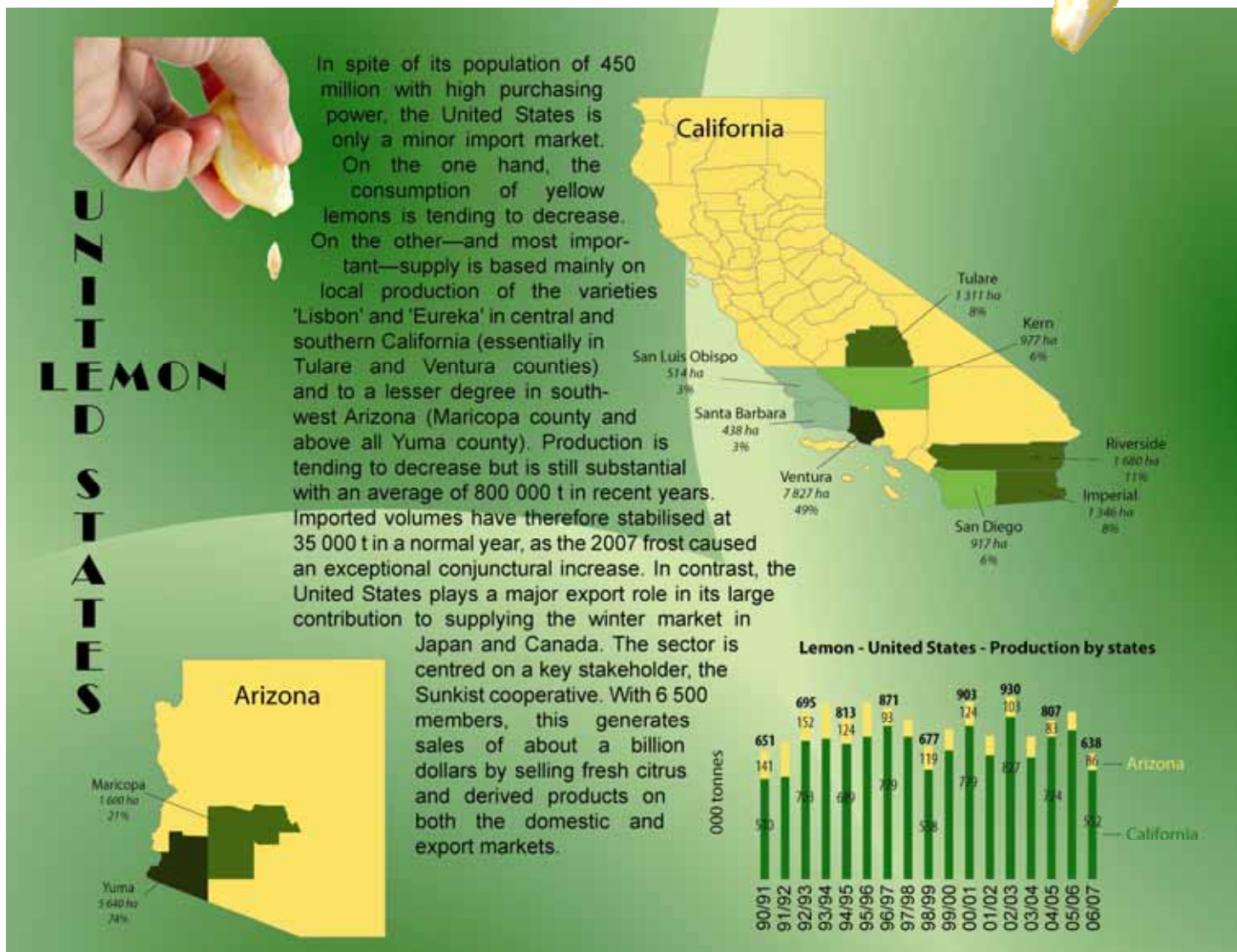
half of the professionals in the sector have developed a strategy aimed at separating them from the world market by manufacturing tailor-made combinations and emphasising service to customers (short delivery periods, etc.). However, the change has only paid off within the juice chain, as returns to producers have remained at some one or two centimes (EUR) per kg since 2002-03 (not counting European aid of 9 centimes per kg), and this is well below production cost. However, the end of direct aid for processing paid by the EU should change the balance of power and lead industrialists to paying more for raw materials in order to assure supplies.

Efforts to be made in rationalisation

As a result of all this, 200 000 to 300 000 tonnes of fruits has remained on the trees during the last two seasons, that is to say nearly 20% of production. The weaknesses of the sector went unnoticed during the glorious period but

are now visible. Production costs are high. The disadvantages stemming from the high cost of labour in the EU are magnified by the scattered nature of the sector. Production structures are generally small, especially in the Huerta de Murcia area. Furthermore, packing facilities are not rationalised as there are more than 100 packing stations and these therefore handle an average of 6 500 tonnes each! It is true that the very traditional mode of marketing of production is still very favourable for the stakeholders downstream. The functioning of cooperatives in the region left to be desired in the past and now there are practically none. Transactions are still concluded mainly on an 'a resultados' basis. The grower is paid according to the amount of the final sale concluded by a middleman, the 'corredor' and has no guarantee of payment.

Relations between Spanish packers and Argentinian exporters have also weighed on the profitability of packing stations for several years. The volumes of 'Eureka' from Argentina handled by Spanish packing stations in the



summer made it possible to smooth the overheads and gain customer fidelity by means of a category management approach.

The updating of the range of cultivars is also a critical point, especially as regards 'Verna'. A long period of economic profitability meant that professionals were not encouraged to address the question, contrasting with other lemon production chains. The dynamic interprofessional association Ailimpo has launched a research programme on the subject but the work will take a while and the results are uncertain.

Irrigation—another serious problem

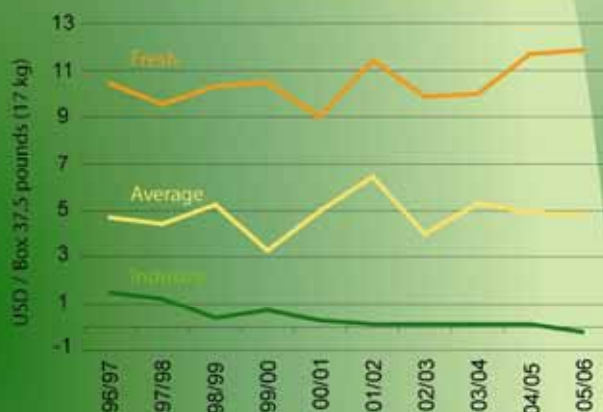
The slump is even gaining a political aspect in the use of water, an increasingly rare and expensive resource in the region. The province of Murcia, with annual rainfall of some 100 mm, is one of the world's arid zones. Covering the needs of the population and of farming is de-

pendent on water conveyed from other regions in the country, and in particular via a conveyance canal nearly 400 km long running from the Tagus. The absence of replacement crops and the general building policy in this very sunny region has led to the reconversion of a large part of the regional economy to mass tourism, resulting in a tremendous increase in water requirements for human use and even for many golf courses (whose absurdity matches the aridity of the region). Pressure on water resources is therefore increasing strongly, to the extent that the region has to build costly desalination plants. The question is nevertheless there—should the whole production area be irrigated when a proportion of production will be lost?

The increasingly limited role played by the other Mediterranean countries ...

The citrus sector is going under in certain Mediterranean countries for reasons that are not solely connected with the slump. In Greece, the

Lemon - United States - Returns for growers



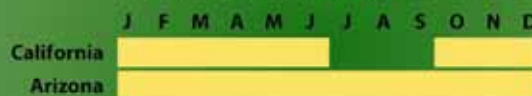
Lemon - United States - Consumption



Lemon - United States - Production distribution by outlet



Lemon - United States - Harvest calendar



Lemon - United States - Exports

tonnes	2002	2003	2004	2005	2006	2007
Total, of which	95 249	107 983	95 898	99 983	101 546	133 885
Japan	58 221	62 118	52 093	53 093	51 570	83 549
Canada	22 660	29 427	29 216	30 366	30 164	27 045
Australia	1 528	2 693	2 352	3 097	4 269	8 795
South Korea	3 362	4 087	3 537	3 573	5 000	7 397
China	1 578	1 282	1 163	1 072	1 776	2 923
Hong Kong	6 171	6 567	6 065	6 501	7 008	1 837
Others	1 730	1 809	1 473	2 282	1 759	2 341

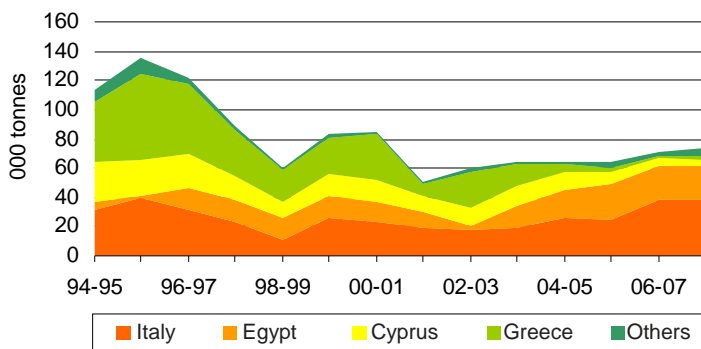
Source USDA/Customs - processing and presentation CIRAD

Graphics: Chez Volant

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Lemon - Mediterranean exports excluding Spain and Turkey



Source : CLAM



sector has not recovered after the devastating frost during the 2004-05 season. The destruction of a fair part of the lemon orchard area has drastically reduced production and this has not topped 40 000 t in recent seasons in comparison with 110 000 to 130 000 t at the beginning of the 2000s. Just like the other citrus fruits, lemon has not escaped the recurrent drought in Cyprus. Production has decreased by three-quarters over a period of about 10 years and is now not more than about 10 000 t.

These two producers no longer play a prominent role in international trade. The non-negligible presence of Morocco on the EU scene in 2007-08 is conjunctural and related to market under-supply. Slightly more than 12 000 tonnes was shipped, much of this to the EU and often repacked in Spain. Moroccan production is limited (25 000 to 30 000 t) and generally sold entirely on the domestic market.

Israeli production is significant and stabilised at about 50 000 t. However, 90% of this is sold on the domestic market. Exports do not exceed 2 000 t in a normal season, especially as 'Villafranca', the main variety grown, is less appreciated than the other cultivars sold in the EU.

... even by Italy, the giant of the sector

There remains another giant in the Mediterranean, with Spain and Turkey. This is Italy. With a total lemon orchard area of about 30 000 ha, mainly in Sicily (provinces of Palermo, Catania and Messina) and a harvest of some 600 000 t in recent seasons, it is in a good position among the world's leading producer countries. However, Italy now plays only a marginal role on the international lemon market because of the high production

cost of its 'Feminello' and 'Monachello' fruits. Very limited farm size (less than 0.40 ha per holding in 2000) affects the competitiveness of the sector.

A strategy of occupying high value-added niches through more profitable types of production (organic lemons) or PGLs (no less than four for lemons from Amalfi, Sorrento, Gargano and Syracuse) has given new impetus to exports, which reached 40 000 t in 2006-07 (also thanks to favourable conditions). However, there is a risk of reaching the limit in terms of volume. Thus most of the crop is sold on the domestic market or to industry.



Practically all the large Egyptian crop of about 300 000 t is based on very specific cultivars (mainly different types of lime, locally going by the name Lamuun) that do not interest the international market. Thus 90% of the 20 000 t exported in 2006-07 was shipped to the Arab countries that seek this particular produce. The volumes exported to the EU have never exceeded 2 000 t. Nevertheless, the evolution of the Egyptian lemon sector should be monitored on a medium and long term basis. The sector professionals display determination to diversify their production and possess comparative advantages in terms of production cost; they have already proved their competitiveness on the Eastern European markets. Exports of oranges hardly exceeded 200 000 t in the early 2000s but approached 800 000 t in 2006-07.

What markets to target to re-launch demand for fresh lemons?

Is any consumption potential left around the world to re-launch demand for fresh lemons? There do not seem to be many new markets to gain. Consumption habits are focused on lime in the tropics. Sour products have difficulty in Asia and substantial development potential can hardly be imagined. However, market surveys should be conducted to confirm this. In contrast, an out-of-season market might be accessible for Mediterranean producers in the southern hemisphere producer countries such as Chile, Argentina, South Africa and Australia. But, a technical obstacle remains to be overcome to gain access to these remote destinations. An alternative must be found to the cold treatment often required and difficult to perform on a fruit as susceptible to cold as lemon.

Consumption is stagnant in the Middle East. The imports by the United Arab Emirates and Saudi Arabia, the two leading markets in the region, seem to have stabilised at 20 000-25 000 t and 25 000-30 000 t respectively.

However, it is probable that there is room for growth in Eastern Europe. Consumption there is approximately 1.4 kg per person per year—half that of Western Europe. The matching of consumption levels in the two parts of Europe can be envisaged in the light of the strong growth in the eastern countries. This leads to thinking that a market for 400 000 t could be gained, mainly in Russia. It remains to know which producers will be best placed for this. Turkey seems to have a favourable position thanks to the comparative advantages mentioned above.

The prospects seem much more limited on a mature market such as Western Europe. Lemon consumption is by nature not very elastic. The acid level of the fruit limits it to two main uses: a food ingredient and a decorative feature to improve presentation (the slice of lemon decorating fish fillets for example). The market seems to be saturated in the developed countries as regards its use as

an ingredient, especially as competition is increasingly fierce. Ready-prepared

juices are an alternative whose strong points are convenience and duration of conservation. However, new uses probably exist in the 'presentation' category. The slice of lemon accompanying drinks such as lemonade and sparkling water is far from omnipresent, especially in fast food establishments. And the potential market is not ridiculous, given the millions of litres of fizzy drinks consumed each year.

Segmentation of supply to increase value added

Another way of generating more profitability in the sector consists of increasing the value-added of products. Absence of pesticide residues seems to be a particularly relevant line for segmentation for a fruits whose peel is often used in presentation or as an ingredient. In addition, sales per fruits gives more latitude for increasing retail prices than sale by weight. Nevertheless,

consumers in certain European countries seem to have found, wrongly or rightly, a product that meets their expectations—lemons with no post-harvest treatment. According to professionals, this market segment forms some 60 to 70% of sales in France. Likewise, the British market has shifted to no postharvest treatment in a big way and, unlike the French market, with no natural wax. But there still seems to be considerable room for growth in Germany, where the weight of discount chains means that the cheapest produce, that is to say with conventional treatment, is dominant. In this context, the European organic lemon market is peaking.

PGIs being examined

Among quality labels, Protected Geographical Indications seem to draw a response from fresh lemon professionals. A project for setting

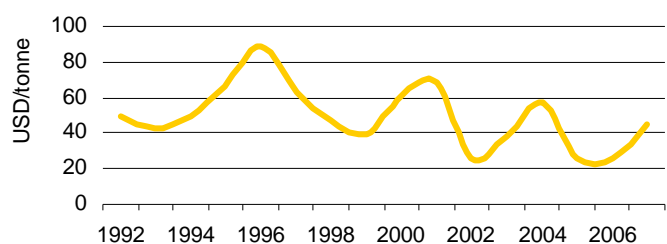
Industry

Concentrated juice is the main product manufactured by the industry. The degree of concentration varies according to the acidity, indicated by the weight of citric acid per litre: from 40 to 48° Brix for 400 gpl and 48 to 58° Brix for 500 gpl. It can be pulped or clarified. Single juice (7 to 10° Brix) forms only a small part of production.

The other main co-products are essential oils extracted from the peel by mechanical scraping before juice extraction, and essences extracted from aromatic evaporation liquids. Deterpeneation is performed to remove limonene and thus obtain high-quality oil with a high level of citral, the main component of lemon fragrance.

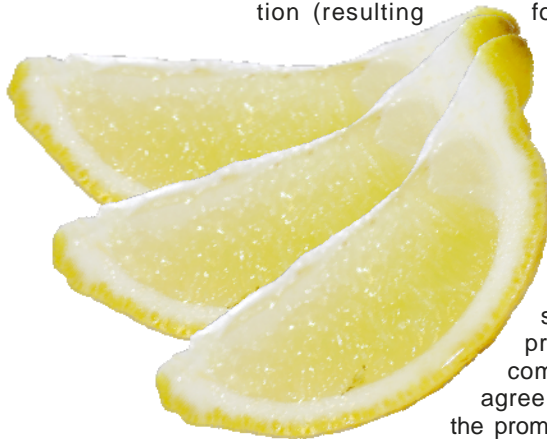
Dehydrated pulp is also used in industry for animal feed and the cells of dehydrated pulp are used in pulp beverage manufacture.

Lemon - Argentina - Prices paid to producers by the juice industry



Source : EEAOC

up this manner of segmentation of supply combining quality and origin is being examined by Ailimpo in Spain. The most powerful differentiation feature at the international level is probably not the 'production zone' aspect. Although a French consumer will immediately perceive the qualitative advantage of the very green grass of Normandy in the making of a Camembert, he will certainly not have such a clear perception of the advantages of the aridity of the Murcia region for the production of lemons with a crop management technique requiring less chemicals. However, such an approach will make it possible to impose a stricter technical specification (resulting



is necessary.

High quality lemon thanks to Californian 'curing'

The 'curing' technique used in California also increases value-added. Developed first and foremost for increasing fruit resistance to damage during transport, it also improves the appearance (smooth, thinner peel and brighter yellow colour) and increases the juice and acid contents. The procedure is simple, consisting of storage at 12.8 to 15.6°C and relative humidity of 75 to 85%. However, the main limiting factor is treatment time. This is fairly long and hence expensive.

Seedless lemons: a must-have!

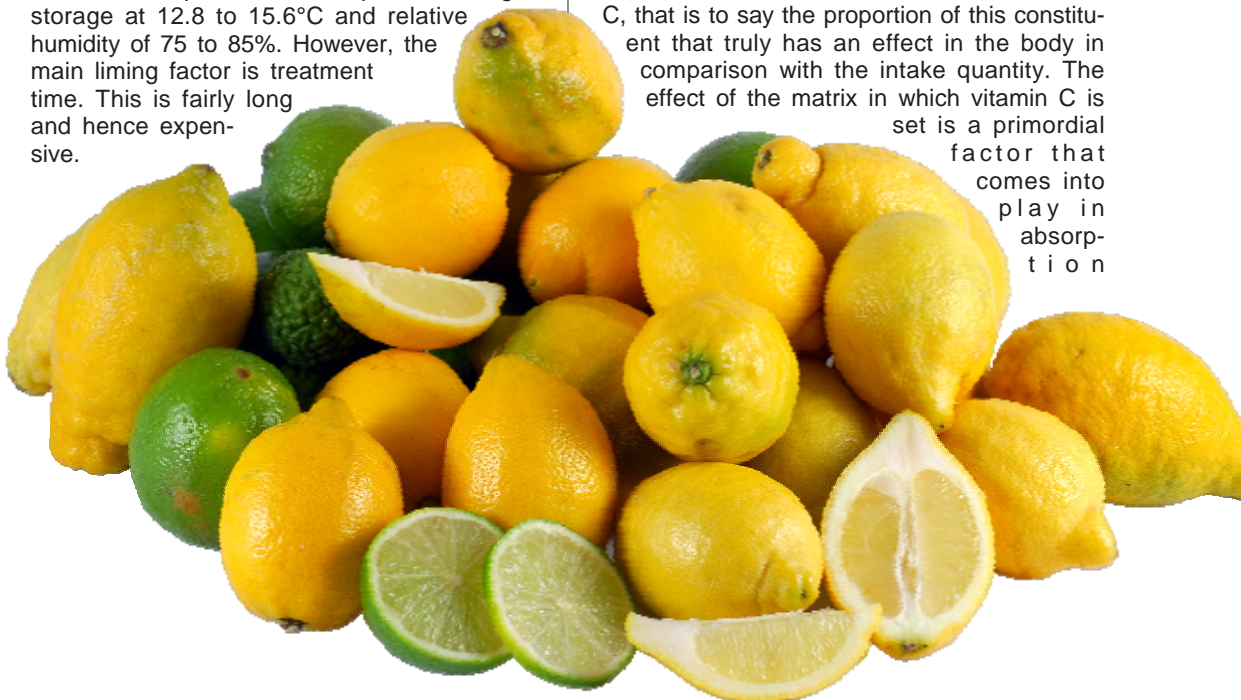
Another factor that could form a strong differentiation feature is the seedless character. However, this character that retail distributors seek vigorously is difficult to produce. One of the technical solutions for achieving this is particularly difficult to put into practice: this is the total isolation of the crops from risks of cross-pollination with other citrus species. It is difficult except on an island or in a desert, as Moroccan growers have done with their 'Afourer' grown in very dry areas near Marrakesh. The other technical solution is to use specific cultivars. The Institute for Tropical and Subtropical Crops at the Agricultural Research Council in South Africa proposes a seedless triploid 'Eureka'. Similarly, the Alata Horticulture Institute in Turkey has bred three seedless varieties by bud irradiation ('Alata', 'Gulsen' and 'Uzun'). The cultivars are being evaluated and registered.



New industrial uses?

Synthetic vitamin C (E330), obtained by fermenting sorbose is widely used in the food industry as an acidifier in canning, as an antioxidant, etc.). Replacing it by lemon juice could create a new market with considerable potential. The nutritional advantages of the natural product could make up for its higher price. Although scientific knowledge of the question is still only partial, it seems that numerous factors may be involved in the bioavailability of vitamin C, that is to say the proportion of this constituent that truly has an effect in the body in comparison with the intake quantity. The effect of the matrix in which vitamin C is

set is a primordial factor that comes into play in absorption





© Aydın Uzun, Alata HRI, Turkey

Seedless variety: Uzun

mechanisms. In addition, possible synergy between vitamin C and the other microcomponents (e.g. flavonoids such as hesperidin in the case of lemon) are also factors that can modulate vitamin C uptake. As an illustration, in a comparative study aimed at improving the vitamin C status of students whose average plasma level was 57 $\mu\text{mol/L}$, orange juice or vitamin C supplements were given to volunteers. Intake of 200 ml fresh orange juice (50 mg vitamin C) increased their plasma level to 75 $\mu\text{mol/L}$ in 14 days, whereas the taking of 250 mg supplements did not increase plasma levels of vitamin C. A supplement cannot reproduce the complexity of a fruit and so the first feature to be favoured in terms of vitamin C intake is food (fruit, in particular citrus). The scale of the potential market justifies the performance of complementary studies focused specifically on lemon.

Necessary structural adjustments in countries where production costs are high

The basic structure of the market seems weaker than the very good performance of prices this season would seem to indicate. Fresh lemon consumption is down in Western Europe, Japan and the United States and growth of the international market is only assured by Eastern Europe. In addition, the profitability of industrial activity is not assured if the world harvest were to be normal. It is true that world production over long periods shows that adverse weather conditions occur on a cyclical basis. However, their impact will be increasingly limited in the light of the rate of increase of production in recent years. Furthermore, is it reasonable to base the profitability of an economic sector on such an uncertain factor?

Room for increasing business does exist for fresh lemon, juice and derived products. However, mobilising this potential is often a long process involving changes in production structure with the installation of seedless varieties, the adaptation of crop management sequences for PGIs, complementary studies, etc.

In the light of this, the return to profitability in the countries where production costs are high may well be both sudden and short-lived.

Spain, and probably Argentina too would seem obliged to implement a structural reform to recover lasting profitability and

maintain their position as world leaders. The structuring of these sectors via inter-professional organisations such as Federcitrus in Argentina and Ailimpo in Spain is a major asset in handling this successfully. In its annual economic analysis bulletin, EEAOC, a regional research body in the province of Tucuman, observed a downward trend in areas under lemon to the benefit of more profitable crops (cereals or sugar cane). Will this 'natural' adjustment suffice? The Spanish lemon sector is addressing the problem with awareness and courage. A large-scale reconversion plan for some 8 000 to 10 000 ha is being studied in Murcia. It will lead to necessary reductions in capacity of both packing stations and juice manufacturing units.

Although the present situation still seems favourable for Turkey, professionals should nevertheless examine the question of their competitiveness in the medium term. The very recent setting up of the National Citrus Board, grouping all the sector stakeholders, is a first step ■

Eric Imbert, Cirad
eric.imbert@cirad.fr



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