8 The development of products protecting the health and the environment in the Mediterranean region

The term "health" products is classically used to denote health-enhancing foods or functional foods. Yet in 2004 there was still no legal definition for "functional foods" in Europe. World regulations classify these products between foodstuffs and drugs. Probiotic or prebiotic milk products[1] F1 and vitamin and mineral-enriched foods are well-known examples in Europe and North America (El-Dahr, 2003). Although organic products are by definition "environment" products[2] by virtue of the methods employed to produce them, the vast majority of consumers buy then mainly as foods that are "better" for the health.

Certain products known as "hydroponic" products could also be classed in the same "environment" category; they are produced in soilless cultures in which inputs are very accurately controlled and the irrigation water is recycled.

8.1 - The health-enhancing food market

In the following section we shall examine the evolution of the health food market in the major countries of the northern Mediterranean region, in particular France, which has followed this trend in its own specific way while keeping an eye on the prospects for developing the market in the southern Mediterranean countries.

8.1.1 - Emergence of the market

The concept of health food or health-enhancing food is currently developing in Europe after emerging in Eastern Asia, and more specifically in Japan in 1984 (Le monde alimentaire, 1999). The Americans subsequently took over in this sector, becoming the world leader of a market estimated at US$156 billion[3] (cited by Kitous, 2003). This new generation of products has now hit the European market, particularly in France, with the emergence of health foods or health-enhancing foods. The French term denoting such foods ("alicaments") is a contraction of the French word for “food” and the French word for “medicine ”, and these products contain a "health" component and differ from conventional foods by the properties

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1 Pro-biotics: “good bacteria” that are found in the intestine. These bacteria help the body to digest proteins and contribute to good bowel health.
Pre-biotics : the precursors of “good digestive bacteria”, which nourish those bacteria and help them to develop normally.
Source : http://www.nutri-site.com/dossiers/index_probiotique.htm)

2 “Environment” products: products that are produced by methods which are ecologically favourable for the environment and ecosystems.

3 Including organic foods, plants and herbal supplements, oral cosmetics and medical foods.

which assimilate them more to medicine or drugs in addition to their basic nutritional input.

Approaches differ widely between western countries and Japan in the perception and marketing of health-enhancing foods. The Japanese regard these products as a class of food in their own right, a category which received a label in 1991 denoting them as food of special health uses - "FOSHU"[4], whereas in western countries they are classed in the same category as other foods. Vested with scientific names – functional foods, nutraceutics, pharmafoods, cosmeto-foods, etc. –, the market of these new products is expanding rapidly in industrialised countries and, more recently in emerging countries (Eastern Europe, etc.). The launching of health foods has been so successful that the market has become a contest between the agro-food industry and the pharmaceutical industry, to the extent that the regulation of these products, particularly in Europe, has fallen into a grey area between foodstuffs and drugs.

8.1.2 - Evolution of the market

Despite the difficulties encountered in the delimitation of the sectoral perimeter of the health food market, supply was estimated at €23 billion in 2003 according to the figures of the Canadian government, with a share of between 10% and 50% for the various health ingredients and a growth rate of 12% to 15% per year. It is in fact consumer interest in health that has been the mainspring of the growth on food markets. The food categories registering the most rapid growth in 2004 were those of health foods, for instance. The study conducted by A.C. Nielsen in 2004 on the evolution of the agro-food markets[5] shows that 75% of the 24 most dynamic food categories contain a health component. Furthermore, of the seven leading categories classed as registering the most rapid development in 2003 and 2004 six are perceived by consumers as being related to health and special diets (Table 1). And 12 of the remaining 17 categories (which have annual growth rates of +6% to +9%) are also associated with a healthy diet.

4 Food of Special Health Use. This term replaces the term “functional foods”. FOSHUs are a subcategory of foods for special dietary use for which provision is made in the Food Hygiene Improvement Act.

5 The study covers 89 food categories and 59 countries in the continents of North and South America, Asia and Europe (including Mediterranean countries such as France, Italy, Greece, Spain and Turkey) and emerging countries in Eastern Europe, Egypt and Morocco.

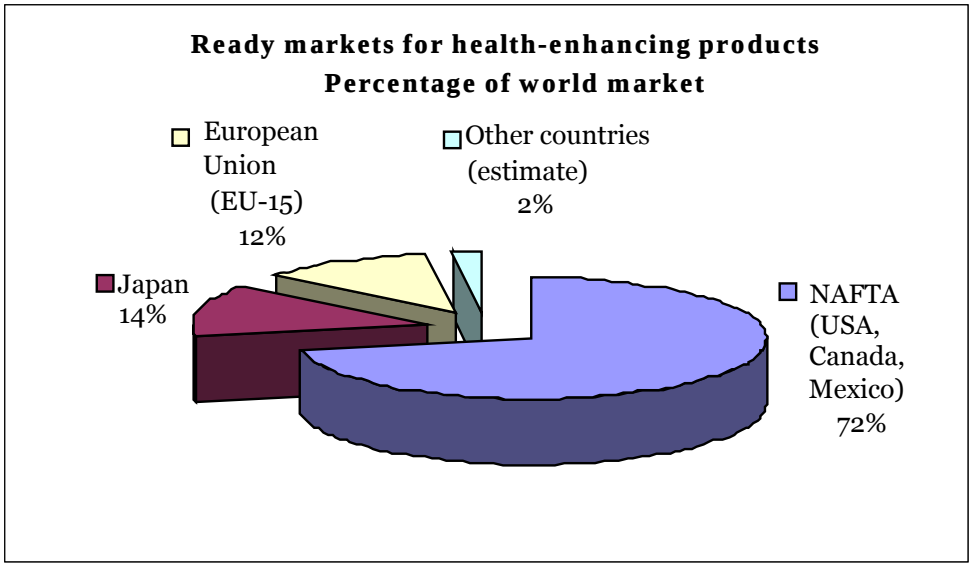
Table 8.1 - Six of the seven food categories registering the highest growth rates at world level in the "health" line

PRODUCT	CATEGORY	Growth rate 2003-2004	Growth in value (€ million)
Soybean beverages	Soft drinks	31%	244
Yogurt beverages	Soft drinks	19%	655
Eggs	Meat, fish and eggs	16%	802
Cereals, muesli, fruit bars	Confectionery and snacks	14%	314
Energy and sports beverages	Soft drinks	10%	438
Sugar substitutes	Staple foods	10%	77

Source: A.C. Nielsen (2004).

Seen in the world perspective, certain countries are well ahead of the others, offering substantial market outlets for health products. **Europe** is currently lagging behind compared to the dynamism of the Americans and the Japanese, although studies have revealed that several European States have real potential for the years that lie ahead. The most recent figures show that in 2000 the European market (15 countries) was estimated at US$30 million, i.e. 12% of the world market (Figure 1). Europe's backwardness in the field of health-enhancing foods compared to the other continents is to be explained first of all by the reluctance of legislators to use health claims in order to market products but also by the cultural disparities amongst the member states, which influence food consumption habits. Due to the combined effects of local traditions and the tastes of their various populations, southern European countries prove to be more conservative than the Nordic countries, where the progress made in the nutritional research field is a favourable factor. The Danish, Finnish and Swedish governments encourage industrialists to draw up scientific reports validating the health claims they make about their products. At a time when the incidence of cardiovascular risk is five times higher in Finland and Italy (in view of the excessive consumption of saturated milk fats), two-thirds of European research projects are run under the aegis of the countries of the North including the Netherlands and the United Kingdom, to the detriment of the countries of the South (Kitous, 2003). Germany, for example, was for many years the leader in the sale of functional products in Europe, surpassing France, Italy and Spain by far.

Figure 8.1



Source: Leatherhead and Elizabeth Sloan, Trends & Solutions, Health Ingredients Europe, Frankfurt (2000); cited by Kitous (2003).

The **southern European** countries armed themselves with their famous "Mediterranean diet" for many years as a protection against certain types of illness. However, as health problems have developed with changing lifestyles and health budgets have reached saturation point governments have been forced to define public health policies focusing on prevention (such as the PNNS[6] in France). The health-enhancing food market has excellent prospects in this context. The lack of harmonisation of regulations amongst the member states remains the main constraint on the marketing of health foods, however. Industrialists in each country are meanwhile endeavouring to implement marketing strategies that are adapted to their specific national context until new legislation is passed. **Spain** is trying to follow the example of the Nordic countries, for instance, by establishing charters of good conduct. In **Italy**, any health-enhancing food can be produced and exported to the member states of the European Union (Kitous, 2003). Until 1999, no legal definition had yet been laid down in either of these two countries (Italy and Spain) concerning health claims (DG SANCO[7], 2000). As for **France**, inertia in the field of regulations remains a powerful factor of conservatism with regard to the marketing of products alleged to enhance the health, even though 10% of the products launched on the food market since 1997 are in the health and fitness line (RIA, 2002).

6 5-year National Nutrition and Health Programme launched officially in 2001.
7 Directorate General for Health and Consumer Affairs.

8.1.3 - The health-enhancing food market in France

Following the various reports which have clearly hailed the emergence of a fundamental trend in the health food sector, French industrialists have realised that the main challenge is to innovate in order to meet the steadily growing demand in the sector. For 82% of the French and 76% of Europeans now agree that the diet contributes (or should contribute) to improving one's state of health (RISC survey, 1999).It should be pointed out that the number of persons who shared the opinion that “a healthy diet is the best medicine" was larger in the southern European countries such as France, Italy and Spain, compared to Germany and the United Kingdom (Table 2).

Table 8.2 - "In my opinion, a healthy diet is the best medicine"

%	EU	France	Germany	Italy	Spain	United Kingdom
bsolutely	3{	{	27	4	42	30
agree more r less	3{	{	43	4	43	30
otal	7(	8	70	9	85	60

Source: R.I.S.C. survey[8], cited by Antoine (1998).

The greater majority of French consumers nevertheless seem to watch their diet – not in terms of quantity (the share of food in total household consumption dropped by more than 50% in the period from 1960 to 2000 [INSEE[9], 2000]), but in terms of quality. At the same time, the family budget devoted to (non-food) "health, beauty, fitness" is steadily increasing: +58% between 1970 and 1990 (INSEE cited by Guillon and Willequet, 2002). Per capita consumption of "health and fitness" foods increased sixfold in volume in the period from 1960 to 2001. In this context, at a time when 5% of health expenditure is spent on inappropriate diets (Grenier et al., 2002), the French are tending more and more to consume products which guarantee a certain balance and well-being. The annual growth rate in the consumption of health foods has thus been evaluated at +3% to +20% depending on the segments studied. These values are much higher than the average annual growth rate in per capita food consumption, which is evaluated in France at +1.6% in terms of volume (INSEE, 2002).

Despite the profusion of products on the market, France has in fact remained a consumer country in the health-enhancing food sector in the past few years rather than a producer, for the share of French industry in this sector is still limited (apart from the role played by certain actors such as Danone). The health-enhancing foodstuff market in France was estimated at US$3.6 billion in 2000, i.e. 2% of the

8 Research Institute on Social Change.
9 National Institute of Statistics and Economic Research, France.

world market, with relatively low per capita consumption compared to other developed countries (US$63 per capita per year compared to US$438 in NAFTA countries) (Table 3). According to a Eurostaf survey, France already accounted for 20% of European sales in 2003 at a value of over €5 billion, almost level with the United Kingdom (18%), but lagging far behind Germany (39%) (Eurasanté, 2005).

Table 8.3 - Estimation of per capita health-enhancing food consumption (in 2000)

Country or region of the world	Market $ billion	World	Population million	Annual consumption $ per capita
NAFTA (US, Canada, Mexico)	175	72	400	438
Japan	35	14	120	291
European Union (EU-15)	30	12	380	79
of which France	3.6	2	60	63
Other countries (estimate)	10	2	4 100	2.5
TOTAL	**250**	**100**	**5 000**	**48**

Source: Leatherhead and Elizabeth Sloan, Trends & Solutions, 2000 (data supplemented by Kitous, 2003).

However, in order to estimate this market some authors have tried to delimit its boundaries using a "restricted perimeter" (Guillon & Willequet, 2002), which is defined by dietary foods, food supplements and functional foods, these products being in principle the subject of scientific reports proving their effectiveness on the specific body functions. According to the authors, other categories of food can be added to the restricted perimeter such as diet foods and enriched foods, organically produced products, fruit and vegetables, sugar and fat substitutes, etc. This is then referred to as the "broader perimeter" of health foods, which can be up to 10 times as large as the restricted perimeter and can amount to up to one-third of total food (Arts-Chiss & Guillon, 2003).

In France, the value of the health food market defined by the restricted perimeter was €1.4 billion in 2000 with a penetration rate of 1.1% compared to the home food market (Guillon & Willequet, 2002).

Others have endeavoured to assess the French health-enhancing food market within the broader perimeter by including products which are presented to consumers with an argument of health benefit. According to these estimates the market value was over €5 billion in 2000, thus amounting to 3% to 5% of the value of the food and drug markets (Kitous, 2003).The 10 segments included in these estimations are as follows:

- diet foods and enriched foods
- organically produced products

- food supplements, nutritional pharmaceuticals and self-medication foods
- dietetics
- "good form – fitness – slimming" products
- liquids and waters (for which functional claims are made)
- novel foods (new products in the health ingredient field)
- recommended remedies (unregistered specialities such as homoeopathic products)
- herbal therapy products
- cosmet0-foods (oral cosmetics).

Whatever the estimates of the size of the market in France, the functional food segment is still one of the most dynamic health food segments. A functional food is by definition similar in appearance to a traditional food but, according to Professor Robertfroid (1996), it contains a (nutritive or non-nutritive) ingredient which specifically affects one or several body functions with a view to obtaining favourable effects which can justify functional (physiological) claims or even health claims).[10]

France ranks second in Europe as regards the sale of functional foods (with a value of US$336 million) when only products whose labelling or publicity explicitly mentions a health advantage are taken into account (Leatherhead Food RA, cited by Inter/Sect Alliance, 2001). The largest European market is in Germany with a value of US$406 million. France is closely followed by the United Kingdom with a total of US$285 million. When one uses a broader definition covering products ranking or perceived as functional foods (even if their manufacturers do not make any specific health allegation), France ranks third and after the United Kingdom and Germany, with a total sales value of US$907 million (Hillian, 1999 cited by Inter/Sect Alliance, 2001). These products include in particular enriched milks, energy beverages and beverages for sportspeople, spreads, breads, vitamin-enriched sweets and sugar-free chewing gum.

There are two families of products in the functional product category which register a growth rate of 50% in France: probiotic yoghurts and low-cholesterol margarines (Guillon & Willequet, 2002). Functional dairy products account for a considerable share of health-enhancing food sales in France (45% in northern Europe). Whereas the share of dairy products in total sales in France is still low – less than 10% –, enrichment processes and the addition of live and prebiotic cultures have enabled manufacturers to thwart stagnation in the milk sector.

Two other categories – high-fibre breakfast cereals and diet biscuits – are developing just as rapidly as dairy specialities.

[10] According to CNERNA/CNRS Director Gérard Pascal, since there is no global agreement on the definition of "functional food", the European meaning of this term could be that proposed by Prof. M. Robertfroid (Catholic University of Louvain).

8.1.4 - Health food demand at the European level

Although the European health food markets still lack maturity compared to their American and Japanese competitors, the combined effects of growing consumer expectations, public incentives and the role played by industrialists are helping this sector to gradually catch up and develop.

In fact the demand data show that the potential of the European consumer market is considerable for a variety of reasons:

- The growing awareness of the need for a healthier diet in a western society where food is abundant; the fact that in its 2003 report, the WHO clearly stressed the influence of diet as a risk factor and a factor for preventing disease.
- The increase in the number of women in employment, the decrease in the size of the family unit and the development of away-from-home catering; the fact that meals are becoming less structured and that people are tending more to eat snacks or other forms of fast food; the fact that the consumption of processed products is steadily growing in the diet of most Europeans.
- The ageing of a population that is anxious to keep as fit and healthy as possible. By 2025 eight of the ten “oldest" populations in the world will be in Europe – i.e. Europe will have the highest percentage of people over 60 years of age, of whom there will be at least 10 million. It is estimated that by 2050 35% of the European population will be over 60 years of age, compared to 20% at the present time (Eurasanté, 2005).
- The increase in health expenditure: according to OECD projections, an ageing European population entails higher health and long-term care costs, which would increase from the current 6% of GDP to 9% by 2040. In this context of increasing longevity, the development of certain illnesses which are highly disabling and considerably impair people's quality of life is a matter of particular concern. Multifactorial illnesses are the primary illnesses concerned in this context, particularly those related to diet. Obesity accounts for 5% of public health expenditure in the world at the present time and concerns 10% of the French population.
- The increase in the number of food crises – mad cow disease, listeriosis, dioxin, etc. – has greatly affected consumers in the various countries, who say that they are concerned about the advent of GMO-based foodstuffs and seek above all products which are reassuring and have "health" virtues.
- The emergence of a new clientele of young women who are obsessed with body hygiene brings the prospect of expansion of the market of certain types of health-enhancing foods such as cosmeto-foods.

8.1.5 - Health supply opportunities

The government indecision which is reflected in the lack of a sufficiently concise definition of health foods, particularly in the South (of Europe and around the Mediterranean), has not impeded the development of the health food market. Industrialists in these countries have found a new outlet for diversifying their products by means of a new form of supply without falling into the pharmaceuticals trap[11]. So why venture into this field and how can the new consumer expectations be fulfilled?

In a virtually deflationary context where margins have dwindled, firms compete on both prices and innovation by developing in new market niches, which they see as growth areas. Foodstuffs with a strong "health" image are a source of differentiation and profitability in certain agro-food branches where there is marked stagnation, such as the milk sector. In their pursuit of value added industrialists have used the health argument to segment their products: the value added rate for dietary products, for example, is one of the highest in the agro-food industries (over 20%), whereas the rates registered in milk processing are low (13% on average in France as a whole, according to Agreste, 2004).

However, since the key to success on the health-enhancing food market is innovation, the barriers to market access are formidable for agro-food industrialists. For the segments which product supply has to fit are becoming increasingly narrow, and this leads to highly developed product segmentation with a view to meeting the rigorous expectations regarding health. In order to satisfy this demand the agro-food industries (AFIs) are forced to specialise to a very great extent and thus to effect very costly physical and intangible investments. Research and development (R&D) and communication mobilise large sums in connection with the high-tech aspect of their products. In order to innovate they thus have to achieve the critical size in relation to the target market, which is very dependent on the spin-offs of technological advancement.

In developed countries only large firms are in a position to allocate resources to R&D. Small and medium-sized enterprises (SME) and small enterprises in less industrialised countries have a low or zero investment rate compared to the rate observed in the countries of the North.

In this context, the AFIs have to adopt lines of strategy such as collaboration with pharmaceutical firms through partnership operations (mergers and takeovers) with a view to ensuring growth in both areas. The supremacy of the pharmaceutical

[11] In Europe, subject to provisions applicable to foodstuffs intended for a specific purpose, food labels must not list properties preventing, treating and/or curing a human disease or mention such properties. Claims which mention a connection between a substance and a health-related state without referring to an illness are allowed, on the other hand. A label may thus contain a statement such as "calcium improves bone density", whereas statements such as "calcium prevents osteoporosis" are prohibited.

industry in these collaboration operations is due to its higher research potential and its close links with the medical world. But the AFIs have the advantage of knowledge of consumers and mass marketing and of conserving the "pleasure" aspect in health foods.

A new avenue is thus opening to firms in the South, and in particular to those in the southern Mediterranean countries, through partnership between agricultural suppliers and the agro-food industry. By capitalising on the functional properties of agricultural raw materials from the countries in the South the AFIs can now find new outlets for growth by developing health foods with a high value added. Contributing to the production of functional foods is a new challenge for agriculture in the countries of the South where the wealth of flora can be a major source of high-quality functional ingredients. This expanding market is opening to innovating actors who are capable of working together as mutually supportive players and can demonstrate the legitimacy of this new market niche.

8.2 - The organic and hydroponic product market

8.2.1 - Description and concepts

8.2.1.1 - Organic products

i) Definitions of organic farming:

There are several definitions of organic farming which vary in their degree of detail (Codex Alimentarius: www.codexalimentarius.net, IFOAM standards: www.ifoam.org, etc.).

Organic agriculture is defined first and foremost as a method of crop and animal husbandry which is practised in harmony with nature. The value of an organic product is thus related to the set of principles governing its production. Contrary to what is often thought, organic agriculture is not a simplistic form of farming: very elaborate techniques are actually used.

Let us explain the fundamental principles of organic agriculture.

The Codex Alimentarius describes organic agriculture as: "a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. The philosophy of organic agriculture is to take account of the interdependence of soil, plant, animal and human life." It is a form of agriculture based on specific and precise crop and animal husbandry methods that are based mainly on the total banishment of all synthetic inputs in cultivation (such as pesticides, chemical fertilisers, antibiotics, genetically modified organisms, etc.) and observance of procedures

such as the treatment of animals and the space allocated to them (Codex Alimentarius, 1999).

For all organic crops the organic farming specifications thus require that any use of synthetic chemicals (pesticides, weedkillers, fungicides, fertilisers, etc.) be totally prohibited. Only natural fertilisers, green (grass-based) manure crops, compost and dung are allowed. Crop rotation and constant tilling are needed in order to control parasites, diseases and weeds.

At the international level organic farming has been part of the guidelines of the Codex Alimentarius for plants since 1999 and for animals since 2001. Private framework rules have furthermore been decreed by the IFOAM (International Federation of Organic Farming Movements) since 1980 and are regularly revised.

The European regulations to which organic agriculture is subject also provides that "No claim may be made on the label or advertising material that suggests to the purchaser that the indication shown in Annex V constitutes a guarantee of superior organoleptic, nutritional or salubrious quality." (amended Art. 10, §2 of Regulation EEC/2092/91).

ii) General presentation of organic agricultural production in the Mediterranean region:

There are considerable differences between the Euro-Mediterranean and the other Mediterranean countries as regards the history and development of the application of the organic farming concept. Organic agriculture actually emerged in the Euro-Mediterranean countries 20 years before it began to develop in their southern counterparts. In addition, there is a considerable difference in production area between the two shores of the Mediterranean (the northern countries account for 93% of production).

Due to the excessive use of synthetic chemicals in conventional agriculture in the second half of the 20th century in order to considerably increase food production, one of the major objectives to be pursued is to identify sustainable methods of farming the land in order to limit the degradation of natural resources as well as the destruction of the rural environment and biodiversity. Soil management using the concept of organic agriculture can be a sustainable development model. However, the application of this production method requires additional knowledge in terms of technique, agronomy, legislation and the state of the market if farmers are to be able to produce and sell on the market in accordance with the rules imposed by the certification and control system (Fersino and Petruzzella, 2002). It was thus pointed out at the international colloquium on organic agriculture in the Mediterranean region (Agadir, Morocco, October 2001) that action must be taken to support the development of the organic sector such as measures(a) to establish specific rules for control and certification in the southern Mediterranean countries;(b) to train technicians; (c) to disseminate information; (d) to step up

research and (e) to develop markets, particularly local markets (Fersino et Petruzzella, 2002).

In short, the definition of organic agriculture as construed by international organisations seems to be based essentially on production methods (standards) and the environmental advantages of this type of farming. However, this conception of organic farming is not exactly shared by consumers in general, since the main reason for purchasing organic products is still the "health" argument (Agence Bio, 2004). Furthermore, it is also to be presumed that consumer perception of organic products varies from one Mediterranean country to another, and more specifically from Euro-Mediterranean to other Mediterranean countries, in view of differences in culture, eating habits, living standards, etc.

8.2.1.2 - Hydroponic products

i) Description of hydroponics:

Soilless cultures are also known as "hydroponic cultures". They are classed in two categories:

(a) Solution cultures (true hydroponic culture), where the nutritive solution is recirculated after re-aeration and adjustment of the pH and nutrient levels (closed systems); an example is the NFT (Nutrient Film Technique) system: www.nutriculture.com.
(b) Substrate cultures, where the nutritive solution is supplied to the plants via a special irrigation system and excess solution is either directly eliminated (open system) or recirculated; examples of this method are perlite culture, sand culture, gravel culture, coconut coir culture, etc. (Olympios, 2002).

Table 8.4 – Description of hydroponic growing systems

Solution culture (true hydroponic method)	Aggregate systems		
	Inorganic ("hydroponic") medium		Organic medium
	Natural medium	Synthetic medium	
Static solution Circulating solution 'Aeroponics'	sand, gravel rockwool glass wool perlite vermiculite pumice	(PUR) foam mat "Oasis" (plastic foam) hydrogel	sawdust, bark chips wood shavings peat, fleece pulp coconut coir

Source: Olympios, 2002 (CIHEAM, 2002).

Table 8.5 – Distribution of the use of hydroponic production systems

System categories	System	Percentage of the use of the system in industry
Solution culture	NFT	5%
	water culture (Gericke system)	3%
	gravel culture	1%
	Subtotal	9%
Substrate culture	rockwool (rock medium: inorganic medium)	57%
	other inorganic media	22%
	organic media	12%
	Subtotal	91%

Source: Donnan, 1998 (modified).

Hydroponic culture is seen as a very efficient method for supplying water and nutrients to cultures. Crops develop more rapidly when the roots are given a balanced supply of water, nutrients and oxygen. Crop density and yields per unit of area can be increased with more rapid crop rotation (Cooper, 1979).

Most hydroponic greenhouses in the region have a fairly simple structure: they are covered with plastic sheeting and equipped with relatively simple irrigation technologies and systems for controlling the cultivation environment. These systems are chosen to a large extent in view of the low cost of this type of greenhouse due to the specific features of the Mediterranean climate.

8.2.2 - Estimation of the size of the health and environment product market in the Mediterranean region: products and produce destinations

8.2.2.1 - Organic products

The present section aims essentially to present organic agricultural production as a whole in Mediterranean countries and to identify the differences in production between the Euro-Mediterranean countries and the other Mediterranean countries. To do so we have selected the most recent information available, but despite our efforts to be precise some of the information is relatively dated and must be interpreted and used with precaution.

Table 8.6 – Summary of organic production in Mediterranean countries

Country	Date	Acreage farmed organically (ha)	%	Number of farms	%
Cyprus	2004	500	0.44	150	n.c.*
Spain	31.12.2004	733 182	2.9	17 688	1.4
France	31.12.2004	540 000	2	11 025	1.7
Greece	31.12.2003	244 455	6.24	6 028	0.7
Italy	31.12.2003	1 052 002	6.86	44 043	2.0
Malta	2003	14	n.c.*	20	n.c.*

* n.c.: not communicated

Sources: data compiled by Calleja, 2004; Papastylianou, 2004; Agence Bio 2004; Lampkin, 2004; Spanish Ministry of Agriculture, 2005, and Italian Ministry of Agro-Food Policies, 2004.

i) Organic production and certification in the Euro-Mediterranean countries:

Cyprus
Legislation was passed in 2001 on the control of organic agriculture. Certification and inspection are carried out by local certification bodies and the national action plan makes provision for subsidies for plantations and animal production units (Papastylianou, 2004).

Table 8.7 – Some data on the organic sector in Cyprus

Years	Number of farms	Acreage (ha)	Development of acreage farmed organically	Percentage of the total agricultural area
2002	45	166.5	---	0.12
2003	85	301	+81%	0.22
2004	150	500	+66%	0.44

Source: Papastylianou, 2004 (CIHEAM, 2004) (modified).

Spain

The total organic production acreage is approximately 733 182 ha (31/12/2004). The average size of an "organic" farm in Spain is 28 hectares compared to 18 hectares for "conventional" farms (Spanish Ministry of Agriculture (MAPA), 2005: www.mapya.es).

Although, according to the Ministry of Agriculture, Spain was exporting approximately 99.6% of its organic produce in 2003 (MAPA, 2004), the percentage of organic products exported varies according to the source (>80% according to the SEAE [Sociedad Española de Agricultura Ecológica] – Spanish association for organic agriculture).

France

In 2004, 540 000 ha were farmed organically, i.e. approximately 2% of the total agricultural area (-3% compared to 2003).These figures include acreage under conversion: 61 000 ha (compared to 145 000 in 2003) (Agence bio, 2004).

Exports account for some 17% of French organic production and consist mainly of high value-added products. France's main organic exports are cereals, which go to Germany and the Scandinavian countries. Most of the dairy, meat, poultry and fruit and vegetable exports are sold to the neighbouring countries in the European Union (EU) (Paison, 1999).

Organic agriculture was recognised by the public authorities in France in 1980 and it constitutes one of the four official marks for identifying quality and origin alongside the Protected Designation of Origin (PDO), Red Label and Certification of Product Conformity (CCP) marks. It differs from those marks in that synthetic chemicals and GMO derivatives are not used, organic matter is recycled, crops are rotated and pest control is biological. In organic animal husbandry, which is extensive, farmers use "alternative" medicines (homoeopathy, herbal therapy) and respect animal welfare.

France was one of the first European countries to establish very comprehensive regulations on organic agriculture. These regulations currently govern organic farming in the country and are composed of two essential instruments: Regulation

EEC/2092/91 of 24 June 1991 in its amended form, which has been in effect since 24 August 2000; it concerns the methods used in the organic production of plant products and includes the provisions of Regulation EC/1804/99 of 19 July 1999 on animal products. The French specifications REPAB F of 28 August 2000 concern the methods used in animal husbandry and the production and preparation of animal products.

Greece

Organic agriculture has been developing rapidly in Greece ever since it was established, with annual growth rates of between 50% and 120%, although the growth rate dropped to 20%-30% from 1999 to 2000. According to the Ministry of Agriculture, the total acreage devoted to organic crops in Greece was estimated at 22 000 ha in 2001 compared to only 1 200 ha in 1994. In 2004 the organically farmed acreage was estimated at 244 455 ha, i.e. 6.2% of the total agricultural area in Greece (Lampkin, 2005).

Approximately 50% of Greek organic produce – more specifically olives, olive oil, wine, fresh fruit and lemons – is exported, mainly to European countries and, to a lesser extent, to the United States and other countries (Rose, 2001).

Italy

In 2004, the estimated agricultural area occupied by the 44 034 organic farms was 1 052 002 ha (Italian Ministry of Agro-Food Policies, 2004), i.e. 6.8% of the total agricultural area. Italy is Europe's biggest producer in the organic farming field.

The average acreage of organic farms is approximately 21 ha, 80% of which is farmed organically. It should be noted that in the case of 6.3% of these farms organic agriculture is combined with agro-tourism, and many farms also have a small-scale processing unit. The typical producer is an entrepreneur – an image which shocks no one in Italy. These farm managers, whose labour force is composed mainly of family members, declare an average turnover of €28 050, €18 000 of which is obtained from their organic farming activities (Pinton and Zanoli, 2004).

The national consumption rate is still low, although the annual growth rate is between 20% and 40%. The fruit and vegetables grown in the south of Italy could be added to these figures; this produce is sold through the conventional channels without any reference to organic agriculture. These products account for quite a sizeable share – probably around 13% (Pinton et Zanoli, 2004).

Exports go mainly to northern Europe – 30% of the products consumed in Europe come from Italy (Chicco, 2002) – but also to the United States and Japan. They consist mainly of fresh products or products which have undergone very little processing such as cereals, flours and pasta, olive oil or fruit and vegetables. In order to cover its needs Italy resorts to imports amounting to €305 million (Pinton

and Zanoli, 2004): dairy products and agri-foodstuffs from other European countries and fruit and vegetables from South America.

Malta
The organic sector in Malta has developed considerably since the country entered the EU. National regulations have been introduced and a competent national authority has been set up within the Ministry of Agriculture to support the sector at all levels: economic, technical, social, etc.

There were 20 farms registered with the organic agriculture authority by May 2004; 15 of them are situated in Malta, 4 in Gozo and 1 in Comino (the latter are Mediterranean islands close to Malta); 19 of these farms harvest and sell their produce as well as their derivatives. No animal farm had yet been registered by the end of May 2004. The acreage farmed has increased – from 3.2 ha (registered in October 2003, Petruzzella and Verrastro, 2003) to 14.45 ha (Calleja, 2004), but this area has not yet been certified since there is no certification system as yet in Malta.

ii) Organic production in the Mediterranean countries (excluding Europe):

Albania
The first organic farms were established in 1997. The total area farmed organically is estimated at 200 ha (Isufi, 2004), whereas it was estimated at only 4 ha in 2001 (Furruni, 2001).The Albanian parliament passed a law on organic agriculture in 2004, but there is as yet no national policy for developing the organic sector.

Algeria
The first attempts to introduce organic agriculture in Algeria began in 2001 with several integrated farming units, which enjoyed considerable support from the Ministry of Agriculture. According to the statistics of the national marketing board of the vines and wines programme, the organic sector is estimated at approximately 1400 ha (Telmat and Hadgeres, 2003). A unit for the control and certification of organic products was set up within the Ministry of Agriculture in 2002 and is responsible for training and extension as well as for drawing up regulations and establishing an approval system.

Egypt
It was as the result of a German initiative that organic agriculture was introduced in Egypt. The first certifications were carried out 20 years ago in order to meet the requirements of foreign importers of medicinal plants (El-Araby, 2001). Local and foreign bodies are responsible for inspection activities. There is as yet no national certification and subsidisation policy, but this has not been an impediment to the marketing of organic products.

There are two major “organic and biodynamic" farming projects that are now well established in Egypt: the Sekem and UGEOBA (Union of Growers and Exporters of

Organic and Biodynamic Agriculture) initiatives. Over 3 500 ha were farmed organically in Egypt in 2004, and a wide range of products is available both on the domestic market and for export (El-Araby, 2004).

Exports account for approximately 85% of total organic markets, the remaining 15% of products being sold on the domestic market (El-Araby, 2004). Great efforts are being made in this field to improve local markets and encourage organic markets. The main exports generally go to EU countries, Scandinavian countries, the United States, Japan, Australia and the countries of the Gulf.

Israel

Organic agriculture emerged in Israel about thirty years ago (Adler, 2001), but was not tremendously successful. A special department of the Ministry of Agriculture is responsible for certifying products intended for export. Both the domestic market and the export market are developed markets. The 400 farms practising organic agriculture have a total acreage of approximately 5 640 ha; they include cooperatives, private farms and industries producing organic goods (Eshel and Rilov, 2004).

Jordan

The organic sector is just emerging in Jordan but seems to be developing rapidly. It began in Jordan in 2001 once the Department of Organic Agriculture had been set up within the Ministry of Agriculture (Zaabi, 2003).The organic sector in its entirety covers an agricultural area of approximately 7 ha (Al-Damarat, 2004).

Lebanon

Organic farming developed in Lebanon about 10 years ago in response to the mismanagement and "non-sustainability" of the production system employed in the agricultural sector after the war. It was launched through private initiatives and non-government organisations (NGOs). Various activities have been established to promote the development of the domestic market. National regulations have already been submitted to the authorities, which are expected to approve them by the end of 2005. In the past two years, the organic sector increased from an area of 185 ha in 2003 to 750 ha in 2004 including farms under conversion (Khoury, 2004), i.e. an increase of over 310%.

Morocco

Although Morocco was one of the first Mediterranean countries to introduce organic production, there is still no control of the activity at the national level. This lack of control was not a major obstacle to the first organic farmers, and the organic sector registered an area of approximately 20 000 ha by 2004 (Kenny, 2004). Although there is great potential in the country for organic farming, which should be supported by a national strategy, no such strategy has yet been established.

Syria
Although organic farming is still in embryo in Syria occupying an agricultural area of only 260 ha, the Syrian government is taking great interest in the sector and planning to support it to the full. A committee on organic agriculture is due to be set up and a national strategy established for supporting the organic sector (Makhoul, 2004).

Tunisia
Organic agriculture began in Tunisia in the mid-1980s as a result of private initiatives and developed slowly until 1997. The sector (which covered an area of 35 000 ha in 2004) has registered a high growth rate in the past few years due to government support based on a national strategy. Tunisia was in fact one of the first Mediterranean countries to pass a national law on organic agriculture (promulgated in 1999), and it is the first country to subsidise organic farmers. This subsidisation takes various forms: direct support covering up to 70% of costs in the case of certification, or various forms of incentives such as tax relief, VAT exemption, etc. (Ben Kheder, 2004).

The bulk of production is intended for export and sold as typical Tunisian produce, the main products being olive oil and dates (Ben Kheder, 2004). A strategy is currently being elaborated which aims to encourage local marketing and consumption of organic products.

Turkey
Organic farming began in Turkey in the mid-1980s. National regulations were established in 1994, the competent authority being the Ministry of Agriculture, which is responsible for the overall management of the sector. Turkey is the only Mediterranean country which has designed an official body responsible for collecting statistical data (Babadoğan and Koç, 2004). A production area of 103 190 ha was registered in the sector in 2003, i.e. 0.4% of the total agricultural area (Turkish Ministry of Agriculture and Rural Affairs).

Foreign importers are becoming more and more familiar with Turkish organic products – there were some 37 countries importing such products in 2003 (according to the above Ministry). Most exports go to European countries such as Germany, the Netherlands, the United Kingdom, Italy and France, and further export markets are developing in Switzerland, the US, Belgium, Denmark, Austria, Thailand, Spain, Canada, Australia, Sweden, Bulgaria, India, Japan, Slovenia and New Zealand (Babadoğan and Koç, 2004).

There are two further points which clearly differentiate the Euro-Mediterranean countries from the other (developing) Mediterranean countries. First, the relative significance of organic production in the southern Mediterranean countries is still limited (a total acreage of 0.18 M ha and an average farm acreage of approximately 6.8 ha) compared to Mediterranean organic production as a whole (2.75 M ha and an average farm acreage of 34.8 ha), i.e. approximately 7% (compared to 4% in

2001 and an average farm acreage of 5.1 ha in non-EU Mediterranean countries and 24 ha per farm in the Euro-Mediterranean countries [Fersino, 2001]). However, the growth rates registered in these countries in the last few years suggest that the sector is developing rapidly in the southern Mediterranean (increasing from 81 000 ha in 2002 to 182 000 ha in 2004 [Al-Bitar, 2004], i.e. an increase of approximately 230%). Furthermore, a considerable difference is observed (in the period from 2001 to 2004) in the average farm acreage that is farmed organically. Organic farms in Euro-Mediterranean countries are in fact five times larger and have the largest production capacities. And in addition to this difference in production area there is also a difference in the use of organic products. For whereas the Euro-Mediterranean countries – such as France, for example – produce, consume and even import organic products, organic production in the countries of the South is geared to a very large extent – almost exclusively – to export (Algeria, Egypt, Tunisia, Turkey, etc).

8.2.2.2 - Hydroponic products

This section aims to describe the situation regarding hydroponic production in the Mediterranean region, despite the difficulty in finding recent information on hydroponic production units in that zone.

Table 8.8 –Hydroponic production area in several Mediterranean countries

Country	Date	Production area (ha)	Sources
Cyprus	1999	3	Production in 1999 (Chimonidou and Pavlidou, 1999)
Egypt	1996	115	Production in 1996 (Olympios, 2002)
Spain	1996	1 000	Production in 1996 (Donnan, 1998); Production in 2001 (MAPA, 2002)
	2001	4 000	
France	1996	1 000	Production in 1996 (Donnan, 1998); Production in 2002 (Padilla and Oberti, 2005)
	2002	1 500	
Greece	1996	33	Production in 1996 (Donnan, 1998) ; Production in 1999 (Mavrogianopoulos, 1999)
	1999	60	
Israel	1996	650	Production in 1996 (Donnan, 1998)
Italy	1996	36.8	Production in 1996 (Olympios, 2002); Production in 1999 (Pardossi et al. 1999)
	1999	400	
Morocco	1996	27.5	Production in 1996 (Olympios, 2002)
Tunisia	1996	10	Production in 1996 (Olympios, 2002); Production in 1999 (Kouki, 1999)
	1999	30	
Turkey	1999	10	Production in 1999 (Tüzel and Gül, 1999)

Cyprus
The area devoted to soilless culture in Cyprus was evaluated at 3 ha in 1999 (Chimonidou and Pavlidou, 1999); rockwool is used as the substrate.

France
France had 3 000 ha of greenhouse horticulture in 2002, 50% of which was devoted to soilless production, and 1000 ha of these soilless cultures were devoted to tomatoes.

Foreign competitors in this field of production are China, Italy and Spain. All cucumber production in France is soilless, and strawberry production is also tending to become hydroponic. Furthermore, farms are only viable if they have a soilless tomato production area of at least 4 ha and production is continued throughout the year (Padilla and Oberti, 2005). They have contracts with the large-scale retail trade, which stipulates very strict specifications causing difficulties for small multi-product farms, which can only sell their produce on alternative markets in the informal sector.

Tunisia
It was following the emergence of problems due to the accumulation of salts in the soil and the rapid spread of disease that soilless culture was introduced in Tunisia. The total soilless production area was estimated at 30 ha in September 1999 (Kouki, 1999).

Turkey
Interest in soilless cultivation techniques is growing in Turkey, a total area of 10 ha being devoted to hydroponic production in 1999. Research is focusing mainly on soilless culture, various substrates having been tested with various crops (tomatoes, cucumbers, eggplants, lettuces and strawberries) (Tüzel and Gül, 1999).

As is the case with organic products, there is a difference in hydroponic production area between the Euro-Mediterranean countries and their southern counterparts. In 1996, the Euro-Mediterranean countries registered a production area of approximately 2 570 ha, whereas the production area registered in the other (non-European) Mediterranean countries was only around 803 ha. This difference in production area is probably due to the high investment costs, which many producers in non-European Mediterranean countries can ill afford. It must be borne in mind, however, that these data are fairly dated and do not cover all hydroponic production units in Mediterranean countries; they must therefore be used and interpreted with precaution.

In addition, a further point which draws attention is the rapid growth of the organic and hydroponic production sector in the Mediterranean region (+ 300% in the period from 1996 to 1999 in Tunisia, for instance, and + 55% in the period from 1996 to 2002 in France). This development raises the question of the advantages, limitations and specific features of these production methods in the Mediterranean region.

The following section aims to present the advantages and limitations of organic and hydroponic production methods in the Mediterranean region and then to explain

the specific features of these methods in the case of the few countries for which we have been able to collect data on organic production (Egypt, Lebanon, Tunisia and Turkey).

8.2.3 - The advantages and limitations of these production methods in the Mediterranean region

8.2.3.1 - Organic production

i) General comments:

Mediterranean organic agriculture experiences all of the problems affecting the agricultural sector in general (Europe & Liberté magazine, 2004), such as:

- the introduction of new varieties which are more prone to the influence of biotic and abiotic factors;
- the excessive use of mineral fertilisers, particularly nitrogen, which makes certain plants more prone to fungous diseases and parasites;
- the development of the resistance of pathogenic microbes to insecticides, weed killers and fungicides;
- the modifications in plant physiology caused by certain pesticides making the plants more prone to attack and to disease;
- little or no use of biological fertilisers.

In addition to the above problems there is also the problem of adapting the current international and European regulations to the specific features of the region. For all of the rules on organic production methods (Rush-Muller, Biodynamics; Lemaire, IFOAM standards and EEC regulations) have been established historically in northern European countries and do not take account of the specific characteristics of Mediterranean countries. ((Fersino and Petruzzella, 2002). Problems concerning the applicability of the regulations are due to the specific features of the Mediterranean sector and make access to this production method difficult (as is the case in Egypt).

ii) Case study covering several Mediterranean countries:

The case of Egypt
The following are the main problems encountered in the development of the organic sector in Egypt:

- Several standardisation aspects concerning the long conversion period (three years) and the conversion conditions required by the EU;(the crop season is no longer than 4 or 5 months a year in certain regions, products are sold as conventional products during the conversion period, and there is no subsidisation whatever for farms undergoing conversion).

- Organic seed is difficult to obtain and very expensive.
- Organic treatment products (insecticides) are imported and very expensive. (El-Araby, 2004).

The case of Lebanon
Although the climate and soil are suitable for organic production, the absence of control, the limited size of organic farms (164 farms occupy an agricultural area of approximately 758 ha [Khoury, 2004], i.e. an average farm acreage of less than 5 ha), and difficulties in cooperation amongst producers make it difficult to develop the organic sector.

The case of Tunisia
Due to very favourable production conditions – weather conditions that are unfavourable for parasites and disease, the existence of traditional production techniques (Ben Khedher and Nabli, 2002) – many agricultural zones can easily be converted to organic production zones.

These environmental advantages create excellent conditions for production and for increasing organic production. However, the lack of fertilisation products, products for controlling parasites and diseases, equipment used in organic agriculture (e.g. for managing compost and weeds), veterinary medicines, and experience in marketing organic products constitutes a major difficulty for converting farms in certain regions of Tunisia (Ben Khedher and Nabli, 2002).

And as regards agronomic aspects, the soil is generally poor (low content of biological matter, low biological activity and fragile soil structure). The main problems concerning improvement of soil fertility concern: a) the introduction of green manure in rotation programmes; b) the training of farmers in compost management; c) finding (a sufficient quantity of) authorised biological and mineral fertilisers in Tunisia (Ben Khedher, 2004).

The case of Turkey
Although organic farming is developing in Turkey, if sustained growth is to be achieved in the organic sector a national strategy must be imposed, institutional and legislative changes must be made, and technical and financial support must be provided for the various farmers undertaking conversion measures; this would support research in priority regions and training through the production chains. (Maloupa, 2000).

To sum up, the main limitations of organic production in Mediterranean countries seem to be the gap between the requirements set by foreign importers and the specific features of production units in Mediterranean regions, the lack of subsidies for farms undergoing conversion, the lack of crop treatment products and the absence of national coordination and control.

8.2.3.2 - Hydroponic production

i) Advantages:

Several of the advantages of hydroponic production methods (reduction of labour, increase in productivity, effectiveness of sterilisation practices, economisation of water and control of culture nutrition, control of the root environment, the possibility of growing many different crops without needing to have the soil suited to those crops) are more important in the specific case of Mediterranean countries.

First of all, in regions of the Mediterranean where arable acreage is limited, hydroponic production techniques provide an advantageous alternative.

Secondly, hydroponic production could bring higher yields, for accurate control of the nutrition of plants in soilless cultures would result in higher yields and better quality, but this does not necessarily mean that the yields of the best crops (grown in soil) are appreciably lower. (Olympios, 2002). However, if there are soil problems (saline soil, poor soil, etc.), soilless cultures will obviously produce much better harvests.

Thirdly, water is certainly the most important factor for plant production, particularly in the case of Mediterranean production. It is a limiting factor, not only in terms of availability but also in terms of quality. Hence the advantage of hydroponic cultivation systems, particularly those where water is recirculated and substantial quantities of water can thus be economised since drainage and surface evaporation are considerably reduced (NFT, “closed” systems, etc.). (Olympios, 2002). Basically, hydroponics can be regarded as a water conservation production system since it requires only 10% to 20% of the water needed to produce the same crop in soil culture (Bradley and Marulanda, 2000; UNDP, 1996). It is thus regarded as a prime technique in arid climate conditions (Schwarz, 1995). Such water economy is a major advantage of hydroponic production in the Mediterranean regions where water is very scarce.

Furthermore, soilless cultures offer an ideal alternative for growing crops whenever the soil is unsuitable (Moroccan land unsuited to production due to excessive use of methyl bromide) or whenever there is no soil at all (as is the case in certain regions of several Mediterranean countries such as Egypt, Libya, etc).

It can also be added that the nutrients in the soil which have not yet been used by the plants can be leached out by rain or irrigation water, and this “loaded” water seeps into the soil, eventually contaminating ground, river and lake water. Organic crop-growing methods seek to limit these phenomena. In the case of hydroponic systems where irrigation water is recirculated (closed systems) there is no seepage and no contamination of the environment. Most of the products that are added into the system are used by the plants (source: www.thehydroponicum.com). It is

thus indeed a "non-pollutant" method which requires less fertilisers and pesticides than conventional systems.

ii) Limitations:

The main limitations of hydroponic production systems remain the initial outlay involved in building the facilities and the maintenance costs. For in some Mediterranean regions there is little or no subsidisation of these production methods, particularly in the southern Mediterranean countries.

The construction of soilless production structures requires considerable initial investment compared to soil cultures, the level of these investments depending on the type of hydroponic culture chosen and the degree of sophistication of the control and irrigation measures (Olympios, 2002). In terms of agricultural production systems hydroponics was actually classed by Ruthenberg (in 1980) as a high risk system involving considerable inputs. The techniques available to date do in fact require considerable specialisation, sophisticated management and specific know-how, and they also involve high financial risks (Schwarz, 1995), for the deficits caused by poor harvests can be disastrous.

Furthermore, in order to practice hydroponics successfully one needs to have some knowledge of or be able to learn the rudiments of plant physiology and elementary chemistry and to understand how the control system works, and so on, but this knowledge can only be acquired through appropriate training or by recruiting technicians or engineers, which most producers in the southern Mediterranean cannot afford.

To sum up, the overall advantages of hydroponic production in the Mediterranean region are still water economy and increase in yields (in certain regions where the soil is not particularly suitable for growing crops), whereas the limitations of these production methods are no doubt the initial construction costs and the high level of training required in technique and management skills.

One might also wonder whether hydroponic products could be organic and could thus be regarded as "health" products. The answer to this question is 'no', since hydroponic products are by definition grown in soilless cultures, whereas in order for a product to qualify as organic it is absolutely essential that it be grown in soil. Furthermore, there is as yet no biological fertiliser for soilless cultures. Hydroponic production could constitute an alternative "ecological" cultivation method if combined with a policy of integrated pest control concerning the use of pest control products.

iii) Outlook:

In the Mediterranean region attention must be focused on developing and evaluating local substrates so that they can be used for hydroponic production (Olympios, 2002). For the use of less costly substrates which farmers are familiar with, such as sand from the Mediterranean region (the most abundant substrate in the zone), gravel, perlite, pumace, etc., could facilitate the development of hydroponic cultures in Mediterranean regions. What is more, it is important to use local substrates which are efficient when used with water of satisfactory quality.

In view of the productivity problems encountered by many Mediterranean countries (drought, poor soil, no soil, etc.), it is therefore urgently necessary to find a hydroponic production system which is easy to use and not too costly for farmers.

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TABLE OF CONTENTS

page