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**Deliverable D8-D9:
Characterization of European Fruit and Vegetable Production
and Markets**

***La vulnérabilité des régions européennes productrices
de fruits et légumes frais dans un contexte
de libéralisation internationale***

Synthesis and Conclusions

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Dissemination Level

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PP	Restricted to other programme participants (including the Commission	
RE	Restricted to a group specified by the consortium (including the Commission	
CO	Confidential, only for members of the consortium (including the Commission Services)	

The main assumption of this research concerns the easing of trade restrictions for farm and food products within the future free trade Mediterranean area (which is supposed to be completed in 2015). This easing will affect the concerned commodity systems at the same time within the European Union and the southern and eastern part of the Mediterranean area. The goal of this research consists in measuring these impacts and suggesting some public policies while lightening the negative aspects. We shall try first to characterize one of the most important and common commodity systems to the 5 Mediterranean countries of the EU (Spain, France, Greece, Italy and Portugal), the fresh fruit and vegetable commodity system and, secondly, to measure the “vulnerability” of the concerned regions of these countries faced with an increasing competition coming from SEMC¹. This assessment leads to build an inter-regional diagnostic comparison, outlining the strengths and weaknesses of fruit and vegetable specialized European regions. The theoretical basement of this research could be found mainly in the resource theory, abilities and *capabilities* based upon the management and organization sciences.

The characterization of the sector is built on a twofold entry: geographical (the EU is analysed by itself and by Mediterranean countries) and by product (we focus on the tomato for vegetables and citrus for fruits). To do that, we analysed successively the international positioning of the EU on the fruit and vegetable market and, then, its production potential, consumption dynamics and EEC institutional framework (CMO).

The EU-25 is, in 2004, **the second world fruit and vegetable producing economic entity** with 9.5 % of the world supply which outpaces 1350 M t. The leader has always been China. However, the recent Chinese supremacy results from an increasing production during the last years : indeed, China doubled its market share during the last fifteen years, rising from 18 % in 1990 to 37 % in 2004. India is now the main competitor of Europe with 9.4 % of the world supply. NAFTA² and MERCOSUR are now the third and fourth biggest world fruit and vegetable producers with 7.1 and 4.1 % of the 2004 total production. We observe in the fruit and vegetable sector, as in many other sectors, a quick strong increase of big Asian countries (China and India) and, consequently, a “world upside down”.

However, the EU remains **the first world commercial operator**. Based upon the UN statistics (Comtrade), UE-15 controlled in 2003 more than 45 % of the world fresh fruit and vegetable exports which were estimated to \$63 billion³ (the second world exporting entity being the NAFTA with 19 %). Other entities occupy a marginal place, particularly the SEMC (6 %) and the Great China (5 %). Moreover, we know the weight of the intra-area exchanges which obliges to nuance the sharing of the international market. This market, estimated to \$25 billion in 2003, could be presented in the following way : EU-15 and NAFTA with each 18 %, SEMC in third position with 14 % and Great China in fourth position with 12 %. If the fruit and vegetable production stagnates in EU, it's different for its exports which increased by 136 % between 1990 and 2003, with an identical rate to that of China and India. We note that, in the same time, Iran has been able to triple its exports which outpaced in 2003 one \$billion. These figures show an increase of the competition on the international market.

Customers are also very concentrated. According to Comtrade (for the year 2003), EU-15 is the first world importer with 53 % in value, followed by NAFTA (19 %) : high income countries from the Triad still control more than 80 % of the world market. If we except the

¹ Southern and Eastern Mediterranean Countries (SEMC).

² North American Free Trade Agreement (NAFTA).

³ Sources can be different. FAOSTAT gives for the world fruit and vegetable exportations \$56 billion.

intra-area trade, the market size falls by 60 % and the distribution is significantly modified : EU-15, 38 %, NAFTA, 16 % and “the rest of the world”, that is to say mainly exchanges between Asian countries, 40 %.

The most exported products in the world are the fruits: citrus (more than 10 Mt for 5 \$billion, that is to say 10 % of the fruit and vegetable as a whole, annual average 2001-2003), then bananas (9 %). Tomato is the the third big product with 4.3 Mt and \$3.5 billion (7.2 %). The EU is by far the first citrus fruit exporter with 56 % of the market. Its position on the tomato market is also strong with 58 %, the same for apple (50 %), potato (72 %), green pepper (59 %) and lettuce (74 %). All these products exceeded one \$billion for exports in 2003. However, we must remember that about 70 % of EU exports are dispatched on the domestic markets : it means that exports of the top 10 products destined to extra EU markets correspond to only 20-25 % of the world exports (this figure is still very important).

**International Trade Matrix of Fresh Fruit & Vegetable (*) by Economic Area
Excluding Intra-Region trade - Average 2001-2003 -**

M.US\$, CIF Export =>	Import							Total Export	Export Market share
	EU	NAFTA	SEMC	MERCOS UR	Great China	RoW			
EU		418	244	25	7	4 527	5 222	18%	
NAFTA	1 308		139	25	66	2 593	4 131	14%	
SEMC	1 758	137		11	6	2 230	4 142	15%	
MERCOSUR	612	210	15		1	643	1 482	5%	
Great China	288	167	45	17		1 662	2 179	8%	
Rest of the World	4 527	2 973	204	106	564	2 978	11 352	40%	
Total Import	8 493	3 905	647	184	645	14 633	28 506	100%	
Import Market share	30%	14%	2%	1%	2%	51%			

(*) Including frozen and partially preserved fruit and vegetable

EU: European Union (15), NAFTA: North Atlantic Free Trade Association, SEMC: Southern and Eastern Mediterranean Countries

Source: working out from UN, Comtrade, 2005 and Emlinger, 2005

We find again in the list of the top 10 imported fruit and vegetables by the EU-15 in 2001-2003, the same products than those mentioned already and, as the same, for some amounts higher than \$1 billion : citrus (11.5 % of imports in value), tomatoes (7.7 %), apples (6.6 %), grapes (5.3 %), peppers (4 %), potatoes (3.9 %), lettuces (3 %). These figures reflect the intra-area exchange intensity, knowing that tomatoes and citrus from SEMC provide more than the third of the EEC supply.

The fruit and vegetable share in the EU farm economy is big: more than 16 % of the final farm production (FFP), in value for EU-15, is supplied by this sector in 2004 that is to say about \$48 billion (the figure is \$38 billion for cereals). The vegetable amounts to 29 billion and the fruits to \$19 billion. Due to prices higher than in other sectors, the F&V part in the FFP increased during the last ten years while the production remained steady (decreasing fruit volumes were compensated by increasing vegetables).

We note also a production specialization for European countries which tends to increase (which is a confirmation of the comparative cost theory) but making, at the same time, the “local” economies more vulnerable to the market. Presented in percentage of the FFP on the years 2001-2003, the fruit and vegetable sector is estimated to 34.5 % in Greece, 32.3 % in Spain, 30.8 % in Portugal, 25 % in Italy, 11 % in France⁴. These figures confirm the acuteness of the fruit and vegetable problem both in the EU-Mediterranean relationships and between EU members. The concentration of the European production in some countries and some regions is relatively important for fruits as well as for vegetables.

Market shares of 5 main countries in the UE-15 fruit and vegetable production
(volumes, 2001-2003)

Countries	Fruits	Vegetables
1- Spain	29 %	22 %
2- Italy	29 %	28 %
3- France	19 %	16 %
4- Germany	8 %	7 %
5- Greece	7 %	7 %

Source : FAOSTAT, 2005

Data from the FADN (Farm Accountancy Data Network) which permits the identification of specialized holdings by ESU (European Size Unit), by countries and by regions, confirm the strong specialization rate of production in the Mediterranean EU members: on the 1999-2002 average period, Spain is in the first position with 38 % of the 5 countries F&V value production, followed by Italy (28 %) and France (25 %). In the southern part of Europe, 48 regions own a sector turnover up to €1 M but Spain dominates with 3 regions located within the first five⁵: Andalusia (16.6 %), Comunidad Valenciana (9.2 %) and Murcia (5.0 %). France, with PACA, represents 6 % and Sicily 5 %. As a whole, 20 Spanish, French, Italian regions (plus 2 Greek) represent 78 % of the fruit and vegetable farm turnover for the 5 EU Mediterranean countries (\$13.6 billion).

The production structures remain strongly atomized in the EU, with about 715 000 holdings in 2002, that is to say an average size of 7 ha (UAA)⁶ for fruits and 4 ha for vegetables. The holding number registers a decreasing of 2 % per year for vegetables and 3 % for fruits, which results in the appearance of big producers taking advantage of economics of scale. The employment (in equivalent full time) could be estimated to about 1.3 million workers, which is huge. In some regions (as it was above mentioned), the F&V sector is strategic on economical and social sides.

The technical levels remain heterogeneous. For example, the apparent average yields in the citrus production are 27 t/ha in Greece, 20 t in Spain, 16 t in Italy and France. Concerning tomato, the yields are 110 t/ha in France, 60 t in Spain and 58 t in Italy. The economic performances are also variable: an Ernst & Young study performed for the Oniflhor shows for vine tomatoes some differences of more than 30 % between countries (France was at 1.02 €/kg, Netherlands at 0.86, Spain at 0.68 and Italy at 0.67).

⁴ Source: European Commission, DG Agri, 2004.

⁵ That is to say €13.6 billion for the sample calculated from the specialized holdings of the FADN.

⁶ Utilized agricultural area (UAA).

The apparent fruit and vegetable consumption in the EU was in 2003 372 kg per capita, that is to say one of the highest in the world, as a result of the food habits in the Mediterranean countries (456 kg/capita in Greece and 450 kg/capita in Italy). The nutritionists for long time recommended a food diversified diet making a large place for fruit and vegetables. The famous “food consumption Mediterranean model” (FCMM) makes a huge opportunity to develop the sector. Paradoxically, the concerned countries use very little this advantage while USA, Scandinavian countries, China, in the context of struggle programmes against the pathologies connected to disequibrated food, built some real nutritional programmes based on the FCMM. Apparently, the fruit and vegetable consumption in Europe stagnates but, in fact, registers some important changes: fresh products are replaced by frozen, preserved salads and cook-chilled, all products stemming from new ways of life (urbanization, continuous working, increasing leisures...). The main parameter in the purchasing behavior of the consumer remains the price and, in few cases, the quality. This reduces the margin of operators along the commodity system and, therefore, their adaptation capacities for innovation and communication.

The distribution channels play the main role within this evolution. Indeed, the concentration of the retail trade and the tendency to the vertical integration of services connected to the marketing of products (the multiples control in Europe between 50 and 80 % of sales) exacerbate the competition (through prices) and favours the super-discounters. Usually, the big retailers give an advantage to the cost control and utilize three tools: the sourcing (introducing strong competition among suppliers), the logistics (with Just in Time techniques) and the communication on the product level (geomarketing, mailing, distributor’s brand, merchandising...). These strategies don’t leave any choice to other operators who try to adapt by establishing economies of network and offering services. For some of them, it will be possible to set up some differentiation strategies, but for only 10 to 15 % of the market (that to say €5 to 7 billion in Europe). We must add that *the sourcing* needs the utilization of norms (such as BRC, IFS, EFSIS, EUREP-GAP...), which strengthen the power of the big retailers inside the commodity systems.

The institutional European framework for the F&V commodity system is supplied by the new CMO⁷ (Agreement 2200/96). An Operational Fund (OF) has been created in order to help the producer organisations (POs) which start a process of concentration and modernisation (they paid now for half of investments). As a whole, EAGGF payments devoted to the F&V sector declined slightly (3.6 % of the Fund in 2002 against 4 % in 1996): this could be explained by the difficulties for producers to merge and practise the forward integration and perhaps by some bureaucratic attitudes of regional, national and European administrations. The OP rate organisation was, in 2002, 75 % in the Netherlands, 46 % in France, 36 % in Spain, 30 % in Italy, 11 % in Greece and 5 % in Portugal (average rate : 38 %).

In short, **the strategic parameters for the F&V commodity system in Europe** are the following: the producer structure and performances, the density and quality of the marketing organisations, the capacity for the commodity system to create value and the economic and institutional constraints on the regional level.

In the framework of the above mentioned problematic and on the basis of the management sciences, that is to say the *Resource-based View*, we propose the use of a comparative

⁷ Common Market Organization (CMO).

methodology applied to the regional level (the region is supposed to be more homogeneous than the country), using the *benchmarking techniques* (assessment of performances by comparing entities of the same sub-system). The first step of this methodology consists in imagining a function to be called **regional vulnerability index (RVI)** combining the four identified strategic parameters⁸. In a second step, we shall proceed to a hierarchical classification of regions leading to a strength-weakness diagnostic with possible solutions.

The RVI function combines the four strategic parameters which are each one analysed by a range of indicators.

Regional Vulnerability Index (RVI)

Strategic parameters	Indicators
Structure and performances of farm producers (SPFP)	Size, concentration, increasing of turnover, investment rate, subsidy rate, mark-on, work productivity
Density and quality of marketing institutions (DQMO)	Number, turnover, assets, indebtedness, mark-on, productivity, rentability
Capacity of the commodity system to create value by differentiating the territory (CV)	Number of PDO (AOP), PGI (IGP) and OF (AB) ⁹
Constraints of the economic and institutional regional environment (CRE)	Population density, purchasing power, transportation infrastructures, R&D expenses

The Regional Vulnerability Index is inversely proportional to the total of the score of each parameter. It's calculated by using the following equation:

$$RVI = 1/[(SPFP) \times \alpha + (DQMO) \times \beta + (CV) \times \lambda + (CRE) \times \theta]$$

$\alpha, \beta, \lambda, \theta$ being weighting coefficients.

The regions which have been selected for calculating the index are those which made the most important average annual turnover during the period 1999-2002: 23 for fresh products, 24 for fresh vegetables, that is to say 34 European regions as a whole counting 324 000 holdings specialized in fruit and vegetable production and making a production of about €12 billion in annual average.

⁸ The theoretical justification of this approach is the following: the vulnerability is one way to study the risk of a sector failure in front of an external event (for instance the removal of tariff barriers). Finally, the vulnerability is an estimate of the sector "resilience" (Cf. Nussbaum M.C. and Sen A., 1993).

⁹ Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Organic Farming (OF).

Listed regions for the calculation of the RVI

Countries	Fruits	Vegetables	Total
Spain	Andalucia, Aragon, Cataluna, Valencia, Murcia 112 841 holdings */2 369 M.€**	Andalucia, Canarias, Castilla, Valencia, Murcia 3 8423 expl./2 612 M.€	151 264 holdings 4 981 M.€
France	Languedoc-Roussillon, Midi-Pyrénées, PACA, Rhône-Alpes 6 203 holdings /882 M.€	Brittany, Languedoc-Roussillon, Pays de la Loire, PACA, Rhône-Alpes 6 526 holdings /1 496 M.€	12 729 holdings 2 378 M.€
Greece	Ipiros-P-NI, Makedonia-Thraki, Thessalia 32 910 holdings /481 M.€	Ipiros-P-NI, Sterea-Elias-NE-Kriti 6 975 expl./247 M.€	39 885 holdings 728 M.€
Italy	Alto-Adige, Calabria, Campania, Emilia-Romagna, Piemonte, Sicilia, Trentino, Veneto 73 230 holdings /1 851 M.€	Capania, Emilia-Romania, Lazio, Liguria, Puglia, Sicilia, Toscana, Veneto 23 439 expl./1 623 M.€	96 669 holdings 3 474 M.€
Portugal	Alentejo-Algarve, Ribatejo-Oeste, Tras os Montes-Beira 16 093 holdings./170 M.€	Açores, Alentejo-Algarve, Entre Douro-Minho-Beira litoral, Ribatejo-Oeste 7 326 expl./154 M.€	23 419 holdings 324 M.€
Total	241 277 holdings / 5 750 M.€	82 689 expl. / 6 133 M.€	323 966 hldgs 11 883 M. €

*Number of specialized holdings in the ESU / **value of the final production (average 1999-2003)

Source : FADN, Eurostat

The SPFP score reaches a 3.50 average value for fruits. The 3 most outstanding regions are: Languedoc-Roussillon (7.25), Midi-Pyrenees (6.15) and Andalucia (5.78), probably as a result of large production structures. The 3 regions with problems are the Alentejo-Algarve (1.47), the Makedonia (0.19) and the Tras-os-Montes (- 1.52). The score gaps are huge (from 1 to 9) and make unlikely an adjustment. In the vegetable sector, the average score is higher (4.13): we find first Emilia-Romagna (8.35), Acores (7.41) and the Canaries (7.35), as a probable consequence from early fruit and vegetables. Finally, in the end, we find Murcia (0.59), Toscana (3.55) and Lazio (1.49), that is to say a gap from 1 to 8.

The DQMO score is calculated from an analysis of the wholesalers located in production regions. We assume that these firms are able to dynamize the upper levels of the system by offering outlets and transmitting signals (such as prices) coming from consumers and retailers. By using Comtrade, we have listed 1150 firms in the fruit and vegetable wholesale sector, amounting to a €8 billion turnover and 105 000 workers. On this total, 505 firms representing a turnover of €17 billion have been selected within 28 regions of our sample. From a financial analysis of these enterprises, we built a score of which the average value is 3.64 (but the limits are spaced, from -1 to 27), which shows a very strong heterogeneity of regions. This parameter, very discriminant, seems essential for assessing the system performances. The 3 leaders are Puglia (26.7), Valencia (56.1) and Trentino (9.16). The three last ones are 3 little specialized Spanish region: Castilla (-0.36), Galicia (-0.47) and Canaries (-0.77).

The score CV is settled from the number of PDOs and PGIs observed in each region. The outcome is an average note of 0.14 for 26 regions (24 PDOs). The Epire-Peloponese arrive first with a score of 0.38 (9 PDOs), followed by Valencia (0.38 with 8 PDOs) and Terea-Ellada (0.25 with 6 PDOs). Calabria, Piemont and Pugli are the last with a score of 0.04 and one only PDO. The fact to control PDOs and, in a less measure, PGIs enables to create a “distinct competence” for regional firms and be able to find some high value markets under the condition to master the marketing (the green tourism industry is a good example).

The score CRE seems particularly efficient because it contains some pre-requisites to the creation and growth of activities (as it was formalized in the industrial district theory¹⁰ by Marshall, Beccatini). Indeed, the presence of infrastructures and intangible investments (R&D, education, communication) on a given territory is often presented in empirical studies as a condition to develop an inter-sector apprenticeship process (which is supposed to be excellent to the firms). The measured score in 33 regions is on an average 9.22 and stands at 26.81 in Rhone-Alpes, 21.36 in PACA, 18.54 in Midi-Pyrénées, 2.99 in Stera-Ellada, 2.97 in Acores and 2.0 in Thessaly.

These different scores permit estimating the **RVI** for each of these two sub-sectors. This index fluctuates between 0.07 (Valencia) and 1.60 (Anatolie-Macedoine-Thrace) for **fruits**, that is to say a large benchmark from 1 to 23 (average 0.4) and between 0.06 (Puglia) to 0.66 (Alentejo-Algarve) for vegetables, that is to say a smaller dispersion from 1 to 11 (average 0.33). These scores outline the big diversities of European regions on the development level. Finally, we crossed the RVI index with a regional specialization index in order to build a classification of regions (at the beginning of the years 2000).

Presentation of fruit producing European regions faced to the international free trade

	Weak specialization	Strong specialisation
Strong vulnerabilty (0.41<RVI<1.60)	Makedonia Thessalia Tras Os Monte Alentejo-Algarve Aragon Sicilia	Ipiros (THREATS +++)
Weak vulnerability (0.07<RVI<0.41)	Campania Emilie Romagne Cataluna Calabra Veneto Piemonte Languedoc Roussillon Midi-Pyrénées Rhône-Alpes	Ribatejo Andalucia Murcia PACA Alto-Adige TrentinoValencia

A strong vulnerabilty combined with a strong specialization make the regions fragile (in this case, they are confronted to a high level of threats). On the opposite side, a weak vulnerability

¹⁰ This theory is presently reutilized under the concept of “cluster”.

(that is to say high performances according to the 4 types of indicators) and diversification of farm production systems permit to plan some alternative solutions.

In the fruit sector, only one region (Ipiros in Greece) among 23, seems to be threatened by the free trade and six should suffer a significative impact. A lot of regions are in fact protected by their diversified productions and good structural indexes.

Presentation of vegetable producing European regions faced to the international free trade

	Weak specialization	Strong specialization
Strong vulnerability ($0.33 < RVI < 0.66$)	Alentejo-Algarve Entre Douro Sicilia Toscana Sterea Castilla Açores Lazio	Ipiros Ribatejo Murcia Andalucia (THREATS +++)
Weak vulnerability ($0.06 < RVI < 0.33$)	Campania Pays de la Loire Veneto Languedoc Roussillon Emilia Romagna Brittany Rhone Alpes Puglia	Canaries Ligurie PACA Valencia

In the vegetable sector, the outcome is not so good, probably as a consequence of the high intensification levels achieved by the production models. Four regions are strongly faced with the liberalization, of which the European leader, Andalucia (27 000 farm holdings, turnover of €1.8 billion). Eight other regions are threatened (but at a lower degree). Therefore, half of the specialized European regions take some risks.

The vulnerability concerns, on the RVI basis, 31 % of firms making a turnover of €1.1 billion and about 100 000 jobs in the primary fruit sector and 68 % of firms corresponding to a turnover of €3.4 billion and 175 000 jobs in the vegetable sector. It's impossible to measure the impact within the peripheric activities of farming but we must recall that a farm job is generally correlated with 2 or 3 other jobs located upstream and downstream.

An application of the **SWOT method** to European regions specialized in fruit and vegetable production outlines the following weaknesses in the regions characterized by a high RVI: atomization of farm structures with difficulties for enlarging, strong technical constraints on the farming systems (water, pollution, high labor costs); not very competitive low or middle range products in front of a potential supply from SEMC; marketing organizations with sub-critical size and poor management; disadvantageous geographical location with heavy transportation costs to reach the consumption areas; lack of institutional follow-up (training and R&D).

An estimate of an Euro-Med tariff barrier removal suggests (2015 forecast) €2 billion loss for the fruit and vegetable EU exporters as a whole, i.e. about 5 % of their turnover on the corresponding area (on an average 1999-2002 basis).

Some beginnings of solutions for the fruit and vegetable commodity systems within the EU Mediterranean countries must be considered, first on the products portfolio level which should be refocused on the top range (resting on typical and high gustative quality products); and, secondly, in the framework of the European and North-South complementarities: product line effects and set up of partnership between marketing operators.

If there is no Euro-mediterranean “burst”, **the opportunities** resulting from the very dynamic world market of the Mediterranean diet will be captured by regions located outside the Mediterranean area. For example, some studies are presently conducted by the USDA for estimating the consequences of development of Mediterranean products (especially fruit and vegetables) on the USA farming. Australia, Chili and California have set up some strategic plans in order to invade the wine world market. These plans seem very successful if we observe the decline of the traditional producing countries (such as France) on the emblematic and very competitive UK market. Other projects concern the mass planting of olive trees. So, the voluntarism taught by F. Perroux “making spaces” is still to be very topical.