



Consumers' willingness to pay for organic products, both with existing brands as the exclusive signal of quality and with additional signals incorporated

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Pascale Bazoche, Pierre P. Combris, Eric E. Giraud-Heraud, Alexandra Seabra Pinto, Efthimia Tsakiridou. Consumers' willingness to pay for organic products, both with existing brands as the exclusive signal of quality and with additional signals incorporated. TEAMPEST Work Package 4, Deliverable 4.4, 2010. hal-02818687

HAL Id: hal-02818687

<https://hal.inrae.fr/hal-02818687>

Submitted on 6 Jun 2020

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Deliverable Factsheet

Deliverable	4.4: Consumers' WTP for organic products, both with existing brands as the exclusive signal of quality and with additional signals incorporated
Working Package	WP4 : Indirect Pesticides Costs on Consumers Willingness to Pay
Partner responsible	INRA
Other partners participating	INRB, AUTH, LEI,
Nature	R
Dissemination level	PU
Delivery date according to DoW	February 2010
Actual delivery date	April 2010
Finalization date	April 2010
Relevant Task(s):	4.4

Brief description of the deliverable:

This deliverable presents an assessment of consumers' willingness to pay for products from organic farming. The results are obtained through experimental markets, carried out both in Portugal, France, Greece, and more recently in Netherlands (country added at the request of the TEAMPEST coordinator). In this country, we tested two types of organic certification: The conventional organic certification, tested in the previous countries (where no chemical pesticides have been used in the production process) and a certification "Organic Plus" where no chemical and organic pesticides have been used. The results are also put into perspective in relation to all published work to date on consumer demand for organic certification.

Followed methodology / framework applied:

A literature survey based on a bibliographic database and economic experimental method based on Becker-DeGroot-Marschak procedure. Econometric estimations allow testing the robustness of the results.

Target group(s):

Experimental economics research units.

Key findings / results:

Using a simple random of the population of each country, we show how the public certification of organic farming is widely acclaimed both in Portugal, France and Greece. The average premium (difference of WTP between organic and conventional products) is about 96% in Portugal, 72% in France and 68% in Greece. Moreover, we show how certifications, which do not guarantee a drastic reduction of pesticides (namely certifications with Integrated Pest Management), do not yield to such significant results. This last result seems to be strongly confirmed in experiments in Netherlands. However, in this country, organic production seems to be less valued by the consumers. The average premium for conventional organic certification is only around 11% and 22% for the certification "Organic plus".

Socio-professional categories play a significant role in the consumers' behavior. However this is not the income that expresses the premium given to the WTP for pesticide reduction. The premium for organic products is more important for women, for young people (20-29 years), for high education level and presence of children in the household.

Interactions with other WPs deliverables / joint outputs

WP no.	Relevant tasks	Partner(s) involved	Context of interaction
5	5.2	WU and LEI	Experimental auction for Netherlands (October 2010)



Project no. **212120**

Project acronym: **TEAMPEST**

Project title:

**Theoretical Developments and Empirical Measurement of the
External Costs of Pesticides**

Collaborative Project

SEVENTH FRAMEWORK PROGRAMME

THEME 2

Food, Agriculture and Fisheries, and Biotechnology

Bazoche, P., Combris, P., Giraud-Héraud, E., Seabra Pinto, A., Tsakiridou, E.

Deliverable 4.4

Consumers' WTP for organic products, both with existing brands as the exclusive signal of quality and with additional signals incorporated.

Date: December, 2011

Extended summary

The main objective of the deliverable 4.4 is to evaluate consumers' WTP for organic products and compare both with existing brands as the exclusive signal of quality and with additional signals incorporated.

The literature about demand for organic products shows that there is a price gap between organic and conventional food. The first works (Ott, 1990; Misra et al., 1991) that measure this gap were centred on the consumers' evaluation of certified food products. After, Loureiro et al. (2002), Chinnici et al. (2002), Haghir and Mcnamara (2007) enlarge this study to different ways to signalise the absence of pesticide residues on food and on the evaluation of consumers' concerns about the health and environmental dimensions of organic food. Another part of the literature (Wandel and Bugge, 1997; Boccaletti and Nardella, 2000; Tsakiridou et al., 2006) on consumer demand for organic food considers that organic food consumption would rise appreciably if the prices of organic food would decrease considerably. However, a more recent literature (Monier et al., 2009 and Bunte et al., 2010) using field experiments, shows that marginal reductions of organic prices may not change consumer's decisions of buying organic rather than conventional food products.

Nevertheless, all these works do not focus on comparing the WTP of consumers for organic farming with alternative certifications. Moreover, they do not control the representation of consumers tested, compared to the national population, in order to measure the real potential market for organic production. In the present work, we used an experimental market and we determined consumer's willingness to pay (WTP) for produce grown with different pesticide levels. For our experimental markets conducted in Portugal (April, 2009), France (May, 2009) and Greece (February, 2010) consumers' WTP were estimate using the apple example, for three levels of pesticide reduction: i) "Regular": apples produced in the respect of the legal legislation. These apples don't have any cue. ii) Integrated Pest Management (IPM): apples produced with a decrease of the pesticides' use. In our experimental markets, IPM strategy involved three different signals with a "generic" IPM certification, a retailer brand and a protected designation of origin, (iii) "Organic": apples produced without any synthesis pesticides. More recently, we conducted the experimental market in Netherlands (October, 2010). In this country, we tested two types of organic certification: The conventional organic certification, tested in the previous countries (where no chemical pesticides have been used in

the production process) and a certification “Organic Plus” where no chemical and organic pesticides have been used. Results obtained in the latter country are preliminary and will be confirmed by the Deliverable 4.5.

After showing that consumers’ premium for pesticide reduction is not independent from the product’s sensory attributes, we give the quantitative results for the consumers WTP for a pesticide reduction. In the context of our experimental auctions, the premium for organic is around 96% in Portugal, 72% in France and 68% in Greece. It should be noted that demand for organic products seems relatively important in the EU countries that we tested. However in Netherlands, organic production seems to be less valued by the consumers. The average premium for conventional organic certification is only around 11% and 22% for the certification “Organic plus”.

Countries where the experimental auctions were conducted do not necessarily correspond to countries where income levels are highest in the EU (specifically for Portugal and Greece). Moreover, we show that the income is not significant to explain the premium for organic products. This means that the demand for organic product is likely to grow significantly within the EU in the coming years, this demand involves *a priori* all segments of the population and the willingness to pay for these products is relatively large.

This positive result was not observed for less restrictive alternatives (in terms of pesticide reduction), leading to limit the contribution that we can expect from consumers in favor of a partial reduction of pesticides (for example, using integrated pest management-IPM-system). In terms of pesticide reduction, "Nothing but organic" seems to be the *leitmotif* of European consumers, so it is reasonable to consider an important development of this mode of production in the coming years.

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1. Introduction

There is a vast literature on consumers' preferences for organic food relative to conventional products (Bonti-Ankomah and Yiridoe, 2006). This literature has done emphasis to several issues: i) consumer knowledge about organic products; ii) factors that oriented demand for organic products; iii) profile of organic consumers; iv) size of organic price premium of consumers' willingness-to-pay for organic foods. Our literature survey starts with ethnological study on consumers of organic products and after we present the principals' works that study the price gap between organic and conventional food.

1.1 Consumption of organic products

Studies that focus on organic agriculture find themselves at the intersection of a variety of disciplines (Bellon & Lamine 2009). The most widely written about research in France, Europe and North America deals with the subject of organic agriculture by focussing on the study of organic products, with a variety of different emphases. This review of the research carried out on the subject encompasses economic studies that bring further information to bear on the matter, and is written with a view to carrying out an ethnological study on consumers of organic products. This is related to the research carried out by Sylvander on how French and European consumers view organic products (2003), as well as to the studies of Vermeir & Verbeke (2006) that focus on what might be termed organic products' 'perception of efficiency' in Belgium, and how this influences the consumption and purchase of organic products. The research of Yiridoe *et al.* (2005), Soler *et al.* (2002) and Holt (2006) is also considered. This discusses what might be referred to as the 'willingness to pay' for the consumption of organic products. The research of Ureñal *et al.* (2008) is also considered, which posits that in Spain men and women do not share the same attitude to organic products (women are more favourably disposed to them) nor the same degree of willingness to pay (men are willing to pay more), and three kinds of organic product consumers can be discerned – users that are habitual, those that are occasional and those that are potential. These economic studies provide a lot of information on the impact of some of the socio-demographic aspects of our research. Our readings on organic products are on three different levels: production, the market and purchasing, and the consumer.

1.1.1. Organics: a (new) production method

Various research studies have been carried out that draw comparisons between organic production methods that are conventional and those that are new. Hendrickson & Heffernan (2002) demonstrate the importance of pinpointing the weaknesses within the world food system. Holloway *et al.* (2007) examine the efficiency of setting conventional and alternative production methods against each other, and look at different distribution systems in the UK (organic food boxes, farm sales, farmers' markets) where the relationships of power both internal to these production-distribution systems and external to them can sometimes hinder their development.

French and non-French sociologists examine the way alternative markets work and the development of farm-to-fork networks, and look at the confidence-loyalty relationship between producers and consumers. This is considered in Sweden (Hochedez 2008), Denmark, and in the UK (Wier *et al.* 2008). Concerns about ethical trading, sustainable development, and fair trade are examined in the writings of socio-economic studies of fair-trade and organic products (Adams & Raisborough 2010, *Anthropology of Food* 2009). Consumption of organic products is linked to a consumer ethics mindset that incorporates religious, ecological and political value-systems (Lindeman & Väänänen 2000). Strategies developed by producers, sellers and consumers of organic products in California demonstrate economic, ethical and political interests that are both convergent and contradictory (Alkon 2008). According to Burch *et al.* (2001), so-called green thinking and green practices manifest themselves among each of the interested parties (producers, sellers and consumers). The green thinker's mindset is permeated by these issues to the extent that these consumers eat, live by and practice an organic way of life.

Economists and sociologists are becoming more and more interested in the way organic production methods are developing. This interest incorporates concepts surrounding issues of territoriality, territory, local products, and farm-to-fork networks (*Anthropology of Food* 2005 & 2007, Goodman & DuPuis, 2005). Goodman (2003) and Holloway *et al.* (2007) compared the outlook of North Americans and Europeans as far as the production and purchase of local produce is concerned. Fonte (2008) examines the increase in value of local production and in rural development as it relates to local know-how in ten European countries. Guthman considers the ways in which production and consumption can be re-designed in the light of organic products' tastes, provenance and quality (2002). Hinrichs (2000) analyses two kinds

of direct sales at agricultural markets in the USA, and raises the question of local production. He also emphasises (2003) the political, social, economic and moral value-system of global and local production systems. Selfa & Qazi (2004) have researched the producer-consumer relationship within local food systems in Washington state, and look at how local agro-feed networks are defined both sociologically and geographically.

1.1.2 Organics: a (new) way of buying and consuming

Sociologists and economists have looked at the market for organic products in various parts of the world. In the USA, the strategies and views adopted by producers and sellers of organic products are not the same as those of the consumers. The lack of understanding of organic products that is demonstrated in consumer opinion is reflected in their buying habits and consumption (Chrzan. 2010). In Canada, the kind of relationship between organic producers and consumers specific to a given area (within the community, market gardens, and public awareness focal points) has an influence on the purchase of organic products (Kerton & Sinclair 2010). The behaviour of Norwegian consumers and producers as far as organic products are concerned is compared with that of other Europeans, where production-consumption models are more highly developed (Storstad & Bjørkhaug 2003).

The accrediting and purchasing of an approved product has meaning to the consumer. In Australia, this manifests itself as 'eating green' (Lockie *et al.* 2002), and in the USA as a preference for organic and fair-trade brands (Howard & Allen 2010). In Mexico, the issue of accreditation is dealt with as falling within the « participatory organic certification » label, an initiative which aims to maintain the integrity of the organic brand (Nelson *et al.* 2010).

The motivation of consumers of organic products in various countries is examined, namely in Sweden (Magnusson *et al.* 2001), and in the UK (Makatouni 2001). British consumers are motivated by seasonality and French consumers by preservation of the ecosystem (Brown *et al.* 2009). Sirieix *et al.* (2006) in France and Zanolli & Naspetti (2002) in Italy analyse the motivation underlying the purchase decisions of organic products, taking into account cultural value systems (including tradition, family, environment, children's health, and well-being). Zukin (2008) demonstrates through the examination of the motivations underlying purchase decisions that the adoption of organic buying habits enables a tiny part of the population of the centre of Manhattan to set itself apart morally and socially and to exclude other consumers.

1.1.3 Organic consumption – a (new) way forward for consumers¹

Consumer behaviour is analysed through the examination of various themes including fears about food, perceptions of organic products, and the social factors that determine their choices.

Researchers have looked at food fears and risks (Douglas & Wildavsky 1984, Fischler 1998, Apfelbaum 1998, Peretti-Watel 1999 & 2000) and have observed that the discourse environment surrounding health and food safety issues creates anxiety (Dab 1998). Some of these fears are set out in detail, such as those fears about avian flu that were faced by the Vietnamese (Fournier 2009). Sometimes consumer behaviour that seems unpredictable is justified by a particular discourse environment – an example being the residents of an English village wishing to preserve their rural identity by producing and consuming unpasteurised milk that is nevertheless considered a risk by the authorities (Enticott 2003).

Various studies have been carried out on the characteristics attributed to organic products. Researchers have looked at the attitudes of consumers concerning the quality and safety of organic foods and of low input food (Midmore *et al.* 2005). In Greece, attitudes towards organic food are focussed on fruit and vegetables (Tsakiridou *et al.* 2006). In Australia, a study has dealt with how ethnic origin (Afro-American or Caucasian) impacts on the purchase and consumption of organic and non-organic products (Zepeda *et al.* 2006). In Canada, perceptions of organic consumption as an alternative ethical set of consumption values as a result of a family decision is examined in three ethnic and cultural groups (Beagan *et al.* 2011). Researchers have drawn up sociological profiles of organic consumers in New Zealand (Campbell & Liepins 2001), Northern Ireland (Davies *et al.* (1995), and in the USA (Abrams *et al.* 2010). Other researchers have looked at the process of social identification that is going on in the USA and in the UK among consumers who regularly buy organic products (Bartels & Reinders 2010).

Sociologists have looked at a variety of social, cultural, religious, political and economic factors in the context of the consumption of organic products. Lockie *et al.* (2002) found 4 groups of organic consumers that were delineated by the type of organic products bought over the year, levels of education, income, and the proportion of organic products bought. Lea & Worsley (2005) looked at the interaction between the personal value-system, including preservation of the environment, socio-demographic factors (gender, age) and beliefs about organic agriculture. They found that in Australia, women had a more positive attitude to

¹ On the behaviour of consumers and their sociological classification, cf. Corbeau 1997.

organic food than men. Little *et al.* (2009) looked at the relationship between types of food, its supply, and food preparation in the home. Women did the shopping, made product and supplier choices and prepared the meals while demonstrating concerns about their own body shape and the health of their children.

E.J. Roe (2006) looked at the way in which men chose their foodstuffs for food preparation. Certain specific values were attached to the food, for example men make fish into sushi while others prefer to buy and eat organic potatoes rather than conventional potatoes.

Many studies have been carried out that deal with the issue of where food is made available, particularly at specialised food outlets, and at Amap stores where local produce is sold on a regular basis (*Associations pour le maintien d'une agriculture paysanne* – Organisation for the support of rural agriculture)². In France, most economic and sociological studies deal with the analysis of the so-called organic basket (François *et al.* 2002, François & Sylvander 2004, Dubuisson-Quellier & Lamine 2004, Lamine 2008, Ouédraogo 1998). Two types of organic consumers have been distinguished. These are: habitual consumers who are organically literate, as it were, and who have strong views on the subject and have a significant number of organic products in their shopping basket and/or a number of different categories of organic products. The other type of organic consumer is the occasional consumer whose shopping basket will include very few organic products and/or few categories of organic products.

The limitations are largely a result of the actual research methods – the directive questionnaire – which do not allow the researcher to grasp the overall picture of the consumers' views and habits. Free interviews are a way of gathering more detailed information about consumer thinking and behaviour. A number of questionnaire research campaigns were carried out by phone (Sirieix 2000, Lockie *et al.* 2002, etc.) or by email and were undertaken by market research organisations (Bartels & Reinders 2010, Adams & Raisborough 2010, Howard & Allen 2006, Lea & Worsley 2005, etc.).

Researchers are not in a position to compare consumer behaviour views, which were recorded only with reference to one single supply source that specialised in the sale of organic products. Moreover, consumers, including those of organic products, shop in different places. The categorisation of consumers of organic products does not comprehensively cover all consumers of organic products. Sociologists have, notably, omitted to take into account

² Very occasionally at supermarkets and superstores (François *et al.* 2002).

studies of small-scale organic consumers – those who consume only one or two organic products or just one category of organic product. This has been noted by Hughner *et al.* (2007), based on a thorough review of sociological studies on consumers of organic products. In their studies, sociologists have also set aside those who consume non-accredited organic products even where they are still organic and those who do not consume organic products.

We are proposing to deconstruct the analytical categorisation of organic consumers, and in order to do this, we are putting forward a proposal for an ethnographic study of consumers of organic products on a small, medium, large and very large scale. We will undertake research within the home with a view to drawing up a profile of the full gamut of consumer behaviour, as even large-scale consumers of organic products who are habitual and have strong beliefs about the subject do not consume only organic products. We consider it to be very important that an examination is carried out into the ways in which types of consumption are negotiated within the household, given that the home environment is not one straightforward unit of food consumption, but a place where various kinds of behaviour are exhibited that are sometimes contradictory (Valentine 1999).

1.2 Consumers' willingness-to-pay for organic foods

Our work focuses on the literature that studies the price gap between organic and conventional food. The first works that measure this gap were centred on the consumers' evaluation of certified food products. After, others works enlarge this study to different ways to signalise the absence of pesticide residues on food and on the evaluation of consumers' concerns about the health and environmental dimensions of organic food. Part of the literature on consumer demand for organic food considers that organic food consumption would rise appreciably if the prices of organic food would decrease considerably. But, recently, some literature shows that marginal reductions of organic prices does not change consumer's decisions of buying organic rather than conventional food products.

The pioneer work of Ott (1990) evaluates the consumer's willingness to pay for food that are certified as pesticide residue-free (CFRF). The work focus was consumers' concerns about using pesticides in fresh produce. The author used the answers of a questionnaire responded by shoppers from Atlanta counties (USA) to determine the price premium that consumers are willing to pay for CFRF fresh produce. He concluded that two-thirds of the respondents would pay a premium for CFRF fresh products 5 to 10% higher than current prices. In line of

this work, Misra et al. (1991) conducted a consumer survey in Georgia (USA) to determine if consumers are willing to pay a higher price for fresh products that are certified as free of pesticide residues (FPR). The results of the contingent evaluation show that 54% of the consumers, which wanted to pay a price premium for FPR, were willing to pay up to 10% more.

The work of Loureiro et al. (2002) enlarges the evaluation of certified products to the study of the impact of environmental dimension of food products. The authors analyse the “environmentally sound” practices on consumers’ WTP for eco-labelled apples. They used the answers of apple-buying consumers to a survey conducted in two grocery stores in Portland (USA). They observed that the amount of price differential between the apple eco-labelled and the conventional and the organic ones has a negative relationship with the WTP level. They estimated a small mean premium for eco-labelled apples (5%) and considered that the context of the procedure used, with conventional and organic apples as substitutes, had an influence on these results. Many consumers have considered organic apples a better environmentally alternative and they would be more willing to pay a higher premium for them.

The study of Chinnici et al. (2002) was centred on the health dimension of organic food products. The authors carried out a survey to study the relation between the receptivity to the price of organic products and preferences stated by Italians consumers as regards the benefits linked with their consumption. The whole of consumers know that there is a price premium of 20-30 per cent for organic produce but only the consumers that have a consolidated consumption of organic produce and are “health conscious” have stated they are willing to pay this premium.

Wier et al. (2003) evaluate the Danish consumers WTP for organic food products and they realise that consumers are more sensitive to price changes of organic food products when these products are signalise as organic. They also verified that comparable prices between organic and conventional food are perceived as a signal of low quality.

Gil and Soler (2006) analysed the Spanish consumers’ decisions to pay a premium for organic olive oil. They designed an experimental market based on two types of information about organic olive oil: price of conventionally produced non-organic olive oil; and two alternative information channels to inform about certain beneficial attributes of the organic virgin olive oil. They observed that information about conventional produce increased the perceived value of the organic product. The results also show that only the consumers that have already

bought organic products were willing to pay a price premium and only 5% of them would be willing to pay the correspondent market price.

Haghiri and Mcnamara (2007) analysed the factors that affect Canadian' consumers decisions in respect of paying a price premium for organic fresh products. The authors conducted a survey with the goal of knowing the perceptions towards the consumption of fresh fruit and vegetables. The results show that Canadian's consumers are willing to pay at least 10 per cent premium for organic fresh products. They also observed a positive relation between the motivation of paying an additional price for organic produce and the transmission of information about these products.

Didier and Lucie (2008) compared French consumer's willingness to pay for organic and fair-trade chocolate product. They designed an experimental market and used the Becker-DeGroot-Marschak's mechanism to measure the value of environmental and social dimensions of these products. They also identified different consumer profiles based on their evaluation of the labels linked to these dimensions. The authors observed that nearly half of the consumers were not sensible of the presence of fair-trade and organic labels on a product. This segment of consumers evaluated better the taste and health dimension of the product than its social and environmental dimensions. The consumers that positive evaluated the presence of the labels (two different segments) were willing to pay 20% to 30% higher the price of conventional ones.

The work of Wandel and Bugge (1997) belongs to the literature that said that organic food consumption would rise appreciably if the prices of organic food would decrease considerably. The authors evaluate Norwegian consumers concerns about environmental aspects of food, measuring consumers' willingness to pay for foods from environmentally sound production. The results show that more than 70% of the Norwegian consumers were willing to buy organic foods, if the price difference between conventional foods and organic foods does not exceed 5%.

The authors Boccaletti and Nardella (2000) conducted a consumer survey in Italy to know if the costumer of large supermarkets/hypermarkets would be willing to pay price premiums for organic fresh products and to what extent. The results of their contingent evaluation were in line with those of past studies which supported the idea that consumers would accepted to pay a small premium for organic produce. They observed that 70% of consumers would not pay a price premium higher than 10% of the regular price.

Posri et al. (2007) evaluated consumers' attitudes towards and their willingness to pay for safe vegetables in semi-urban/rural regions of Thailand. They used a dichotomous choice contingent valuation method (DC CVM) where consumers made choices between safe vegetable and its conventional type at a given price difference. They concluded that up-country Thai consumers are willing to pay current market premium levels for organic vegetables.

The results achieved by Tsakiridou et al. (2006) do not corroborate with the idea that consumers are willingness to pay small premium for organic food products. The authors measure consumers' WTP for organic products in Greece and they find that the average price consumers are willing to pay for organic products is 35 percent higher than the prices of conventional products. Also, their study shows that the more credible the price differences between organic and conventional products, higher the premium for organic products. After this work, Tsakiridou et al. (2009) evaluated the Greek consumers' willingness to pay for two different products: organic and traditional specialty guaranteed products. The authors wanted to know if consumers' quality awareness, beliefs and socioeconomic characteristics that influenced the consumer's willingness to pay, are the same for the two kinds of products. The results showed that there are no difference between the price premium for the two products (2€ per kilo). They also observed that WTP for TSG products was influence by socioeconomic factors but the same was not found for organic products, for which socioeconomic factors seem to have a limited influence.

Monier et al. (2009) pointed out the future of organic consumption in France and they studied French organic consumer patterns with the goal of know if they are or not occasional consumers of organic products. The authors analysed the impact of price on buying organics. They concluded that consumers are prone to enlarge their demand for organics to a large variety of goods. Their work showed that the price gap between organic and conventional products does not change because the marginal reductions of the organic price. Their results are in line with the work of Bunte et al. (2010), when they considered that consumer demand for organic products changes when price gap between organic and conventional is high and does not change when this price gap is low. Bunte el al. (2010) wanted to know to what extent consumer demand for organic products in Netherlands is sensitive to changes in the prices of organic food and also to changes in the prices of conventional products. They show that the reduction of organic price for some distribution products, like organic milk, potatoes and rice do not shift demand much.

2. Methodology

The aim of our work was to measure the consumers' willingness to pay for apples produced with different levels of pesticides use, and to compare results from various European countries. In accordance with the commitment under the original program TEAMPEST, we first led experimental sessions in three countries: Portugal, France and Greece. We describe below these experimentations, but we added at the end of this deliverable, the results obtained in Netherlands, with the same kind of protocol, and with two different organic certifications (conventional organic and “organic plus”).

The goal of the experiments was the same in the different countries even if few differences appear between the protocols. Mainly these differences were introduced in order to improve the previous protocols. The first sessions were carried in Portugal during April 2009, the second set of sessions was carried in France in May 2009 and the last sessions were conducted in February 2010 in Greece.

In this section, we present the sample and the recruitment procedure, the products used during the sessions and the protocols used for the three first countries.³

2.1 Subjects

Altogether 309 subjects participated in the experiments (102 in Portugal, 107 in France and 100 in Greece). The sessions took place in sensory analysis rooms and were able to receive between 8 and 16 participants. For each country the same set of criteria was used in order to recruit the participants. The same questions have been asked to the participants in Lisboa, Dijon and Thessaloniki. To be selected for the experiments, subjects had to be regular consumers and buyers of apples. They had to tell to the recruiter a realistic price for one kilo of apples. All the participants received an explanation letter to expose the context in which apples will be evaluated and the incentive mechanism.

³ We do not integrate at this stage the proposed protocol in Holland in October 2010. Indeed, the results obtained in this country are very preliminary and the number of sessions of the experimental market will probably be to increase at the beginning of 2011. The full comparison of the four European countries will be presented at the deliverable 4.5.

Table 1 - The characteristics of the participants for each country.

	Portugal	France	Greece
Sample Size	N=102	N=107	N=100
	Nber women :	Nber women : 55	Nber women : 56
	Nber men :	Nber men :52	Nber men :44
Age	18- 30 years old : 23%	18- 30 years old : 26%	18- 30 years old : 42%
	31-40 years old : 33%	31-40 years old : 19%	31-40 years old : 14%
	41-50 years old : 17%	41-50 years old : 21%	41-50 years old : 19%
	51-60 years old : 22%	51-60 years old : 18%	51-60 years old : 14%
	> 60 years old : 6%	> 60 years old : 16%	> 60 years old : 11%
Income	< 1000 €/month : 7%	< 1000 €/month : 7%	< 1000 €/month : 26%
	1000-2500€/month :56%	1000-2500€/month : 39%	1000-2500 €/month : 46%
	2500-4000 €/month : 25%	2500-4000 €/month : 44%	2500-3500 €/month : 19%
	>4000 €/month : 12%	>4000 €/month : 9%	>3500 €/month : 9%
Family size	Mean : 2.73 ; S.E : 1.06	Mean : 2.6 ; S.E : 1.45	Mean : 3.16 ; S.E : 1.48

We notice that in the Greek sample the first class of age (18-30 years old) is over-represented compared with the Portuguese and French samples. Note that in the three countries the same constraints were imposed about the number of participants without professional activities (such as housewives, students, etc.). Moreover, the family size seems to be larger in Greece than in the two other countries.

2.2 Products

Broadly, in each country, apples produced with three levels of pesticide use were proposed to the participants. The first level of pesticide use is defined by the minimum quality standard in force. In this category, the apples, named "regular", respect only the national law for the pesticides use.

The second level of pesticide is defined by a controlled reduction of pesticide use compare to the existing legislation. The decrease of pesticide in production methods can be guarantee by

the government, by the retailer or by the producers' union. In order to identify the best way to promote this reduction, we proposed apples certified by each of these organisms.

Finally, the organic apples represent the last level of pesticides use, where chemical inputs are prohibited. The table 2 presents the apples proposed to participants in each country. In the case of the Portuguese experiment, we were careful to take into account the heterogeneity of tastes that can be observed in the market. In the first step of the Portuguese experiment, the participants had to taste six apples from two different varieties: three Granny Smith and three Royal Gala. In the two varieties, the three level of pesticides use was proposed (regular, IPM and organic) but participants didn't have any information about the products' characteristics except the name of the variety. The objective was to determine if the consumers can reject an apple because of its variety. At the end of the first stage, the favorite variety of each participant was identified, and then each participant continued the experiment only with his favorite variety (Granny Smith or Royal Gala).

Table 2 – Types of apples by experimental market

Portugal		France	Greece
Granny Smith	Royal Gala	Golden	Starklin
1. Regular		1. Regular	1. Regular
2. PDO (Alcobaça)		2. Small Regular	2. Regular with
3. IPM		3. PDO (Limousin)	variety name
4. Retailer brand		4. IPM	3. PDO (Zagorin)
5. Organic		5. Retailer Brand	4. IPM
		6. Organic	5. Retailer Brand
			6. Organic

In France and in Greece, only one variety was proposed to the participants. Apples were selected according national preferences for varieties and according to supply constraints. In France, the organic apples was not available in the same size than the other apples, for this reason a small regular apple was added in order to control the effect of the apple size. In Greece, we wanted to test a « sticker » effect, so we added an apple with the name of the variety (but with the same pesticides level than the regular apple).

2.3 The experimental markets

In order to assess the WTP for apples produced with different levels of pesticides, the BDM procedure (Becker, De Groot, Marschak, 1964) was used to elicit participants' willingness to pay. The incentive mechanism allowing the consumers to make an actual decision is a sale⁴.

The mechanism is quite simple, the participants give the maximum price he's ready to pay for the product, and then he draws lot the selling price. If the selling price is greater than the willingness to pay given by the participant he cannot buy the product. If the selling price is lower than (or equal) his revealed willingness to pay, the participant buy the product at the selling price. So participants have to be cautious when they write down their willingness to pay because they likely will have to pay the price they announced.

The session began by explaining the procedure verbally to everyone. To ensure the revelation mechanism was properly understood (auction process) a trial auction was held with alternative products.

Basically, the sale experiments were conducted following four steps. For each of them, consumers had to answer to same question: "What is the maximum price you are ready to pay to buy 1 kg of this apple?". The steps are defined according the information given to the participants to evaluate the apples.

In the first step, the consumers did not have any information about the apples except the variety. To evaluate the participants can look at and taste the apples. As explained in the previous subsection, all the participants have to evaluate six apples in this step (3 Granny Smith and 3 Royal Gala in Portugal, 6 Golden in France and 6 Starklin in Greece). So at the end of this step, each consumer has given a maximum purchase price for 6 apples (participants could refuse to buy the apple with a zero price). After this evaluation, Portuguese participants had to answer to a sensory analysis questionnaire.

In the second step, participants had to evaluate 5 apples (from their favorite variety) for the Portuguese participants and 6 apples for the French and the Greek participants. No information was given to the participants and they were not allowed to taste the apples. These apples were presented simultaneously to the participants with their label.

⁴ Note that two additional steps were included in Portugal and France but are not presented here. These steps were independent of the apple sale and were focused i) on a processed product ii) on a choice experiment.

At the end of this step the French and the Greek participants had to answer to few questions about their knowledge on labels used in the experiment.

In the third step, each participant received an information sheet to clarify the meaning of the labels. The information given to the participants were not exactly the same in the three countries. The reason why this information differs is the heterogeneity of national legal frameworks. The table 3 presents the information given to the participants according to the country and the logo.

Table 3 – Information about different certifications

	Portugal	France	Greece
Regular (no label)	These apples are produced according to national rules regarding pesticides use.	These apples are produced according to national rules regarding pesticides use.	These apples are produced according to national rules regarding pesticides use.
IPM	State's guarantee that pesticides use has been reduced by half	Producers' guarantee that pesticides use has been reduced	Producers' guarantee that pesticides use has been reduced
Retailer	Retailer's guarantee that pesticides use has been reduced by half	Retailer's guarantee that pesticides use has been reduced	Retailer's guarantee that pesticides use has been reduced
PDO	Producers from « Alcobaça » guarantee that pesticides use has been reduced by half	State's guarantee that pesticides use has been reduced	State's guarantee that pesticides use has been reduced
Organic	State's guarantee that no chemical pesticides have been used	State's guarantee that no chemical pesticides have been used	State's guarantee that no chemical pesticides have been used
Variety			These apples are produced according to national rules regarding pesticides use.

In the fourth step, participants evaluated each apple with the same information than in the previous step but they were allowed to taste the apples.

The Greek participants had to evaluate the apples in a fifth step. The information condition was exactly the same than in the previous step but we explained them that the rates of pesticides residues found in apples are lower than the national law in force, and then the European law.

Finally, each Portuguese participant revealed 21 prices, each French participant revealed 24 prices and each Greek participant revealed 30 prices.

3. Results

3.1 Distribution of the willingness to pay values

In Figure 1a,b,c one can see histograms regarding the distribution of the WTP in the three countries, considering the information provided in the four situations mentioned before. The refusal to buy was identical in the two first countries, 8% in Portugal and 7% in France. It is also possible to say that the distribution in both countries is close to the normal distribution. In Portugal, the WTP mean value is around 0,83€, and the median 0,8€ In France, these values were slightly higher, with a WTP mean value of 1,29€ and a median of 1,2€ In Greece the refusal to buy is equal to 2,4% and the mean value is around 1€

Figure 1a: distribution of WTPs for Portugal

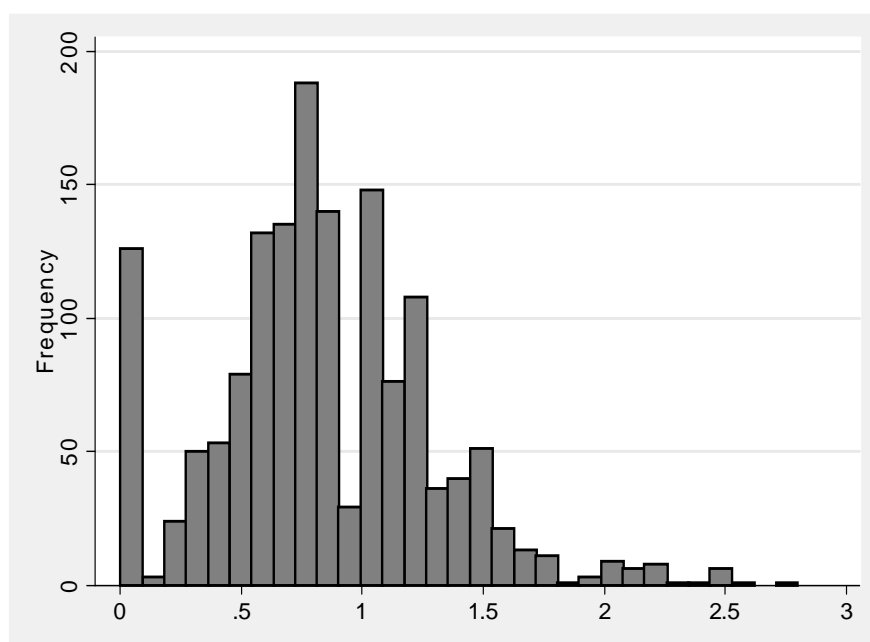


Figure 1b: distribution of WTPs for France

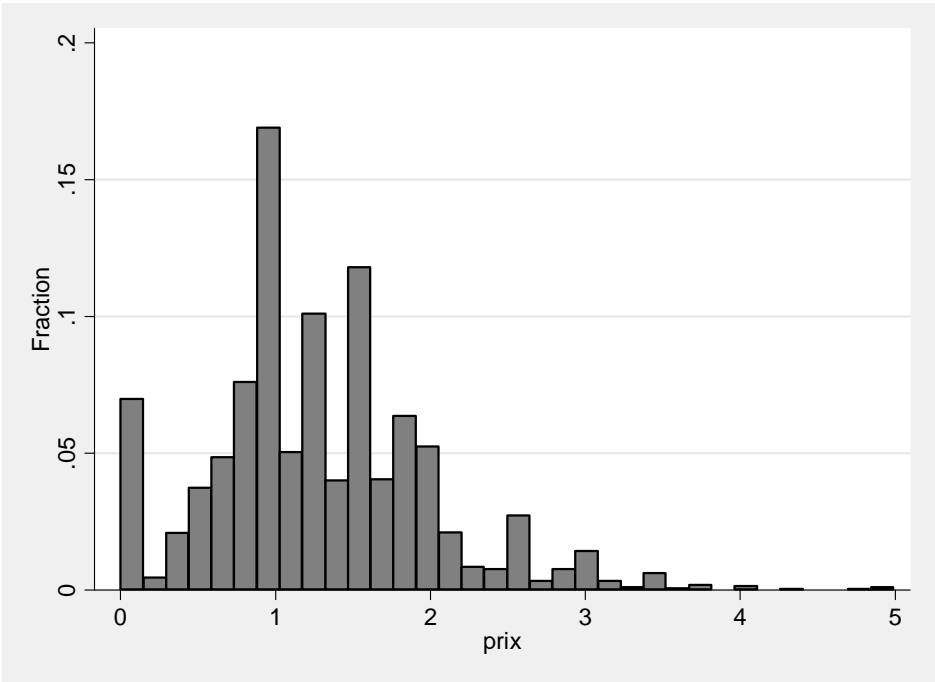
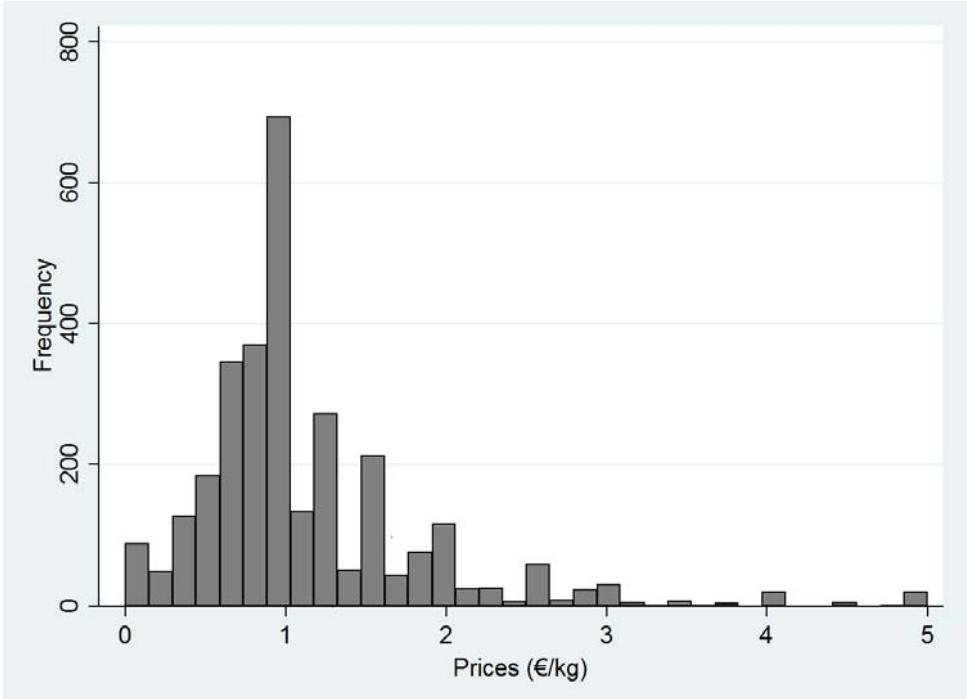


Figure 1c: distribution of WTPs for Greece



3.2 Descriptive analysis of the WTP evolution

Figures 2a,b,c show the confidence intervals for the WTP obtained, regarding the different information provided (namely: “PROVA” for the first situation, concerning the sensorial analysis; “STIKER” for the second situation, regarding the visual analysis; “INFO” for the third situation, related to the visual analysis with the simultaneous presentation of the respective certifications; “PROVA+INFO” for the fourth situation, concerning both the sensorial and visual analysis).

Figure 2a.: Confidence intervals (95%) of the mean WTP by type of apple and information situation in Portugal

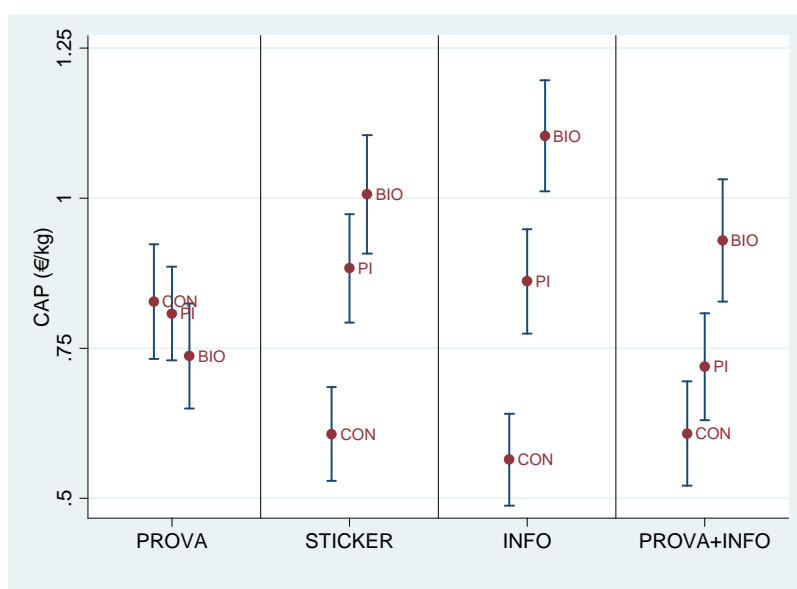


Figure 2b.: Confidence intervals (95%) of the mean WTP by type of apple and information situation in France

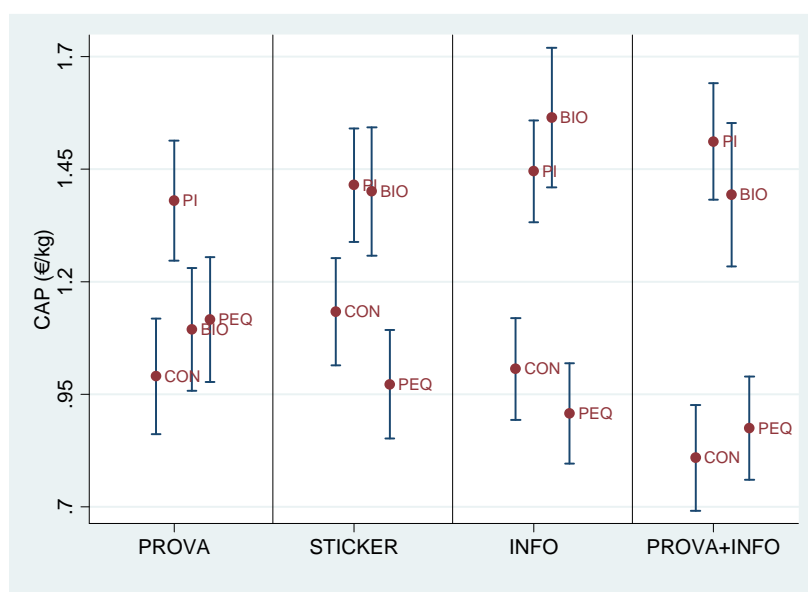
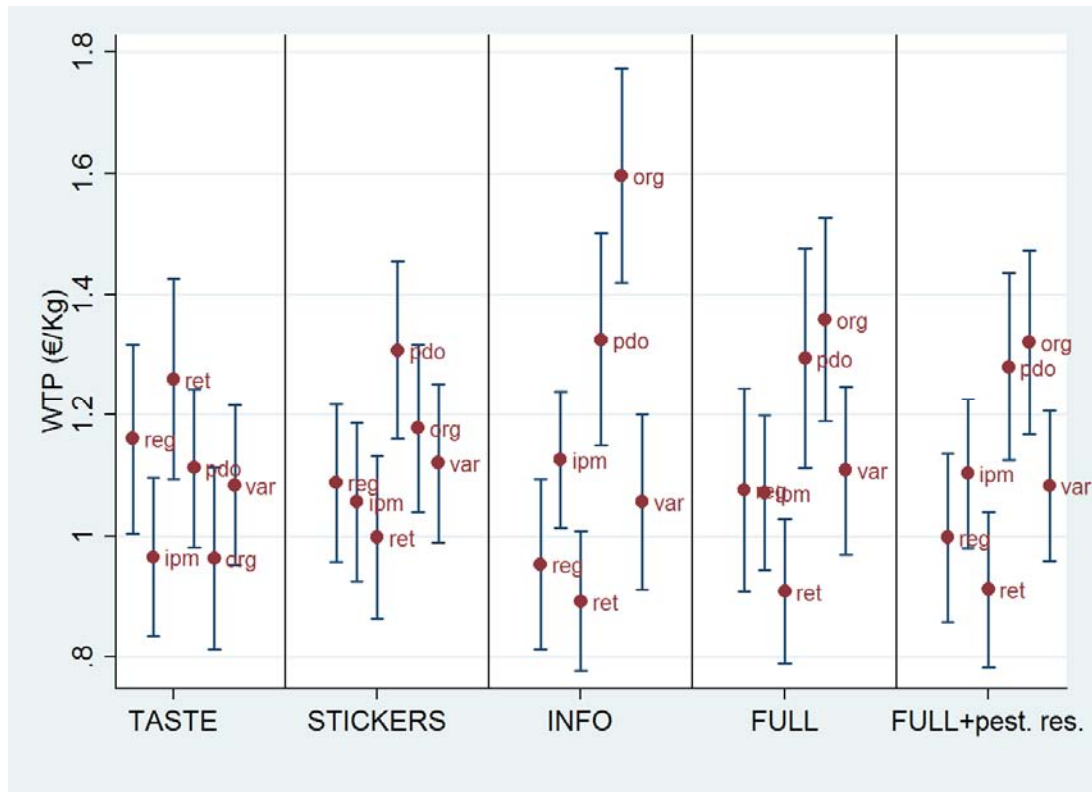


Figure 2c.: Confidence intervals (95%) of the mean WTP by type of apple and information situation in Greece



The most surprising feature was the homogeneity in the answers obtained about the relative value of the WTP, both by the comparison between the different information situations, as well as by the comparison of the WTP for the different types of certification. However, the WTP of the French consumers are significantly higher than those revealed by the Portuguese consumers, between 20% and 80% according to the type of certification. This result is not surprising if one considers the difference in the average salaries of the two population samples and, even more important, the difference in the apples' market price in both countries⁵. Note that, despite the relatively low incomes, the Greek premium for organic apples is greater than all the premiums of the other countries.

The first major result concerns the consumers' reaction in a situation in which the sensorial analysis is not taken into account. Observing the WTP obtained in the third situation,

⁵ The average salary of the portuguese participants was about 1000€ and in France of about 1600€. The average price, when the experiments took place, of 1 kg of apples was 1,51€ in Portugal and 2,04€ in France.

regarding the information provided on pesticide reduction, one observes a clear hierarchy between the three different types of apples.

In Portugal (figure 2), the conventional apple (CON) was evaluated on average at 0,56€ and the integrated protection apple (PI) obtained an increase, when comparing to the CON value, of 0,30€(+53,6%). The organic apple (BIO) increases its average WTP about 0,54€(+96,4%) when compared to CON apple. In France the results are identical. However, in this country, the organic apple's evaluation was done comparing it to the small apple (PEQ), in order to annul the negative effect of its size. For this country, figure 3 shows an average WTP in situation 3 of 1,01€ to the CON apple, with an increase of 0,44€(+43,6%) for the PI apple. The BIO apple gets about 0,56€(+72,5%) when compared to the PEQ apple.

One should say that, both in Portugal and France, the increase (or reinforcement) of the information provided on the partial reduction of pesticides regarding the PI apple, didn't provoke any effect on its evaluation. When comparing the results obtained in situation 2 ("STIKER") and 3 ("INFO"), they are relatively similar for the PI apple. Nevertheless, the comparison of the same situations for the BIO apple, shows that this kind of apple takes advantage of a significant re-evaluation between the two situations (an average increase of 0,12€ in the two countries).

Even though the results described for the evaluation of the BIO apple, in situation 3, can be clearly justified by the consumers' demand for products produced with low levels of pesticides, the results obtained for the PI apple should be analyzed more carefully. In France, the survey carried out to get the *a priori* knowledge of consumers, showed that only 42% of the participants had a clear knowledge about the real meaning of the PI certification. Thus, the information provided on this type of certification about the use of pesticides was essential to justify the relevance of the consumers' demand for a partial reduction in pesticides' use. On the other hand, the information provided about the organic certification was already known by 91% of the surveyed population. In this case the information provided between the second and the third situations means mostly a bigger focus of the consumers' knowledge on this fruit's characteristic. One can verify that this focus generated a positive and significant re-evaluation of the WTP for this kind of certification. In the case of the organic apple, the increase of its value compared to the CON apple is greatly due to this production mode (and not because of some certification stratagem of the evaluated product). The same can't be said for the PI certification.

The second important result that should be highlighted concerns the CON apple. This apple is depreciated when moving from situation 2 to situation 3 (especially in France, where the average decrease of the WTP was about 0,12€). This effect was already shown by Rozan *et al.* (2004) and Combris *et al.* (2010) works. Within an evaluation framework of different certifications of foodstuffs, this kind of result can be interpreted as a change in the consumers' references related to their acceptance of a certain way of production. The "non-positive" information regarding certain types of food generates a negative effect in the WTP. This negative effect may become even more significant than the positive effect provided by the information on pesticides' reduction on the certificated products. This decrease in the WTP between situation 2 and 3 is, after all, significant for the French experiment, with an average decline of 0,1€(see also Fox *et al.*, 2002, in a different context about food safety)

Shortly, the effect of information on the pesticides' reduction may have: i) a significant positive effect when dealing with a total reduction of pesticides as in organic farming; ii) a potentially important negative effect for those apples resulting from a conventional production mode, in which doesn't occur a pesticide reduction.

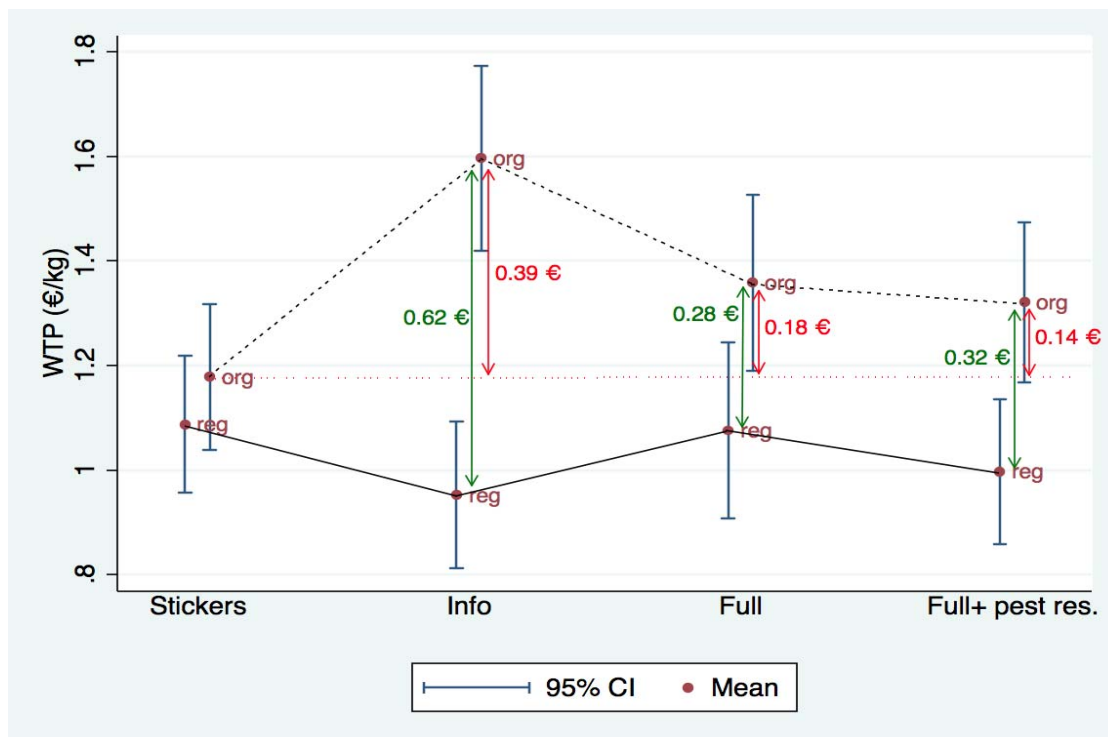
The interpretation of this last result is connected to the change in the consumers' referential after they get the information. This referential is very important in order to evaluate the context in which the WTP gain shape and also the different market segments capable of being won by the different certifications. The sensorial evaluation of the product is also a part of this context, since it is so difficult to adopt, in a credible way, a *ceteris paribus* evaluation strayed from such an essential parameter as is the organoleptic characteristic of food⁶. The situations 1 and 4, in which the apples were actually tasted by the participants, allowed illustrating this phenomenon. In Portugal, situation 1 highlighted that the BIO apple is not so highly evaluated at the sensorial level (around 10,8% lower than the CON apple). This result surely explains why the difference in the WTP between the BIO and CON apples is not higher than 34,4%, in situation 4, where the consumers have all the information; and yet that difference was 96,4% in situation 3. In France, in situation 1, it is the PI apple that distinguishes itself (in a positive way) when compared to the other apples (+ 40,4% compared to the CON apple). One realizes that, in situation 4, this apple's evaluation is higher than that of all the other apples, reaching

⁶ About this issue, see also the Combris *et al.* (2010) discussion.

+87,6% when compared to the CON apple (this one is under evaluated at the sensorial level) and surpassing significantly the BIO apple by 8,5%. Thus, the limelight position given to the BIO apple in situation 3, is threatened by the simple effect of the taste characteristic.

It is so easy to follow the trajectory of the average WTP for organic apple, according to the information available to consumers. Figure 3 below uses the example of the results obtained in Greece (the same type of exercise can be performed with similar results in other countries). The largest gap between organic apple and the conventional one is 0.62 € It is obtained in the phase of complete information on pesticide reduction (without information on the taste of apples), which shows the real expectation of consumers for this type of certification.

Figure 3 : Trajectory of WT for organic apple in Greece



4. Policy Recommendations

The results found in both experimental markets show that there is a consumers' willingness to pay for products obtained under pesticide reduction conditions. One may verify that the information provided to the consumers about the pesticide use in food production increases their willingness to pay for the organic products. But the same situation is not valid for the integrated protection products. The most important result shows that providing information leads to a decrease in the WTP for the conventional product. This result could be observed in the two countries: i) in Portugal, the average WTP for the integrated protection apple and for the organic apple are, respectively, 53,6% and 96,4% higher than the average WTP of the conventional apple; ii) in France, the average WTP for the integrated protection apple and for the organic apple are, respectively, 43,6% e 72,5% higher than the average WTP of the conventional apple. It is also important to mention that for the processed product (apple juice), the increases in the average WTP are not so high as those found for the fresh products.

The interpretation of the results according to the differentials observed in the WTP for the conventional product may predict a loss of its market share when compared to the other kinds of products.

The detailed knowledge of the consumers' willingness to pay for a reduction in the several risks connected to the pesticides' use is essential for both the definition and the successful implementation of environmental policies.

The most important result for policy recommendations is that pricing for organic products is much too high to allow real environmental effectiveness, it is paradoxical to see that consumers show a real interest in this type of food (today, organic products are no longer the preserve of a class of sporadic purchasers) and that on the other hand, the prices practiced are out of proportion to the WTP of consumers, even though this is high. Consequently, it might be really necessary to subsidize organic farming.

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