

## Horticulture in Algarve: a case study for sustainable development

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### ABSTRACT

This study takes into account the general context where the Algarve's citrus culture is inserted. The aim is to identify the constraints faced by the sector in order to understand the main clients, suppliers and competitors' behaviours.

The results have allowed us to characterize the quality attributes considered as determinants when the citrus fruits are acquired, namely the Algarve's citrus, by the national consumers as well as by the main distribution channels, in case they are presented in the market as differentiated or undifferentiated.

The facts identified in the empirical research indicate that limitations of technical and institutional order can make unfeasible or strongly condition the capacity of the Algarve citrus culture (production subsystem) to meet the market requirements.

The conclusions reached for the development of the Algarve citrus culture, were based on Hayami and Ruttan's "induced technical and institutional innovation" theory (1998). We think we have given a contribution towards the definition of strategies for the Algarve's citrus culture development, bearing in mind both the market and the available resources.

### I – INTRODUCTION

The culture of citrus fruit has a huge importance for the Algarve, a region situated in the south of Portugal, both from the history-culture, and the social, economic and territory points of view. According to the Statistics Office - Instituto Nacional de Estatística (RGA1999), the citrus orchards in the Algarve occupied an area larger than 15.000 hectares, which correspond to 27% of the permanent cultures area and were distributed with more or less weight in 57% of the Algarve's explorations and in all the councils. These explorations are an important source of employment in the region, not only for the family's workmanship existing there but also for the jobs it creates. Under the economic point of view, it is to refer that this activity contributed with 38% to the agricultural final product in the region (CER, 2000).

The large expansion of this activity took place specifically in the period from 1950 to 1962, during which the majority (64%) of the Algarve's citrus fruits were planted (INE, 2002), still in a strict market, with good price levels and without competition problems. However, the past situation is very different today, as it will be in the near future. From a protectionist economy we went into an increasingly competitive one, without having been found solutions, which allow a better evaluation of the regional production. From 1995 to 2004 a decrease of around 6% in the producer's average current prices was verified, as

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well as increases in the current consumption goods and services along with investment goods, 14% and 29% respectively (INE, 2006). Significant changes in the markets were registered: from the offer, due not only to the citrus culture worldwide expansion, but also to the increasing opening of countries' borders. From the demand, due to the changes in the requirements, namely in terms of environment, concentration and quality(ies).

The analysis of the Algarve's citrus system external context, from the socio-cultural, political-legal and economic points of view, has allowed to identify some aspects, which may function as strong points or as obstacles to the Algarve's citrus culture.

As strong points to be highlighted, until now, the Portuguese market has been supplied mainly by national citrus fruit (91%), especially by those from the Algarve (70%). It is also worth of note that it is not foreseeable a decrease in the citrus consumption, presently 27 kilograms of fresh fruit *per capita*, bearing in mind the increasing acknowledgement of its value, either from the organoleptic and nutritional points of view, or their importance to health in general. Adding to this, the latest reform of PAC aims at stimulating the fruit consumption in the EU, namely at schools.

However, at the worldwide level, the citrus culture continues to grow, the markets are more and more globalized and an increasing saturation of the main countries importing fresh citrus fruit can be witnessed. It has also been verified that in Portugal there has been an even larger affluence of citric products and their substitutes, arriving from different origins and with very different qualities, either from the organoleptic or the hygiene and services points of view. As a consequence, the Algarve citrus fruit may have to face an increasing competitiveness, especially from Spain, once this is the biggest exporter of fresh citrus fruit. Other reasons have to do with: their geographic nearness to Portugal; the large expansion that has been verified in the Spanish citrus culture; the coincidence relating to the periods of production/ purchase; the dominant varieties in both countries and the best capacity to meet the market needs. This last one is due not only to the already known better organization of production for the citrus fruit trading by Spain, as well as to the fact that the citrus fruit arriving from Spain have a better aspect than those from the Algarve.

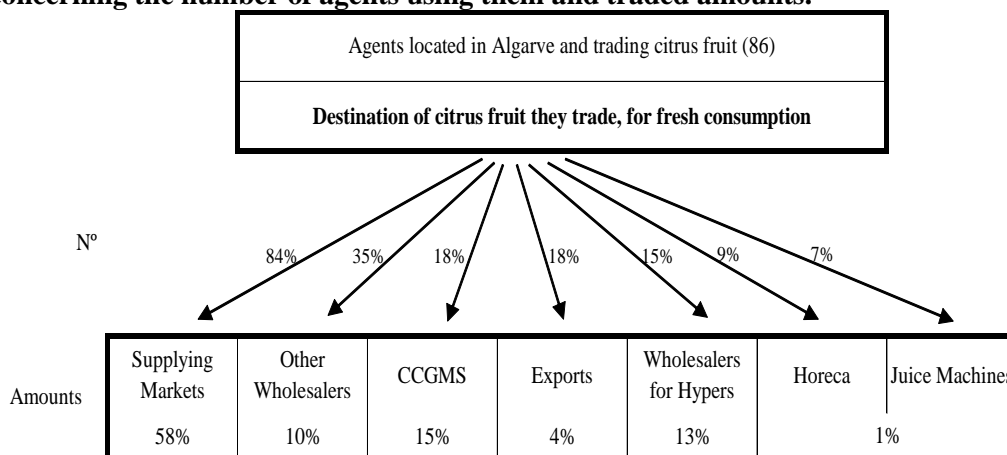
## **Methodology**

**1.-**The characterization of the Algarve's citrus system was done, at two levels: the final consumer and the trading subsystem.

**1.1-** The analysis, at the national final consumer's level allowed to perceive what are the quality attributes they value most when acquiring citrus fruit. If these appeared in the market without differentiation, the external aspect (associated to the absence of spots), the sweetness and the price were the attributes the consumers gave more importance. Differently, if the citrus fruits are referred to as being from the Algarve, the consumers give them a positive reputation, because they are sweeter, have more juice and are more tasteful, compared with those from other origins.

**1.2 -** The study of the purchasing subsystem allowed to understand the different distribution channels structure and functioning, namely in economic and social terms, as well as quality demands associated to them. We came to the conclusion that the Supply Markets and the Purchasing Centrals of Hypermarkets and Supermarkets were distribution channels presenting the most importance either in economic terms (58% and 15% respectively) or in social terms (84% and 18%). However, the Supply Markets had the most importance in selling the citrus of Algarve, 58% of production, which was from 84% of the agents marketing these citrus. As to the quality attributes, more valued by these two channels, it is worth to say they have very different nature and intensity. From among the most valued four quality attributes appear the fruit "external aspect" and colour.

**Figure 1 – Algarve citrus distribution channels – representativeness of each one, concerning the number of agents using them and traded amounts.**



Source: Madeira , E. (2007)

**Table 1 – Quality attributes required by the Purchasing Centrals of Hypermarkets and Supermarkets and by the Supply Markets in acquiring citrus fruit, considered as “very important” and presenting replies above 50%.**

Quality Types	Attributes of great importance for the PCHS	Replies Frequency > 50%	Attributes of great importance for the Supply Markets	Replies Frequency > 50%
Organoleptic	External aspect	100%	Colour	83%
	Colour	92%	Sugar amount	79%
	Size	75%	External aspect	77%
	Juice amount	75%	Size	72%
	Sugar amount	58%	Juice amount	64%
Service	Product transport	100%	Package image	75%
	Product durability	83%	Product durability	75%
	Package type	83%	Product with Cont. and homog.	53%
	Package image	75%		
	Product with cont. and homog.	67%		
Hygiene /sanitary	Without pesticide residues	92%		

Source: Madeira, E. (2007)

It was concluded that the Supply Markets give a great importance to the organoleptic quality, because three from the four attributes considered the most important in marketing terms (color, amount of sugar and “external aspect”) are of this nature. On the other hand, the four quality attributes considered of major relevance by the Purchasing Centrals of Hypermarkets and Supermarkets are associated not only to the organoleptic quality ( the external aspect and the color) but also to the service quality ( the transport of the product) and to the product hygiene and sanitation ( without pesticide residues).

2.- Later, it was tried to obtain knowledge that would allow showing evidence or refutation whether some of the techniques and / or institutions of the Algarve's citrus system meet the market requirements, taking into account the existing constraints.

In the studied period, from 1994 to 2006, some political measures were adopted, both from the technical and institutional points of view, namely: Integrated Protection in the citrus fruit in 1994; The Geographic Protection Indication (IGP – “Algarve's citrus fruit”) in 1994 and the Technological Center for the culture of citrus fruit was created (CTC) in 2000.

Evoking “The theory of Induced technical and institutional progress” (Hayami and Ruttan, 1998), that served as reference framework to the present research, we tried to understand if these technical and institutional innovations have contributed towards the Algarve's citrus culture development.

## RESULTS

### I – INTEGRATED PROTECTION

The Integrated Protection (IP) has presented a significant impact (20%) in terms of Algarve's citrus area and is considered by the EU a technique of the future in the fit sanitary range.

It is a way of production where the farmer, aiming to combat plagues, diseases and weeds, resorts rationally, systematically and with a program to namely biological, biotechnical, cultural and chemical means, integrating them, in order to find more favorable solutions from the economic, ecological and toxicological points of view, reducing the chemical combat to a minimum (Amaro e Baggiolini, 1982).

The farmers, namely the farmers of Algarve, received financial support, through the Agro-environmental Measures, to incentivize the adoption of Integrated Protection. For that purpose, they had to comply with a series of norms defined by the Ministry of Agriculture, Rural Development and Fishery (MADRP). Among other procedures to follow, it is worth to highlight that the implementation of Integrated Protection compelled the farmers to belong to a Farmers' Organization, recognized by the MADRP for services rendering, namely technical support in the Integrated Protection area. Equally, it obliges to use only chemical products homologated by MADRP for the Integrated Protection. These products include only active substances with little toxicity for the environment and for man (both as user and consumer).

The research carried out has highlighted that:

a) The Integrated Protection object was to combat plagues and diseases, with a minimum impact on the environment, without having the aim of overcoming any time of constraint imposed by the market. It was verified that for the recognition by MADRP of the farmers' organizations practicing IP, it was necessary that their programs comprehended “the culture characterization and its fit sanitary protection, and should integrate the strategy of combat to plagues, diseases and weeds”. These facts have led to infer that the MADRP when deciding to accept these associations with the Integrated Protection statute did not give the suitable importance to the role that the plagues can play, as constraints to the citrus fruit valuation by the market. The combat to plagues and diseases appears here, not as a means that could contribute to overcome constraints in the market. The decision for the acceptance of these associations, with such a statute, has not taken into account the market demands.

b) One of the market constraints is the citrus fruit external aspect, especially due to spots caused by thrips, mites and cochineals. However, concerning the availability of technical, chemical and biological means to get an attractive aspect in fruit, the conclusion is there were no means efficacious enough to combat some of the fit sanitary agents that strongly affect with spots the external aspect of the fruits. There were neither active substances homologated by MADRP for an efficient combat to thrips, nor efficacious biological

means to combat both thrips and mites and cochineals. For that reason, it was not possible to eliminate one of the main factors that contribute to the citrus fruit devaluation in the market in the presence of competitors.

It was also verified that it was not for the lack of financial support that there was no research, in order to supply the Integrated Protection with technical means to meet the market requirements. As a matter of fact, between 2000 and 2006 two million and eight thousand Euros were spent in research developed in the Algarve in the citrus culture area. Yet, this research didn't focus on the aspects related with the factors that most influence the degradation of the fruits external aspect, namely the mites, the cochineals and thrips, as well as the branch scratches. From among the reasons that may clarify the just mentioned fact, it is thought that a plausible explanation can be in the distraction from technicians and researchers in what regards relevant aspects in the citrus fruit commercialization. In fact, according to Hayami and Ruttan (1998) "for the success of the technical progress it is fundamental the existence of an efficacious system of information exchange about the market". However, the majority of technicians and researchers have their activity without considering these data.

c) This way of production of Algarve's citrus fruit in IP has shown positive aspects, namely for the use of a chemical combat based on a less number of treatment applications, as well as for the use of less toxic active substances (Rodrigues, 2000). These facts have contributed to improve the environment and the conditions of the fit pharmaceutical product administration as well as the fruits salubrity, due to the guarantee of low levels of pesticide residues in the production and for eliminating the use of more toxic active substances. In face of this, it should be useful for the consumers' health.

Nevertheless, this way of production in the Algarve's citrus fruit didn't have an impact for the consumer. It was verified that from the 86 citrus fruit trading agents in the Algarve only one certified citrus fruit with this quality reference, using it individually in each fruit. It was an irrelevant quantity (approximately 400 tons) and took place in a single year. Also, other agents were compelled to have the certification of citrus fruit they commercialized, as produced in Integrated Production, to comply with the specification, which was imposed by some Hypermarkets and Supermarkets Purchasing Centrals. Yet, these citrus fruit didn't reach the consumer with this differentiation, because, when sold in retail, no type of reference appears relating to this fact, which would value this product as opposed to the non certified one, and would make the consumer aware of the value added proposed to him. Another point is neither the Ministry of Agriculture nor the Ministry of Health have carried out campaigns to inform and sensitize the public in general about the advantages of consuming fruit produced according to the IP rules, due to the food security associated to it. The data from the National Institute for Medical Emergency show an average of five to six diary intoxications, in 2006 and 2007, due to pesticides and these happened essentially (62%) due to very toxic products, whose utilization is not allowed in Integrated Protection. So, it is evident the importance that the products in Integrated Protection could have for the public health.

d) The distribution of subsidies has benefited mainly the farmers/ citrus farmers, paying them for their contribution towards the environment preservation. It is also worth to refer that, in six years, about thirteen millions of Euros were applied in subsidies to incentivize the farmers to practice an "Integrated Protection", which can be understood as "Directed Chemical Combat", once it has insufficient alternative or complementary means to the Chemical Combat (Amaro, 2003; Franco *et al*, 2005), namely biological means for the efficient combat to mites, cochineals and thrips, as it was verified in this research.

This IP didn't take into account the culture of citrus fruit development, once it left aside many technical applications necessary for this type of production to be transmitted and identified by the consumer as an "added value".

## 2 – IGP – “ALGARVE’S CITRUS FRUIT”

The IGP - “Algarve’s citrus fruit” has been analyzed, since it is a differentiation tool for the citrus fruit in this region, hence with a lot of interest for the valuation of the same in an environment where there is an increasing competition. It is known that a differentiation of this type must be associated to the notoriousness and positive reputation of the region’s products with the production social-technical restrictions, as well as to the region’s soil and climate conditions. It is also worth to say that a product having an IGP (Protected Geographic Indication) should meet the conditions stated in the specifications and that any IGP should be considered as an important trump for development

So, in what concerns IGP- “Algarve’s Citrus Fruit”, it was concluded it was a failure, not having worked as an advantage for the Algarve’s citrus culture. The quantities traded yearly, with this quality reference (between 1996 and 2007) presented very low values, about 1% of the Algarve citrus’ production and the number of agents using it was reduced.

**Table 2 – Agents trading Algarve’s citrus fruit, distribution channels used, and suitability to IGP.**

Type of agent			Trading		Trades for				IGP - Algarve' Citrus Fruit			
			Total for fresh consumption		CCGMS		M. Abast.		Knows what it is		Meet the requirements	
	<i>n</i> <sup>o</sup>	%	<i>Ton</i>	%	<i>Ton</i>	%	<i>Ton</i>	%	<i>n</i> <sup>o</sup>	%	<i>n</i> <sup>o</sup>	%
Producer	18	33%	10.228	9%	2.520	16%	3.841	6%	5	28%	5	28%
OP	6	11%	21.973	21%	6.399	40%	3.697	6%	6	100%	5	83%
Wholesaler inter	31	56%	80.106	70%	7.112	44%	52.415	87%	9	29%	4	13%
Total	55	100%	112.307	100%	16.031	100%	59.953	100%	20	36%	14	25%

Fonte: Madeira, E. (2007)

It is worth to say that in the year of major affluence of agents to use the IGP - “Algarve’s citrus fruit” (2002/2003) they corresponded to just 12 from the 86 agents operating in the Algarve. Most of the production with this IGP was traded by Producers’ Organizations (OP) and was essentially aimed at Hypermarkets and Supermarkets. From the Fruit Centrals that asked permission for use, only four weren’t OP. Yet, this research allowed to conclude that the Algarve’s citrus production, aimed at a fresh consumption, was traded essentially (70%) by wholesale mediators, and the OP trading was not beyond 21%. It was verified that this IGP gave a disproportionate importance to the OP in relation with the “weight” they have in the Algarve’s citrus trading (Table 2).

It was understood the failure of IGP – “Algarve’s citrus fruit”, by comparing its specification items with this study results on the reality of the Algarve’s citrus culture system, since:

- The regulations the trading agents have to comply with, namely in what concerns every year’s month of September, as the period when the authorization request for the use of this IGP must be made, as well as the demanded requirements for its authorization, namely those related with the verifying of production conditions, the local and the general state of the orchards didn’t take into account the way how the different types of trading agents purchase the citrus fruits they trade.
- The specifications related with the “external aspect” of the Algarve’s citrus fruit, particularly regarding the spots caused by thrips and branch scratches make evident that the technical constraints have not been taken into account, namely a lack of homologated products to combat the thrips, and suitable technical guidance to diminish the branch scratches, in part due to the region’s climatic conditions.
- Still about the demands relating to the Algarve’s citrus “external aspect” it is worth to say that the market survey carried out at the national level, allowed to conclude that the inquired consumers base the positive reputation of the Algarve’s citrus fruit, comparing with citrus fruits from other origins, on the fact of being sweeter, having more juice and a better taste, not on their good aspect.

d) In what regards the requirements at the level of preparation and packing centrals, in spite of a significant percentage of agents having made investments with the purpose of modernization and adapting to environmental, hygiene-sanitary and labor security norms, the majority of Producers and Wholesale Intermediaries don't comply with the IGP's requirements. Once again, this IGP's specifications didn't take into account the offer conditionings, namely at the centrals level. It was verified that only 25% of the agents complied with the requirements by IGP and in these were included only 13% of the Wholesale Intermediaries, 28% of Producers, but from the Producers' Organizations were included 83%. We have to recall the very small importance of the OP in the Algarve's citrus trading for consumption in fresh, which doesn't go beyond 21%. Effectively, the specifications don't distinguish national rules feasible by most of the agents ( especially those concerning the product tracking down, the citrus sanitary guarantee, as well as the environment protection) from inadequate demands as far as the real conditions of the Algarve's citrus system is concerned, namely in what regards the facilities.

Thus, it can be concluded that when this institutional innovation, the IGP- "Algarve's citrus fruit" was conceived, the importance of the citrus external aspect as a market demand was not taken into account. The constraints faced by the citrus culture in the Algarve, namely a lack of homologated products for the combat to thrips or the culture techniques to avoid the branch scratches were not considered as well. From the social point of view this IGP didn't pay the necessary attention to the structure and functioning of the Algarve's citrus trading subsystem. When it was conceived this institutional innovation turned away from the actual situation that wished to value. Yet, as it is known, when we enter a process of resource valuation it is indispensable to consider the availability of material and human resources, the cultural context and the technical and institutional development level. Without this there is the risk of missing the economic and /or political feasibility (Hayami and Ruttan, 1998).

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