The Role of sensory experience on Spanish consumer's willingness to pay for sustainable produced food

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Abstract

For a variety of reasons, Spanish growth in demand for organic and integrated products has not kept up with supply. This work focused on the effect of information and sensory issues on purchase behaviour in relation to sustainable agricultural production. Using experimental auctions and results from (trained and untrained) sensory Panels, we studied the preferences for attributes related to food sustainability. Spanish consumers have a positive attitude towards sustainable food due to environmental concerns, health concerns, and trust in certification and market agents. However, the premium they are willing to pay for these products is lower than the current market price. Furthermore, "search" and sensory "experience" influence consumers' purchase behavior.

Keywords: Spain, organic production, integrated production, sensory issues, consumer behaviour, willingness to pay.

1. Introduction

The growing interest of European consumers in the environmental effects of conventional agriculture have raised interest in sustainability (Chen, 2007, FACUA, 2008). Sustainable agriculture can be defined as a way of production that causes less degradation of the agro-ecological system than conventional agriculture (Quenum, 2010). This designation encompasses both organic and integrated agriculture. Organic farming has been identified as a production system that combines improved environmental practices and the application of high-animal welfare standards, as well as prohibiting the use of synthetic agrochemicals, drugs and hormones and restricting the use of chemical fertilizers and pesticides (Magistris and García, 2006; Michaledou and Hassan, 2009; Miret, 2004). Integrated farming can be defined as an agricultural system which uses resources and natural regulation mechanisms to avoid adverse contributions to the environment and also ensures long-term sustainable agriculture combining the use of biological pest controls and the use of traditional techniques based on agrochemicals (International Organization for Biological Control, IOBC, 2004).

Worldwide land devoted to organic farming has experienced a growth during the last decade, with a total of 37.2 million hectares in 2009. However, only a quarter is devoted to cropped area[i] (Lockie et al., 2004; Michaledou and Hassan, 2009; Willer, 2011). The geographical areas with larger amounts of land allocated to organic production are Oceania, Europe and Latin America. Within Europe, Spain is the country with a higher number of hectares allocated to organic production (Willer, 2011) from the Faostat database[ii] about 1,602,900 ha [iii], which represents 0.58% of total agricultural area about 27680000 ha, with more than 25,000 producers. Organic land growth has exceeded 25% annually (Willer and Yussefi, 2008; Briz and Ward, 2009; Willer, 2011).

In addition to the land allocated to organic agriculture, the market value for organic food and feed has also increased during the last years. Europe domestic sales of organic food and feed in 2008 were estimated at 18 billion Euros, with Germany (almost 6 billion Euros), France (more than 3 billion Euros), U.K. (almost 2 billion Euros) and Italy (almost 1.5 billion Euros) the most outstanding countries (Willer, 2011). In Spain the market accounts for only 905 million Euros (MAPA, 2007; Michaledou and Hassan, 2009; Willer, 2011). This can be explained because, although devoting significant share of arable land to organic production, this is mainly concentrated in crops such as almonds, olive trees and vineyards planted in non-irrigated areas. Moreover, most of the Spanish production is exported. In fact, Italy and Spain concentrate more than the 87% of the European export market for organic food and feed, 900 and 315 million Euros, respectively (Willer, 2011).

Regarding to integrated agriculture, it is important to highlight that integrated farming is not considered by any European regulation; therefore each member state has its own regulation, resulting in consequent differences among countries. Nevertheless, there is an initiative named "European Initiative for Sustainable Development in Agriculture (EISA)" that attempts to eliminate the gaps between the different European regulations regarding integrated production by establishing a definition for integrated farming (IF) while setting certain guidelines at the European level. In Spain, IF is regulated by REAL DECRETO 1201/2002, which establishes the general characteristics and requirements for integrated agriculture. According to a survey done in 2010 by the Spanish Ministry of Agriculture, the nation dedicates 601,394 hectares to integrated production. However, there is not any common institution (at national level) regulating the market and, consequently it differs in each region (Cataluña, Andalucía, Aragón, Canarias, Castilla-León, Extremadura, Galicia, La Rioja, Murcia, Navarra and País

Vasco). In addition there is not any available data about market value and commercialisation of integrated products in Spain.

The potential development for organic and integrated agriculture and food in the Spanish market is still very large. However, a succession of interrelated factors such as the existence of relatively high prices, the export orientation of the Spanish producers, the limited availability of the product in most conventional retailers and the lack of consumer knowledge about what exactly organic and integrated products are, have determined that the domestic demand growth has been lower than supply (Tarkiainen and Sundqvist; 2006; Fotopoulos and Krystallis, 2002). Therefore, to increase domestic demand, a better understanding of Spanish consumers' choices regarding sustainable produced food is needed. Purchasing intentions are measured through consumers' willingness to pay (WTP) for organic and integrated food.

Although there is a vast literature dealing with consumers' WTP for organic foods, as well as about the role of sensory attributes in the food choice (e.g. Cardello and Schutz, 2006; Ishii et al., 2007; Gil et al., 2000; Krystallis and Chryssohoidis, 2005; Batte et al. 2007), this is the first attempt to combine both experiments, WTP and sensory tests for the case of sustainable food. Previously, Poole and Martínez (2006 and 2007) and Combris et al. (2009) showed the importance of experience attributes on individuals quality perception of food and on the final food choice.

In the present study, consumers' willingness to pay is assessed through an experimental auction. Two auctions have been designed: the first consists on consumers' evaluation of different food options based on search attributes (before purchase) and the second after tasting it (simulating a post purchasing situation). In between a hedonic sensory test is performed. Simultaneously, as a complementary exercise, a trained panel sensory test has been employed to identify the main organoleptic characteristics that consumers associate with the hedonic taste satisfaction. Finally, factors affecting consumers' WTP differences in the two auctions are analyzed.

The structure of the paper is as follows. First, a background on the impact of consumption expertise, understanding it as actual consumption experience, on consumers purchase intention and its willingness to pay is presented. Next, we report the description of the sample, the structure of the sensory test and the product under analysis. Third, the experimental design and statistical analysis were presented. Finally, the empirical estimation results are unveiled and some conclusions are stated.

2. The role of consumption expertise and food information on consumers purchase behaviour

Determinants of consumers' behaviour towards food mainly depend on: 1) sensory aspects of food such as taste, smell and texture, achieved by means of personal experiences towards food (Shaw et al., 2007); 2) non-food elements such as, available information as well as environmental and social factors (Bell and Meiselman, 1995; Eofertmans et al., 2001; Rozin and Tuorila, 1993; Shaw et al., 2007); and 3) cognitive factors, which emphasize the development of mental structures and processes that may vary among individuals (Magistris and Gracia, 2008; Peter and Olson, 2005). This work is focused on the role of information and sensory aspects in shaping individuals purchase behaviour for a sustainable produced fruit (organic and integrated apples).

There are two main types of information named "search" information (through inspection) and "experience" information derived by consumers own experience through purchasing and consumption (Nelson, 1970; Poole et al., 2007). The role of "search" information can be relevant for the case of sustainable food -namely organic and integrated food. Although foods are generally considered as economic goods, sustainable produced foods have attributes that cannot only be revealed by visual inspection or consumption (Bonti-Ankomah and Yiridoe, 2006). However, some economic studies have settled organic products as trust assets (Andersen and Philipsen, 1998; Nelson, 1970; Giannakas, 2002). That is, the organic characteristics are difficult or, even in some cases, impossible to detect, but nevertheless play an important role for the buyer (Andersen and Philipsen, 1998). The same happens with other attributes such as quality distinction. Consequently, certification has been developed to transform the confidence characteristics into searchable attributes, allowing the buyers to have the proper information to evaluate more clearly the different alternatives before purchasing a specific product (Bonti-Ankomah and Yiridoe, 2006).

In addition to the "search" information, when talking about fruit, the role of "sensory experience" is especially important and changeable. Sensory experience is formed by two main components: the extrinsic perception (size, texture and shape) and the intrinsic perception (texture, sweetness, flavour etc.) (Poole et al., 2007). However, two fruits growing alongside each other on a tree will develop different levels of sweetness, acidity, flavour and texture. Even different sides of the same fruit can have different sensory characteristics. This variability in quality is compounded by several technological and supply factors. Thus, consumers are often faced with a high degree of variability for fruits purchased from the same batch, as well as among sequential shopping trips (Harker et al., 2002a).

The importance of health and environment in determining consumer choice of organic food is well known (Fotopoulos and Krystallis, 2002; Jolly, 1991; Scheifferstein and Ophiusa, 1998; Shaw et. al., 2007; Makatouni, 2002; Zanoli and Naspetti, 2002; Kotler et al., 2005; O'Donnovan, 2002; Ougthon and Ritson, 2007; Grunert and Juhl, 1995; Padel and Foster, 2005; Chryssohoidis and Krystallis, 2005; Chen, 2007; Magistris and Gracia, 2008; Kuhar and Juvanic, 2005), and has been measured by many different methods, such as focus groups and surveys (when searching for qualitative information), conjoint analysis, contingent valuation, choice modelling and bids, among others (when searching for quantitative data) (Hoffman et al., 1993). In order to value individuals purchase intention towards food, the non-hypothetical methods have the advantage of reducing overestimation of answers because participants have the opportunity to actually buy or get the valued product. Indeed, in a real trade situation there is no interest from buyers to reveal their maximum price, unless this does not affect the price they have to pay. This is exactly what happens in the experimental auction method: participants are assured that a selling price will be settled independently of their own maximum buying price (Combris et al., 2009, Poole et al., 2007). The principal advantage of experimental auctions is that real product and real money is used. Therefore, the procedure replicates as closely as possible the actual purchase decision process.

The relevance of "experience" information in food choices has been considered by Lange et al. (2002) and Noussair et al., (2004) that compare hedonic ratings (obtained from sensory analysis) and experimental auctions to evaluate food preferences. They concluded that there is no reason to use auctions to find out the average preferences of

consumers regarding to a specific good. They state that hedonic rating provided similar aggregate result and it is easier to conduct. In contrast, Poole et al. (2007), propose an experiment to check if the bidding behaviour might be influenced by the hedonic rating for the particular case of mandarins. They employed an experimental auction to test fruit quality perceptions by evaluating consumers' WTP after three alternative sensory experiments (visual appearance, touching and peeling, and tasting). They conclude that "experience" modifies product quality perceptions and scoring behaviour, as well as it is likely to affect repurchase decisions. More recently, an empirical combination of sensory and economic experiments was also developed by Combris et al. (2009). They developed a protocol for investigating the influence of food product characteristics (sensory attributes) and information (labels) on consumer preferences and willingness to pay for wine. They conclude that experience plays a very important role in defining individuals' perception and WTP. In addition they also noticed that personal experience, derived from a blind tasting, is significative more important than label information regarding "appellation of origin" (what we named "search" information) for shaping WTP.

The impact of "experience" and "search" information on individuals purchase behaviour has been taken into account through the theory of "assimilation-contrast". This theory suggests that if the gap between expected and actual experience is small, then consumers will change their perception to be in line with expectations (assimilation) (Deliza and MacFie, 1996). However, if the gap is large, then consumers exaggerate (contrast) the difference and reject the product. Alternatively, when consumers do place high importance to inherent attributes of a product, such as organic or integrated production, they have a broad tolerance to sensory quality. This level of tolerance might be expected if choice is more strongly based on expectations of health or environmental benefits rather than on sensory properties (Harker et al., 2002a).

Based in the former studies our experiment wants to assess by means of a two stage experimental bidding process, the influence of "experience information" in forming consumers WTP for a sustainable food (trust assets) and to value the trade-off with the "search information" attribute of agro-ecosystem preservation.

3. Methodological approach

3.1 The Data

The survey was conducted to a sample of 80 adults representative of Barcelona population during spring 2010. Respondents were recruited by a professional market research company and they had to meet two criteria: a) to be the primary food purchaser within the household and b) to be a frequent apple purchaser. Table 1 shows the main characteristics of respondents. In brief, the sample was made up of 40% men and 60% women. Almost 70% of respondents were in between 35 and 65 years old. The majority of the sample (more than 80%) had finished secondary school and revealed to have medium household income levels (from 1000 to 5000 Euros/month family).

- Insert table 1 about here -

3.2 The product

The experiment was carried out using 'Golden Delicious' apples. In order to value individuals WTP for agro-ecosystem preservation three different production systems namely, organic, integrated and conventional were selected. All fruits were harvested by a single producer from the area of Lleida[iv], between December 2009 and January 2010. Maturity was determined at harvest, and apples were placed in cool storage at 0 ºC for up to 10 weeks. Prior to consumer evaluation, the fruits were removed from storage and stored at room temperature of approximately 15º C for up two days. In order to guarantee a homogeneous assortment of apples, the firmness of the apples was measure by means of an Effegi penetrometer (Harker et al. 2002a)[v].

3.3 The Experiment

The experiment included eight different sessions which were conducted during two consecutive days in March 2010[vi]. The sessions were held in a testing room in Barcelona, the number of participants in each session was ten and each session lasted about one and a half hours.

The experiment was conducted in five stages[vii]: 1) welcome and introduction to the experiment; 2) survey; 3) First auction for each kg of apples (organic, integrated and conventional); 4) Blind tasting of three apple samples (organic, integrated and conventional); and finally, 5) provision of information about identification of tasted apples and second auction for each kg of apples (organic, integrated and conventional).

During the *second stage*, respondents received the payment of 20 Euros for their participation in the experiment. Respondents were requested to answer a computer-based survey containing questions regarding organic purchase behavior, risk perceptions associated with agricultural products, environmental attitudes, and the influence of social norms on respondent behavior, trust in organic market agents, and the importance of price in food purchases.

The *third stage* of the experiment starts with an explanation about the auction procedure. The auction method used is the single bidding Vickery second-price auction (Vickrey, 1961)[viii]. The winning bidder, the one that revealed the highest maximum price for the bid, paid the second highest bid price and received the kilogram of apples. A first bidding employing two different soft drinks was carried out as an example, allowing respondents to ask questions on the auction mechanism. Once the auction mechanism was fully understood by participants, they were asked to submit three confidential bids, each bid corresponding to a kilo of apples produced under a different system (organic, integrated and conventional production), and write them down on a bidding sheet.

In the *fourth stage* of the experiment a blind tasting for three apple samples, one for each production system (integrated, organic and conventional) was performed. Firstly, respondents tasted and valued the three samples (apple slices) and afterwards they assessed the visual aspect of the entire apple. Apple samples were randomly assigned to the different groups and the acceptability was measured by means of a 9-points hedonic ranking from "I don't like it at all" to "I like it very much".

In the *final sta*ge we revealed which of the apples from the blind tasting came from the conventional, the integrated or the organic system. With this information in mind, a second round of the auction was carried out.

At the end of the two rounds, one round was chosen randomly to determine the binding round. Additionally, one production system (conventional, integrated an organic) was chosen randomly. Once the results were announced, the experiment ended by handing the product to the winner who had to pay the corresponding market-clearing price.

4. Results and discussion

Results are presented in three subsections. First, we provide the results from the hedonic sensory test carried out both by respondents and the expert panel. Second, we report results obtained from the auction. Third, we analyze factors affecting respondents' changes related to their willingness-to-pay for organic apples before and after the hedonic sensory test. A regression analysis is used for this purpose. Furthermore, some descriptive statistics about respondents' attitudes and perceptions about organic food are presented as they have been considered as exogenous variables in the regression model. Finally, some conclusions are reported.

4.1. Sensory test and trained panel descriptive analysis

The overall scores obtained from the hedonic sensory test of organic, integrated and conventional apples show that respondents prefer conventional apples when valuing appearance while integrated apples are preferred when valuing taste (see table 2). Differences are statistically significant if organic and integrated apples are compared for both attributes, appearance and taste (see table 2). However, for the evaluation between conventional and organic apples just appearance seems to be significantly different, while for the case of integrated and conventional just taste show significant differences (see table 2).

- **Table 2 about here –**

In order to provide more insight about the relationship between consumer acceptability and the organoleptic characteristics of the apples, a parallel sensory test was carried using a trained panel. The panel tasted the same samples used in the consumers' sensory test. Results from the trained panel was combined with those from the untrained sample of apple consumers to detect which were the main sensory properties that consumers value for organic, integrated and conventional apples (Cardello and Schutz, 2006), and therefore to obtain information regarding how consumers perceive the products and if there are specific characteristics that make consumers more willing to pay for organic compared to integrated or conventional apples (Ishii et al., 2007). The use of panelists is recommended because common consumers usually lack of the necessary experience, vocabulary and concept alignment to generate quality descriptive data (Ishii et al., 2007).

The sensory panel was composed by nine assessors with wide experience in sensory analysis of apples. The panel was trained by a group of researches with an extensive experience in sensory analysis of fruit (apples and peaches). Each panelist received

peeled fruit samples in transparent plastic cups coded using 3-digit, randomly generated numbers. Mineral water and crackers were provided as palate cleansers between samples. Evaluation took place in individual sensory booths in which environmental temperature was held at 20ºC and corrected lighting was used. The samples were scored for the intensity of attributes using 150mm unstructured line (0= absent and 150= extreme), with the exception of firmness which was anchored at 10 = Low and 140 = High. The intensity of the following attributes: sweetness, sourness, crispness, firmness, juiciness, mealiness and apple flavor were evaluated by the panel. The attributes were defined according to definitions given in Harker et al. (2002b) and Harker et al. (2002c).

To identify the sensory attributes associated to each type of apples, first a Principal Component Analysis (PCA) and next an internal preference map was developed. Figure 1 shows the mean values of the sensory attributes evaluated by the panelists. We highlight mealiness for organic food juiciness, crispness and sourness for conventional apples and sweetness and apple flavor for integrated produced apples. There are not significant differences between sweetness and apple flavor for integrated apples (t=-1.14, p=0.274) and neither for juiciness and crispness for organic apples (t=1.32, p=0.213).

- **Insert Figure 1 about here –**

Next, figure 2 shows the internal preference map (MPREF) which has been applied to relate the sensory descriptive analysis and the individual hedonic rating allowing us to relate the sensory description done by a trained panel to consumers' sensory preferences regarding apples. Consumers were grouped into two clusters using the K-means method. As can be observed in Figure 2, the first cluster (59% of the sample) is associated with a preference towards sustainable produced apples (organic and integrated apples), associated with mealiness and sweetness attributes, while the second cluster (41% of the sample) prefers conventional apples, associated to juiciness, sourness and crispiness.

- **Insert Figure 2 about here –**

4.2 WTP for organic, integrated and conventional apples

Results from the two stage single round bidding process revealed that the average bid for a conventional apple previous to the sensory test was 1.09€, while average bids for integrated and organic apples were 2.65€ and 2.99€, respectively (Figure 3)[ix]. Note that, on average, there is a significant WTP for sustainable produced fruit compared to conventional fruit – at least before the sensory test. After the sensory test, the average bid for a conventional apple remained very close (1.07€) while significant decreases were found in the other two production systems. In fact, averages bids decreased by 32.5% for both integrated and organic apples, but they are still higher than the bid for the conventional counterpart. These results combined with the results from the hedonic sensory test show that although "experience" information have a remarkable influence on purchasing intentions, "search" information for sustainable produced certification is very important in defining individuals WTP for fresh food. Consumers do give a higher valuation to integrated and conventional apples for the sensory test but are willing to

pay more for organic produced apples. In line with what Harker et al. (2002a) stated consumers purchase motivations are based on health and environmental benefits rather than sensory reasons.

- **Insert Figure 3 about here -**

The distribution of the premium respondents are willing to pay for both organic and integrated apples compared to the conventional counterpart is shown in Figure 4. As can be observed, for the two cases (organic and integrated apples), the WTP curve is moving towards an average lower value after the tasting. In addition, the premium for organic apples is higher than the one revealed for integrated ones. This can respond to the lower knowledge that Spanish consumers do have of the integrated certification scheme. Finally, significant heterogeneity among respondents' preferences towards sustainable produced apples was found.

- **Insert Figure 4 about here -**

4.3 Factors explaining consumer WTP for organic apples

The bidding process has shown us that respondents are willing to pay more for organic apples than for integrated and conventional ones. In addition the internal preference map has indicated that respondents relate organic and integrated apples to sensorial attributes, such as sweetness, while conventional apples are related to crispiness and juiciness. Therefore, we aim at understanding factors affecting consumers' changes in relation to their WTP for organic apples before (ex-ante) and after (ex-post) the sensory test. In other words, we aim at analyzing if consumers previous expectations at purchasing are maintained or not after purchasing and testing.

In order to identify the relevance of sensory attributes on defining the final premium consumers are willing to pay for organic apples two parallel models have been defined. The first model draws on the difference between the WTP for the organic apples and the conventional counterpart setting a premium for organic apples. The dependent variable is the difference between consumers' revealed premium for organic apples between the second bid (after the hedonic test) and the first bid (before the sensory test). The second model considers differences between consumers WTP for organic and integrated apples.

The two defined models have the same exogenous variables. Among the explaining factors, we have considered some socioeconomic characteristics of respondents such as: gender, age and education. In addition, the willingness to purchase organic product if it was available in regular stores has been also considered in the analysis – as *Availability*, together with the fact that consumers do already purchase organic apples – *Experience*. Additionally, results from the hedonic sensory test have been considered; more precisely, differences between consumers' valuation of organic and conventional/integrated apples appearance and taste. Finally, a factor analysis of some survey questions was performed in order to define some latent variables, which has been considered relevant on individuals' attitudes towards organic food in previous literature: the influence of social norms, the level of risk perception associated to conventional agriculture, the level of trust on organic agents, price, and finally, the

perceived differences between conventional and organic products. Previous to the results from factor analysis, Figures 5 to 9 provide some descriptive information about such variables.

The majority of Spanish consumers revealed high confidence in organic market agents, producers and, especially, certification labeling (Figure 5), in line with the strict rules that run this particular market. In addition, it is noticeable that nearly 70% of the sample was concerned with the use of hormones and antibiotics on food production, as well as with the health risk associated to synthetic additives and chemicals (Figure 6). However, a clear position regarding attitudes towards irradiation technology was not revealed, which might indicate a lack of public knowledge regarding this technology.

- **Insert Figure 5 about here –**
- **Insert Figure 6 about here –**

Regarding to consumers' perception of organic food, nearly 52% of participants perceived organic production as safe as conventional food (Figure 7). However, there is no agreement among respondents when talking about its impact on health and the content of vitamins and minerals. Finally, the survey also revealed that for almost two thirds of respondents' subjective norms have an impact on their behavior (Figure 8) and that opinions from friends and people have more influence than those from their families.

- **Insert Figure 7 about here –**
- **Insert Figure 8 about here-**

Results from factor analysis are shown in Table 3. Latent variables have been defined based on scales already verified in the literature (Tarkainen and Sundqvist, 2006; Lockie et al., 2004; Tsakiridou et al., 2006; Lea and Worsley, 2005, and Chen y Li, 2007). The reliability of the resulting factor was tested using the Cronbach's alpha measure of internal reliability and consistency. Results were acceptable as we got a value over 0.7 in all cases but for the last factor with a value of 0.64.

- **Insert Table 3 about here –**
- **Insert Table 4 about here –**

As mentioned above, two regressions have been carried out. The first one considers changes in the consumers' premium they are willing-to-pay for organic vs. conventional apples before and after the sensory experiment, while the second considers changes in the premium between organic and integrated apples. Table 4 provides a summary of the exogenous variables considered in both regressions. Estimated parameters are shown in Table 5.

- **Insert table 5 about here-**

As can be observed from Table 5, differences between the ex-ante and ex-post WTP for organic apples in comparison to conventional ones mainly depend on sensory variables,

such as external appearance. In other words, consumers that in the sensory test have preferred the appearance of conventional vs organic apples are less willing to pay for organic apples after the sensory experience. This result is in line with the output of the preference map that already showed a clear difference between preferences and attributes associated to organic and conventional apples.

The estimated results also reveal that subjective norms influence consumers' WTP for organic apples. Among the socioeconomic variables, the age negatively affects the premium for organic apples. That is, younger respondents increase their willingness to pay for organic apples after the sensory test. This is in line with previous literature which has revealed that younger people are more concerned about the environment (Jolly, 1991; Fotopoulos and Krystallis, 2002; Tsakiridou et al., 2007), although not always they are able to pay a premium for organic produced food. Education is also a relevant factor to explain differences in consumers' willingness to pay after the sensory test. Higher educated people are willing to pay a higher premium for organic apples in relation to the conventional counterpart. This result is also consistent with previous literature which revealed that higher educated people tended to show more positive attitudes towards organic food, to seek information on production methods and processes, and to pay a higher premium for organic food (Magnusson et al., 2003; Hill and Lyncchehauon, 2002; Lockie, et al., 2004; Padel, 2005). With regard to gender, no significant differences have been observed between men and women, contrary from previous literature which has shown that women have a higher predisposition to buy organic food (Wandel and Bugge, 1997) as they seem to be more concerned about the health and welfare of their family, especially of young children (Magnusson et al. 2003; Tsakiridou et al., 2007; Lea and Worsley, 2005; Lockie et al., 2004).

In relation to the second model which analyses the changes in consumers' WTP for organic vs. integrated apples, results are, to some extent similar in relation to those just mentioned, although some differences can be observed. First, sensory cues (taste and external appearance) are not relevant in this case. This result is consistent with the output of the preference map which showed that consumers identify these two apples to have common sensory parameters. The relevance of the variables subjective norms and age is similar than in the first model. Furthermore, the variable availability is significant and negative which means that people that would buy organic food if it was available in regular stores revealed to be willing to pay less for organic vs. integrated apples after the sensory test. Finally, people that have the perception that organic food is equal to conventional food in terms of vitamins, food security, etc. are more willing to pay for them ex-post in relation to integrated apples.

5. Conclusion

Individuals' valuation of sustainable produced food is determined by a wide range of issues such as attitudes, sensory characteristics, socio-demographic profiles, information available, etc. This study has intended to analyze the influence of these factors on Spanish consumers WTP for organic and integrated apples. To tackle with this issue, this paper has combined an experimental auction with a sensory test. In fact, two auctions have been performed: before and after the sensory experiment to analyze consumer behavior differences between pre-purchasing and post-purchasing.

Results indicate that Spanish consumers' general attitude towards organic production seems to be positive in response to environmental concerns, health concerns and trust on organic certification and market agents. In addition, Spanish respondents have

revealed that they are willing to pay a premium to consume organic produced fresh food, although like better integrated and organic apples for the blind sensory test. However, this premium is lower than the current price for this product in the Spanish market. Indeed, almost all consumers revealed to be willing to buy organic products if their prices decrease.

In the pre-purchasing situation, the role of "search" information is the most important factor defining consumers' food choice towards sustainable produced food. Participants revealed to be willing to pay a premium for apples produced under environmentally friendly production systems either before or after the sensory "experience" is provided. However, we have shown a decrease in consumers WTP for organic and integrated apples after the sensory analysis indicating that both "search" and sensory "experience" information do have an impact on defining consumers purchase behavior towards sustainable produced food. These results are consistent with Fotopoulos and Krystallis (2002), who identified that consumers buy organic food because they perceived it as healthier food, nutritious, safer ("search" information) and tasty (sensory information) over the conventional counterpart.

In relation to the sensory analysis, results indicate that the sample can be segregated in two groups. The first one prefers the sensorial attributes such as mealiness and sweetness (associated to sustainable produced apples) while a second group prefers attributes such as juiciness, crispiness sourness and firmness (associated to conventional apples).

Considering this segregation two regression models were defined in order to identify factors affecting consumers' differences in their WTP for organic apples before (ex-ante) and after (ex-post) the sensory test. Results show that the sensory experience (appearance) does have an important role in defining respondents WTP for organic vs. conventional apples but it is not the case when comparing organic vs. integrated apples. This is consistent with the results of the preference map and supporting the importance of "sensory" experience information on defining individuals' food choices. A further step in this study will be to test the hypothesis made by Fillion and Arazi (2002) and Hill and Lyncchehauon (2002), who stated that beliefs that organic food is tastier generate a positive disposition that will influence consumer perceptions and WTP. This study also highlights the relevance of social pressure and some socio-demographic variables such as age and education on forming individuals' sustainable food decisions.

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Fig. 1 Sensory descriptive analysis. Sensory profile for the three types of apples

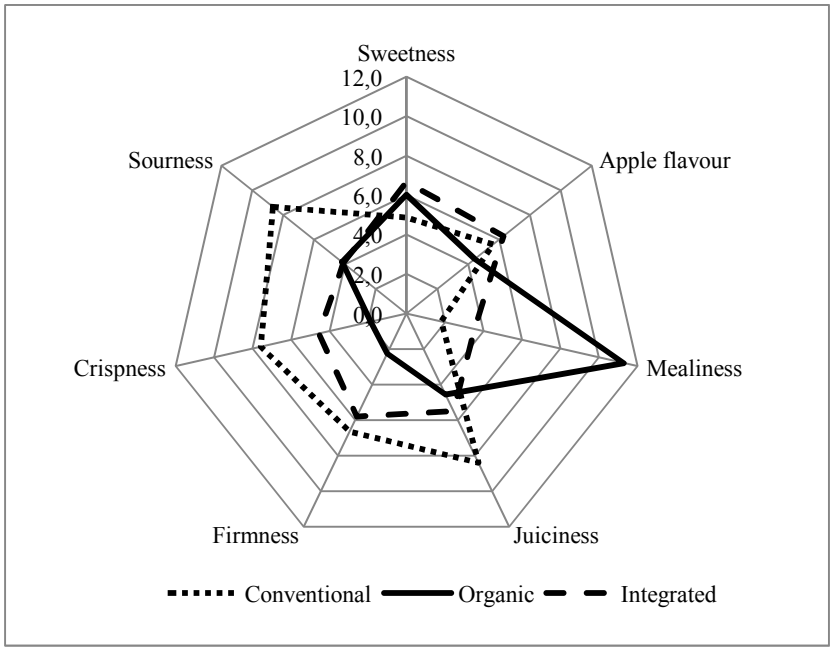


Fig. 2 Internal preference map

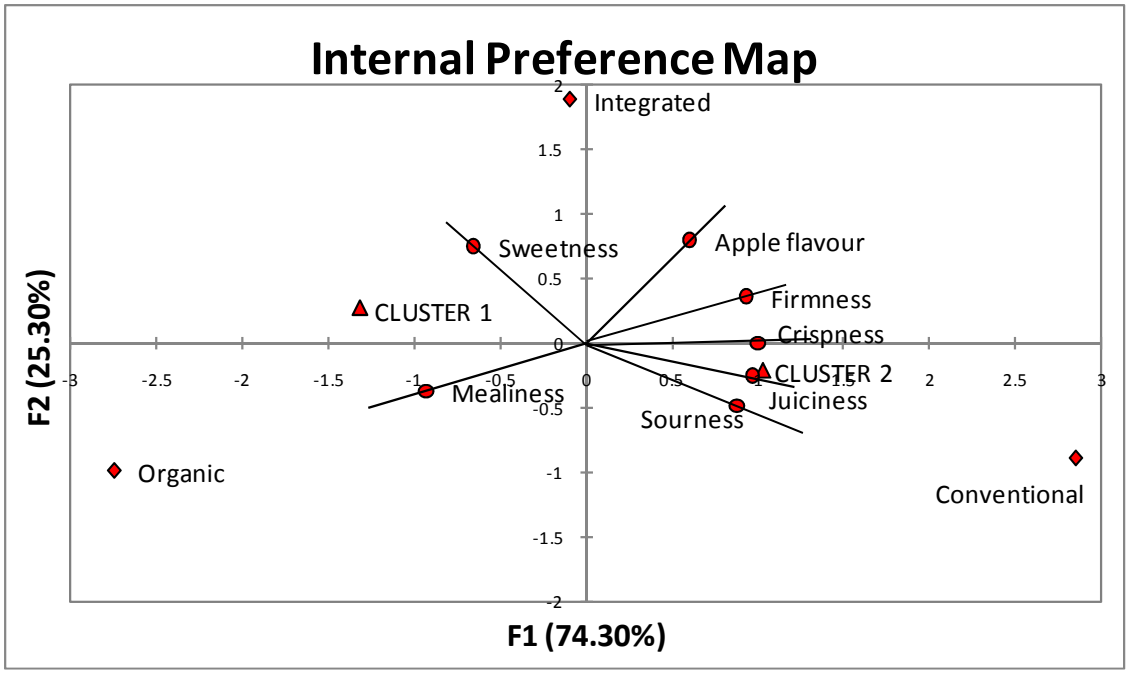


Fig. 3 Consumers average WTP for a kilogram of apples before and after the sensory taste.

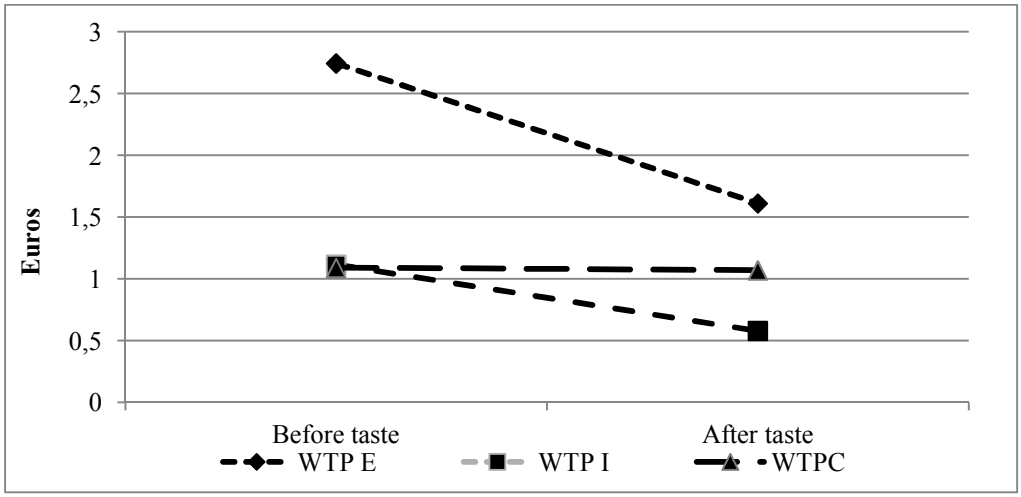
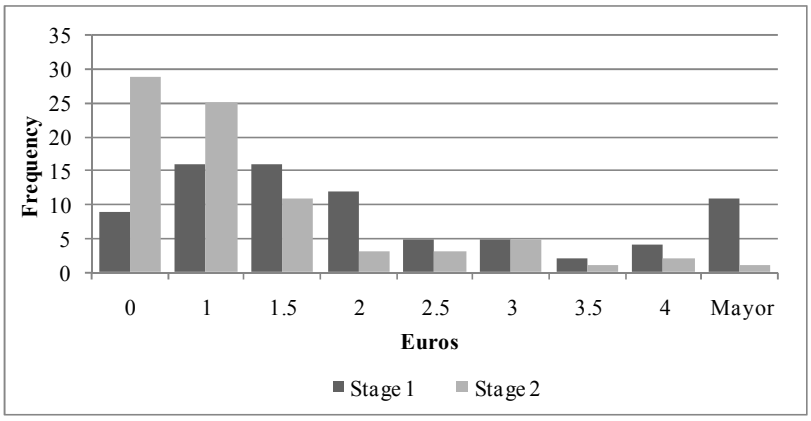
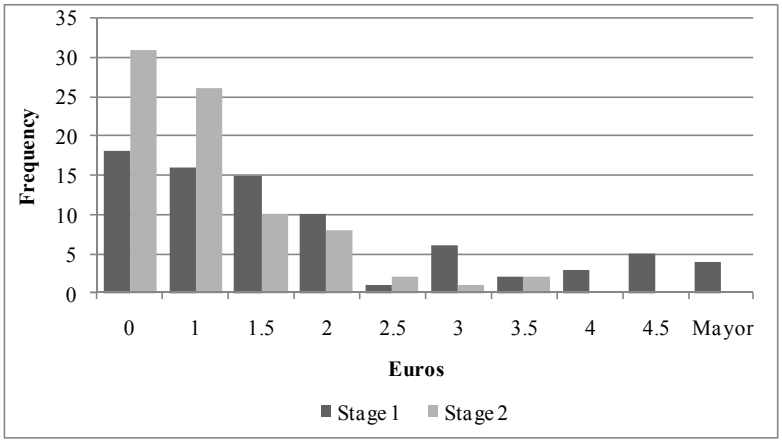


Fig. 4 Distribution of consumers' willingness to pay for organic and integrated apples, before and after the sensory taste.

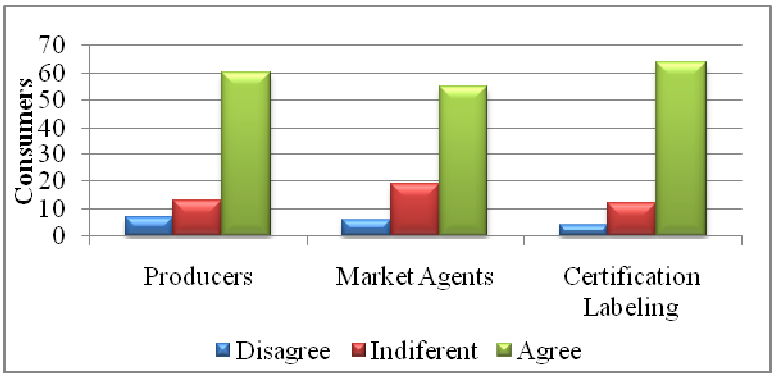


(A) Organic apples vs. conventional apples



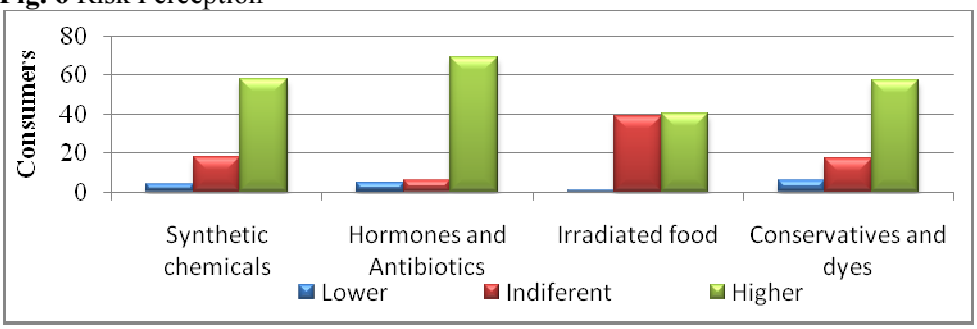
(B) Integrated apples vs. conventional apples

Fig. 5 Trust in Organic Market Agents and institutions



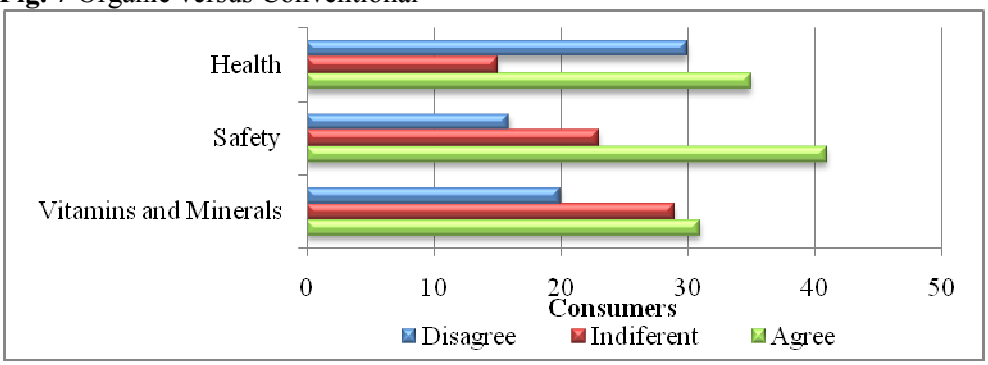
Question 1: I trust organic food producers
Question 2: I trust organic food market agents
Question 3: I trust the certification and labeling scheme for organic food

Fig. 6 Risk Perception



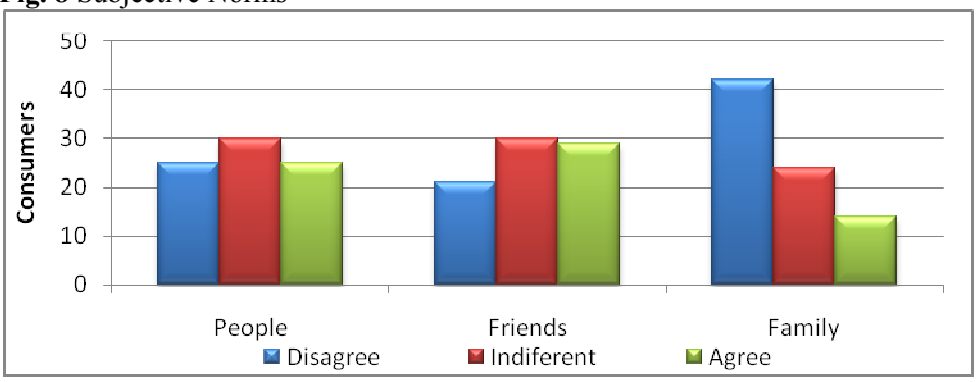
Question 1: Could you tell me which is the perceived health risk for regularly consuming processed food grown with pesticides and other chemicals?
Question 2: Could you tell me which is the perceived health risk for consuming food from animal origin treated with hormones and antibiotics?
Question 3: Could you tell me which is the perceived health risk for regularly consuming irradiated food
Question 4: Could you tell me which is the perceived health risk for regularly consuming foods with preservatives and artificial colors.

Fig. 7 Organic versus Conventional



Question 1: Organic foods are as healthy as conventional foods
Question 2: Organic foods are as safe as conventional foods
Question 3: Organic foods have the same content of vitamin and minerals than conventional foods

Fig. 8 Subjective Norms



Question 1: People who are important to me believe that I should buy organic food
Question 2: My circle of friends advise me to buy organic food
Question 3: My family thinks we should include in our household food consumption organic products.

Table 1. Socio-demographic characteristics of the sample.

Demographic	N = 80	%	Official Population distribution*
Gender			
Female	48	60	51
Male	32	40	49
Age in years			
18-34	23	29	30
35-49	32	40	29
50-64	23	29	21
65 or older	2	2	20
Education			
Primary school unfinished	1	1	12
Primary school finished	4	5	26
Secondary school unfinished	6	8	25
Secondary school finished	40	50	23
University degree	25	31	14
Post graduated degree	4	5	
Income in Euros			
1000 or less	5	6	No available
1001-2000	28	35	data
2001-3000	26	32	
3001-5000	15	19	
5001 or more	6	8	

Table 2. Means values for consumers' hedonic tests.

	Mean	Std Dev	Min	Max
Appearance of apple				
Organic	5.41	1.71	2	7
Integrated	6.12	1.8	1	9
Conventional	6.48	1.59	2	9
Consumer tasting				
Organic	5.52	1.8	2	9
Integrated	6.63	1.79	2	9
Conventional	5.42	1.96	1	9
	Appearance		Taste	
Organic vs Integrated	t=-2,47, p=0.01		t=3.78, p=0.00	
Integrated vs Conventional	t=-1.35, p=0.17		t=4.14, p=0.00	
Conventional vs Organic	t=-4.01, p=0.00		t=0.50, p=0.61	

Table 3. Cronbach's alpha. (Factorial analysis)

Factors	**Cronbach's α (alpha)**
Factor1 - SN: Subjetctive Norms • My circle of friends advises me to buy organic food. • My family thinks that I should include in my diet organic food. • People that are important to me think that I should buy organic food.	0.85
Factor 2 – R: Risk Perception • Could you indicate me what level of risk supposed to your health consume food grown with pesticides and other synthetics chemicals regularly? • Could you indicate me what level of risk supposed to your health consume animal food treated with hormones and antibiotics? • Could you indicate me what level of risk supposed to your health consume irradiated food regularly? • Could you indicate me what level of risk supposed to your health consume food with additives and dyes regularly?	0.79
Factor 3 – T: Trust in organic market agents and institutions • I trust in the organic food producers • I trust in the suppliers of organic food? • I trust in the certification label veracity of the organic foods	0.83
Factor 4 – P: Price relevance • At the time of purchasing you compare the prices of all possible alternatives • I put attention to the sales or to the sale products when I buy food. • When I purchase the price is very important to me.	0.70
Factor 5- A: Organic vs Conventional • The organic food has the same vitamin and minerals content as the conventional food. • The organic foods are equally safe as conventional ones • The organic foods are equally healthy as the conventional ones.	0.64

Table 4. Regression model variables description

Variable	Definition	Type*
DWTP OC	Difference of WTP premium1[1] for organic apples before and after the sensory test.	C
DWTP OI	Difference of WTP premium2[2] for organic apples before and after the sensory test.	C
Appearance O/C & O/I	Difference between the valuation of organic and conventional/integrated apples appearance.	C
Taste O/C & O/I	Difference between the valuation of organic and conventional/integrated apples appearance.	C
Gender	Female=1	D
Age	Older than 49years old =1	D
Education	University education =1	D
SN	Subjective norms	C
R	Risk perception conventional agriculture	C
T	Trust with organic agents	C
P	Attitude towards price	C
O/C	Perception ecologic vs. conventional	C
Availability	I will purchase organic product if it was available in regular stores =1	D
Experience	Consumers do already purchase organic apples=1	D

*D=Dummy variable, C=Continuous variable.

[1] Difference between the WTP for organic apples relative to the conventional counterpart.
[2] Difference between the WTP for the organic relative to the integrated counterpart.

Table 5. Determinants of consumers WTP differences between bids before and after the sensory test for organic apples[a] relative to their conventional (Model 1) and Integrated (Model 2) counterparts

	Model 1			Model 2		
	DWTP OC			DWTP OI		
Variable	Coef.	T	P	Coef.	T	P
Appearance O/C & O/I	**-.084 (0.40)**	**-2.07**	**0.042**	.241 (0.86)	0.84	0.403
Taste O/C & O/I	.225 (0.39)	0.57	0.569	.052 (0.29)	0.18	0.859
Gender	-.329 (0.39)	-0.82	0.413	-.430 (0.27)	-1.54	0.127
Age	**-1.34 (0.45)**	**-2.97**	**0.004**	**-.689 (0.33)**	**-2.09**	**0.041**
Education	**.757 (0.42)**	**1.79**	**0.078**	.316 (0.28)	1.10	0.277
SN	**.340 (0.14)**	**2.29**	**0.025**	**.262(0.10)**	**2.41**	**0.019**
R	-.237 (0.19)	-1.23	0.223	-.000 (0.14)	-0.00	0.999
T	-.351 (0.22)	-1.56	0.123	-.170(0.15)	-1.07	0.287
P	.114 (0.15)	0.73	0.469	.089 (0.11)	0.78	0.438
O/C	.192 (0.14)	1.31	0.195	**.315 (0.10)**	**2.41**	**0.019**
Availability	-.778 (0.49)	-1.56	0.124	**-.678 (0.36)**	**-1.89**	**0.064**
Experience	.679 (0.59)	1.16	0.252	0.173 (0.42)	0.41	0.686
Cons	-.065 (0.53)	-0.12	0.902	.415 (0.37)	1.10	0.276

[a] See Table 3 for variables definition

***Model 1** Obs = 80, Adjusted R2 = 0.135, R2=0.27, Root MSE= 1.59

***Model 2** Obs = 80, AdjustedR2 = 0.1, R2=0.22, Root MSE= 1.59

[i] Arable land and permanent crops.

[ii] Last available data is from 2009.

[iii] Agricultural area certified organic + agricultural area in conversion to organic.

[iv] Lleida is a province within Catalonia in the North East of Spain. It is the largest production area of apples in Spain (MAPA 2010)

[v] Two measurements 180 apart at the equator on the shaded side of the fruit were done, and a small patch of the skin was removed for puncture testing, following Harker et al. (2002b).

[vi] Previous to the experiment, a pilot test was conducted with 10 participants (students and colleagues), in order to test the software developed for the experiment and to test the methodology of the auction that would be used.

[vii] First of all, a pilot experiment was conducted. Its aim was to test both the "software" developed for the CACM experiment and the methodology that would be used for the auction. A total of 10 participants (students and colleagues) were employed.

[viii] There is not an agreement in the literature reading to the number of trial auctions needed. Among the arguments in favor of repeated trials is that the practice allows participants to learn about the auction format improving the accuracy of value estimates (see, e.g., Alfnes and Rickertsen 2003; Hayes et al. 1995; Lusk et al. 2001; Shogren et al. 1994; Shogren et al. 2001). However, Knetsch et al. (2001) find that bids in a repeated-trial auction are influenced by

the choice of auction mechanism. In addition, the application of standard economic theory to conservation auctions suggests that single bidding rounds are appropriate (Stoneham et al., 2003, Lactacz-Lohmann and Van de Hamsvoort, 1997; Rolfe and Windle, 2006).

[ix] With the WTP, the consumers knew which was organic and which wasn't even though the sensory was blind

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Títol: The sample
Tema:
Autor: UPCnet
Paraules clau:
Comentaris:
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Número de canvi: 2
Desat la darrera vegada el: 28/06/2012 13:46:00
Desat la darrera vegada per: UPCnet
Temps total d'edició: 0 Minuts
Imprès la darrera vegada el: 28/06/2012 13:47:00
A partir de l'última impressió completa
Nombre de pàgines: 26
Nombre de paraules: 8.644 (aprox.)
Nombre de caràcters: 47.546 (aprox.)