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Abstract
The paper aims to illustrate the factors that can influence the choices of European and Chinese consumers of products obtained with a lower use of pesticides (IPM methods). The results, obtained from a survey, allow identifying the most aware categories, those still far from a complete knowledge of IPM methods and their potential. They can also suggest useful policies to achieve a more sustainable consumption behavior.

Keywords
Food consumption, Regional Consumer Behavior, sustainable development, IPM products, EU, China

JEL Codes
Q18, R2, O3, Q57

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1. Introduction

In the last decades there has been a rapid global economic and demographic growth which has implied an enormous increase in food consumption. According to a FAO projection, population will reach 9 billion people in 2050, and this upward trend will not stop in the next future. Such an increase is not environmentally sustainable, with respect to current consumption patterns (Chan and Chai, 2010). Even though there has been a raise in productivity, this only helps to limit environmental degradation, however it does not stop it (Mont and Plepys, 2008). Consumers' behaviors are fundamental to move toward a more sustainable consumption pattern, hence the need to analyze and understand them (Shamshi and Siddiqui, 2017). The increase in food consumption has serious consequences on the environment and requires a more convinced approach to sustainable development and, in this, a responsible behavior of consumers plays a vital role. Misra *et al*. (1991) showed how people were already interested in organic products since the '90s. This attitude is still strong, and people are more and more aware of the importance of environmental issues (Boztepe, 2012). However, even though a more aware consumption is growing, that is still marginal with respect to the total consumption, as shown by different empirical researches (Ankeny, 2012; Bray *et al*, 2010; Viorel *et al*., 2017). Most of consumers are willing to buy green products, but only a niche actually does it (Hughner *et al*., 2007). A research developed by Yin *et al*. (2010) showed how consumers consider important a lower use of pesticides in their purchasing. Many studies have been developed on this circumstance: the most common explanation is related to the attitude-behavior (or value-action) gap (Tsakiridou *et al*. 2008; Young *et al*., 2010; Joshi and Rahman, 2015). It occurs when people behavior is not correlated with their attitudes: especially it concerns the gap between the high value people give to environmental issues and the low level of actions taken to face them. Other possible explanations are related to the fact that people are willing to buy healthier and environmental-friendly food only if its price is not (or just a little bit) higher than its equivalent for traditional food (Wandel and Bugge, 1996; Yin *et al*., 2010) or to the use of familiar or well-known brands (Schuitema and De Groot, 2015). According to McCarthy (2015), in China it is not still convenient to buy green products.

Starting from these premises, this paper aims at investigating the consumers' attitude and behavior toward food produced by using IPM measures and organic food. A survey is at the basis of the investigation. This study is part of EUCLID project - *Europe China Leverage for IPM Demonstrations*, funded by the EU Commission under Horizon 2020 Programme. EUCLID aims at developing Integrated Pest Management (IPM) measures in Europe and China to promote food safety and security, by reducing the negative effects of chemical pesticides on human health and the environment, to reduce economic losses in agriculture due to pests, and to provide scientific support

to EU and China policies. In order to understand which policies are needed to further promote IPM, EUCLID project is studying the behaviors and attitudes of the different actors included in the agro-food system, e.g. farmers, retailers, consumers. In Section 2 the background is illustrated, in the Section 3 data and methodology are presented; results are discussed in Section 4. The last section is dedicated to the exposition of the main findings.

2. Background

The idea of Integrated Pest Management (IPM) was introduced into national policies for the first time in 1972 in the US, even if the idea behind it was developed some years before[1]. The first idea of a form of integrated control was already defined by Stern *et al*. in 1959.

IPM is a methodology able to combine different protection practices to manage the use of pesticides to reduce environmental and health risks (Chandler *et al*., 2011). However, there is not a unique definition of IPM, as presented by Bajwa and Kogan (2002) in their work collecting all the definitions used in literature: more than 60 definitions were found. The most currently used definition of IPM is given by FAO as "the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment" (FAO - WHO, 2014, p.4). It is necessary to introduce the European and Chinese legal frameworks to better understand the whole dynamic in the consumption of green products.

During the late '90s Europe faced food scandals: as a consequence, regulations have been implemented in the following years to solve the issue (Chen *et al.,* 2015) and general principles concerning the food safety has been established.

Since 1970s, European environmental policy has been implemented to reach a healthier and safer environment. In the European framework, a legislation related to the use of pesticides was first introduced in 1979 and reinforced in 1992 (EC, 2007).

In 2002, it was established the European Food Safety Authority (EFSA) whose mission is related to supervise risks associated with the food chain, and in the same year the General Food Law was promulgated to guarantee high standards for the protection of human life.

A milestone in the use of pesticides in the European framework is the Regulation (EC) 369/2005 concerning the maximum residue level of pesticides to which consumers are exposed at the end of the food chain. The following year, the EC adopted a thematic strategy related to pesticides and their sustainable use.

[1] The concept was defined during an event held in Rome sponsored by the FAO in 1965.

The Directive 2009/128/EC is an essential step concerning IPM: it encourages their introduction, the development and improvement of other techniques to reduce the dependence on pesticides. Moreover, starting from 2014, it obliges producers to implement the principles of IPM. In the same year the European Pesticide Regulation (EC) 1107/2009 was enacted: it refers to the use of less harmful pesticides such as biopesticides instead of synthetic ones (Villaverde *et al*., 2014).
In 2018 a Committee regarding the evaluation of the implementation of Regulation (EC) 1107/2009 highlighted how the targets are however still far to be reached.

China has not a unique legal framework related to food safety and the use of pesticides. According to Wang (2010) and Zolin *et al*. (2017), provinces are the organisms aimed at implementing the legal regulations. However, provinces must follow central directives and laws.
An improvement in the regulatory system, as well as for Europe, was required due to the high number of scandals and food safety incidents (Cui and Shoemaker, 2018; Chen, 2015). Chinese products must reach Western standards to be commercialized.
In 1965, the first regulation related to the food hygiene was promulgated (Yongmin, 2004). A trial implementation concerning the Food Hygiene Law was enacted in 1983: it was enacted with the aim of regulating the standards for food contents, containers and additives. Subsequently, the law was updated in 1995 (Jia, 2013).
Nowadays, China is the world's leading user of pesticides (Li, 2014). On the one hand, pesticides help producers to avoid food damaging; on the other, the use of pesticides has an environmental impact. To balance these two opposite forces, two Ordinances were approved in 1982. The regulation related to the use of pesticides in China is more recent: it was introduced in 1997 and amended in 2001 to meet the WTO requirements (Zolin *et al*., 2017).
In 2006, the law of the People's Republic of China on Agricultural Product Quality Safety was enacted. The main goal is marked in the first article: "The present Law is formulated for the purpose of guaranteeing the quality safety of agricultural products, maintaining the health of the general public […]".
In 2009, the Food Safety Law was enacted and revised in 2015. It includes an article (nr. 26), that state the "limits on such pollutants as invasive organisms, pesticide residues, veterinary drug residues, biotoxins and heavy metals, and other materials endangering human health contained in food, food additives, and Food-Related-Products". Moreover, enterprises are encouraged to strengthen these standards (USDA, 2015).
Nowadays, IPM is a widespread concept, with various implementation around the world. To sum up, since 2014, following the Directive 2009/128/EC, EU has obliged plant growers to apply IPM principles (Stenberg, 2017). According to Wang *et al*. (2003), IPM in China has faced three

different phases since 1950s: in the last phase, from 1983, IPM is a state research program funded by the central Government. However, IPM measures are still adopted by a marginal part of Chinese farmers as they are in all other developing countries (Parsa *et al*. 2014; Pretty and Bhuracha, 2015).

EU and China also present some voluntary certifications.

In the European framework it can be sold and labeled as organic only that food grown according to the principles outlined in the regulation 834/2007/EC. Moreover, there are many other voluntary certifications at a country level issued by governments or private associations (Janssen and Hamm, 2012).

In China it is possible to find Green Food and Organic Food labels, managed by the Ministry of agriculture.

Moreover, China identifies a mandatory certification since 2006: the "Pollution-free food" certification (Berti, 2015).

The Green Food certification was introduced in 1989, and put into action the following year; it can be considered as a middle-way between the traditional food and the organic one (Berti, 2015; Sadiku *et al*., 2018). The certification has a triennial valence (Bekele *et al*., 2017). According to Giovannucci (2005), it is one of the most successful eco-labeling certifications of the world.

The Green Food system requires specific standards, related to, among others, the environmental and product quality, and the high level of hygiene (IISD, 1996). Criteria to be met to be classified as Green Food are the following: highest grade of air quality standards, heavy metals restricted, standards for processing and chemicals applications restricted and regulated (Giovannucci, 2005). To sum up, the Green Food label refers to safe and ecologically grown foods (McCarthy, 2015).

There are 2 different types of standards: "single A grade" since the beginning and "Double A grade" since 1995. The second standard is stricter than the first one and it presents similar characteristics to the organic certification (Berti, 2015). However, as shown by Paull in 2008, less than 10% of cultivated hectares are certified as Green Food: it is necessary to create different marketing channels in order to expand the consumption of Green Food (Zhu *et al*., 2013) or to develop different channels to increase environmental concerns of consumers (McCarthy, 2015).

Chinese organic farming started in the same year as Green Food. The main characteristics concern the lack of using traditional pesticides, GMOs and chemical pesticides (Zolin *et al.*, 2017).

3. Data and Methodology

The data on consumers' behavior on food purchase has been collected through a survey that gathered 660 questionnaires, mainly from Italy, Spain, France and China in 2016-2017[2]. In particular, the questionnaire aimed at collecting information on consumers' habits and their disposition to fruits, vegetables and cereals grown using IPM methods. It consists of three sections: 1. General information; 2. Eating and grocery shopping habits; 3. Perception and orientation for food grown according to IPM methods, for a total of 37 questions.

Data processing and analysis, aimed at discovering whether there are patterns of consumers' behavior and, in particular, on their willingness to pay, in relation to IPM, has included both descriptive statistics (e.g. frequency, distributions) and regression models estimated through the Ordinary Least Square (OLS) method.

The regression models allowed to verify the relationship between the perceived familiarity with IPM and the willingness to pay a higher price for IPM products and *vice versa*, as well as the relationship between the purchase of IPM products (in the six months before the survey) and the sensitivity to the environmental certification and the willingness to pay a higher price for IPM products.

We have carried out four empirical specifications of the regression equation:

Specification 1 - individual characteristics: dummy of gender (*d_gender*), dummies for the age group (*d_age_1* for interviewees from 18 to 30 years old, *d_age_2* for interviewees from 31 to 50 years old and *d_age_3* for interviewees from 51 years old), dummies for country of residence (*d_rChina*, *d_rFrance*, *d_rItaly* and *d_rSpain*), dummy for the high education (*d_high_education*) and a dummy for the household size (*d_family_high*);

Specification 2 - income characteristics: dummy indicating whether the interviewee's household class of income is below the average household income of his country of residence (*income_low*[3]) and a dummy stating whether the interviewee believes that the income of their family influences the quality of the fruits and vegetables products purchased (*incomeinfluence_16*);

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[2] All Euclid partners contributed to the survey dissemination, in particular the collaboration by the University of Lleida, ACTA, Agroinnova and INRA was fundamental to reach a high number of responses in the different countries.

[3] Questionnaires only gathered data on classes of household income and classes of household size. Since different countries have different standards of living, the same class of income reflects different purchasing power according to the country in which the income is received. Therefore, the income classes are not comparable among interviewees resident in different countries. We tied to overcome this issue by developing a new variable indicating whether the classes of household income of the interviewee is above, below or on average with respect to the average household income of the country of residence (according to the different household size).

Specification 3 - employment characteristics: dummies for the employment status (*d_employees, d_enterpreneur_freelance, d_student*);

Specification 4 – shopping habits: dummies for where the interviewee is used to purchase food (*13_mass_distribution* for supermarkets and discounts or purchases online, *d13_retail_distribution* for greengrocers, markets or open-air markets and *d13_ethical_producer* if he/she usually buys directly from the producer or the farmer or indirectly through ethical purchasing groups), a variable indicating whether the interviewee has a prevalent horticultural diet[4] (*horticultural_diet_11),* dummy for whether the interviewee is responsible for the food choices of his/her family *(d_food_choice)* and a dummy indicating whether the interviewee considers the price as a discriminating factor in the food purchasing choice *(d14_price)*.

Then, descriptive statistics have been used to identify possible different patterns of behaviour between the European and the Chinese respondents.

3.1 The sample

The sample of the respondents to the survey consists of a total of 657 interviewees, of which, approximately the 60% (394 people) are female, while the remaining 40% (263 people) are male. Almost half interviewees (42.5%) are concentrated in the younger age group (18-30 years old), about the 36.7% in the middle age group (31-50 years old) and only a scarce 21% in the older one (more than 50 years old).

Most of the respondents are either employee (54%) or student (31%). The remaining 15% is represented by self-employed (6%), retired (3%), unemployed (1%), homemaker (0.5%) and other. There is almost an equal distribution between high educated (45.5%) and low educated people[5] (54.5%). Focusing on household composition, more than half interviewees (56%) live in families with 3 or 4 components, almost the 17% live alone and almost the 19% with another person, while numerous families (with 5 or more components) represent only the 9% of the sample.

There are three European countries which capture the nationality of more than the 75% of the respondents: France (28%) Spain (26%), and Italy (25%). All the other countries, but China (13%), have been summarized into two categories: “Other EU” (5%) and “Other non-EU” (4%). We have applied the same criteria for the country of residence.

Considering the household income, a distinction between Chinese interviewees and all the others is required. People who live in China, in fact, are strongly concentrated into the category 3,001-5,000

[4] Equal to 1 if the diet is poor of fruit and vegetables (<20%), 2 it is equilibrate (20-50%), 3 if it is prevalent (>50%).

[5] People who have completed, at least, an academic study are considered as high-educated.

Yuan (74%), corresponding to about 375-625 euro (not comparable with European standards). Only the 4.5% of the Chinese sample has declared of having a household income below that class, while the remaining 21.5% above (in particular, almost the 13% has stated a household income between 10,000 and 20,000 Yuan, 1,250-2,500 euro). On the contrary, people of other countries are distributed among all the household income classes defined in the survey, even if prevalently concentrated in the higher classes 1,500-2,000 euro (20.3%), 2,000-3,000 euro (26%) and 3,000-5,000 euro (30%). However, if we look at the variable stating whether the household income of the interviewee is above or below the average of his/her country of residence, the 62% of people resident in Italy have a household income below the national average, against the 44% people resident in France and the 39% of people resident in Spain[6]. These values are high also because the sample includes a large number of students (especially for Italy).

For what concerns the percentage of respondents responsible for their family food purchase, the great majority of the sample (93%) has stated of being at least "sometimes" in charge. There are strong differences on the number of male and female who are "always" and "sometimes" responsible for food choices. The 57.5% of women are in fact always in charge of the food choice against the 33.3% of men.

The main variables related to interviewees' personal information divided by gender are summarized in Table 3.1. What emerges is that marked differences are related to the age and the household income, while slighter discrepancies are detected for the country of residence and the education (e.g. the 48% of the women of the sample have a higher education with respect to men, 42%).

Almost the totality of respondents (93%) are used to purchase food at supermarkets and/or discounts. The percentage falls to 66% when considering instead the retail distribution (e.g. greengrocer, markets...) and further decreases (32%) when looking at those who are used to buy food directly from the producer or the farmer or through ethical purchasing groups.

The last analysis has been run between the European and the Chinese group. The EU sample consists prevalently of women (62.5%) while the Chinese of men (55.1%). Almost the 45% of the Europeans are 18-30 years old against the 27% of the Chinese, while almost the 60% of the Europeans have a high education level against 36% of Chinese.

[6] Data have been collected through the following sources: EUROSTAT (2017) for France, Italy, Spain, Belgium, Germany, Portugal, Switzerland, UK and the Netherlands, Australian Bureau of Statistics (2016), Statistique Canada (2017), National Bureau of Statistics of China (2017), Central Bureau of Statistics (2016) for Israel, US Census Bureau (2016), OECD (2017) for South Korea and CIA (2017) for Mexico.

Table 3.1 Individual characteristics of the interviewees of the sample

		Total		Male		Female	
Age	18-30	280	42.6%	89	34.0%	191	48.5%
	31-50	241	36.7%	101	38.5%	139	35.3%
	>50	136	20.7%	72	27.5%	64	16.2%
Residence	France	181	27.6%	53	20.2%	128	32.6%
	Spain	180	27.4%	81	30.8%	99	25.2%
	Italy	178	27.1%	67	25.5%	111	28.2%
	China	79	11.9%	44	16.3%	35	8.9%
	Other EU	28	4.1%	12	4.6%	16	4.1%
	Other non EU	11	1.5%	7	2.7%	4	1.0%
Education	Low	357	54.5%	151	57.6%	206	52.4%
	High	298	45.5%	111	42.4%	187	47.6%
Income	Low	271	42.5%	88	34.5%	183	47.8%
	High	367	57.5%	167	65.5%	200	52.2%
Occupation	Employee	356	54.5%	136	52.3%	220	56%
	Student	201	30.8%	75	28.9%	126	32.0%
	Self Employed	38	5.8%	24	9.2%	14	3.6%
	Other	58	8.9%	25	9.6%	33	8.4%
Food choice	Always	306	46.9%	80	33.3%	226	57.5%
	Sometimes	304	46.5%	135	56.3%	149	37.9%
	Never	43	6.6%	25	10.4%	18	4.6%

Source: authors' elaboration on questionnaires' data

On the other hand, the 48% of the Europeans respondents have a household income which is lower than the average household income (according to the household size) of the country of residence. This value is significantly lower if considering the Chinese sample (5.4%). This is mainly due to the high-income discrepancies manifested in China.

The majority of both the European and the Chinese samples consists of employee (respectively the 52.4% and the 75.3%) followed by student (respectively the 32.5% and the 13%).

There are relevant differences on the number of Europeans and Chinese who are “always” and “sometimes” responsible for the food choice of their families. The 48.7% of Europeans are in fact always in charge of the food choice with respect to the 32.1% Chinese.
More than 95% European respondents older than 30 are used to take decisions about food. The same behavior belongs to Chinese people from 31 to 50 years old. There is a high percentage of older (14.3%) and younger (28.6%) Chinese respondents who never decide. For what concerns the younger Europeans, around 10% of them are not used to determine purchasing.

Moreover, there is a big difference in the purchasing behavior between Europeans and Chinese. Only a small number (6.4%) of Chinese interviewees with respect to the Europeans (36.2%) are used to purchase food directly from the producers or ethical purchasing groups.

4. Results

With the aim to verify consumers’ attitude towards IPM, in the next sections the results obtained through the analysis of data gathered through the questionnaires are reported. The first two (4.1 and 4.2) take into account the overall sample, while the third (4.3) shows a comparison between the European and the Chinese respondents in the pattern of behavior related to IPM products.

4.1 Descriptive analysis on consumers’ behavior on food choice

The first part of Table 4.1.1 (IPM familiarity) shows the number and the percentage of the interviewees of the overall sample, and divided by gender, that have stated of being familiar with IPM methods. The second part of table (IPM actual knowledge) shows instead the number and the percentage of the interviewees who have previously declared of being familiar with IPM, who actually knows what IPM is, who does not. A control question was in fact present in the questionnaire.

Table 4.1.1 IPM familiarity and knowledge by gender

IPM familiarity							IPM actual knowledge						
	Total		Male		Female		Knowledge	Total		Male		Female	
Yes	373	56.8%	160	61%	213	54%	**Yes, and correct**	195	52.5%	95	59%	100	47%
No	284	43.2%	103	39%	181	46%	**Yes, but incorrect**	178	25.7%	65	41%	113	53%

Source: authors' elaboration on questionnaires' data

Almost the 57% of the sample (consisting of the 61% of the female and the 54% of the male) thought of knowing IPM. However, if looking at the actual knowledge, what emerges is that only the 52% of them actually knows what IPM means. Specifically, the 59% of men have given the right answer against only the 47% of women. Therefore, a lack of awareness is what arises.

Looking at the percentages of respondents[7] who have previously stated of being familiar with IPM methods who are willing to pay a higher price for IPM fruits and vegetables and cereal and derived products (divided in three different categories, 1%-20% more, 21%-50% more and more than 50%) as well as those who are instead not willing to pay more for IPM products (0% category), Table 3.1.2 provides significant insights. On average, almost the 60% of the sample is willing to pay a 1%-20% higher price for fruits and vegetables while about the 50% for cereal. However, there is a substantial difference considering the type of product when looking at those who are not willing to pay more (39% for cereals while 22% for fruits and vegetables) as well as if looking at those who are willing to pay more than 20% (10% for cereals while 19% for fruits and vegetables). There are no significant differences between genders.

An important factor to underline is that the percentages of respondents willing to pay a higher price for organic fruits and vegetables and organic cereal and derived products are very close to IPM's.

[7] This question should have been asked only to those who have previously stated of being familiar with IPM methods, but almost the total sample has answered.

Table 4.1.2 Willingness to pay a higher price for IPM products

	Willingness to pay a higher price	Total	
Fruit and vegetables	0%	124	21.8%
	1%-20%	326	57.4%
	21%-50%	88	15.5%
	more than 50%	30	5.3%
Cereals	0%	224	38.9%
	1%-20%	293	50.9%
	21%-50%	46	8.0%
	more than 50%	13	2.2%

Source: authors' elaboration on questionnaires' data

However, the percentage of those who are not willing to pay more for organic products is slightly lower than those for IPM products, while the percentage of those who are willing to pay a 21%-50% higher price for organic products is higher than those for IPM products.

This clearly emerges in the following Table 3.1.3 where a comparison in the willingness to pay for IPM and organic products is reported.

Table 4.1.3 Willingness to pay a higher price: comparison Organic vs. IPM products

Cereals	**IPM**				
		0%	**1%-20%**	**21%-50%**	**>50%**
Organic	**0%**	154	37	1	0
	1%-20%	59	218	11	1
	21%-50%	7	39	26	5
	>50%	2	1	5	7
F. & V.	**IPM**				
		0%	**1%-20%**	**21%-50%**	**>50%**
Organic	**0%**	69	32	3	0
	1%-20%	40	320	22	2
	21%-50%	10	55	55	8
	>50%	3	2	8	20

Source: authors' elaboration on questionnaires' data

In green are highlighted those respondents who are willing to pay more for IPM products than organic, in red those willing to pay more for organic products, while in black those willing to pay for IPM and organic products in the same way. The trend, common for cereals and fruits and vegetables, shows that the majority of respondents who are willing to spend more for food buy IPM as well as organic products, however if they have to choose between them, the choice falls on organic products.

Another interesting comparison between IPM and organic products is related to the percentage of respondents who have declared of having (or having not) purchased IPM and/or organic products in the last six months (Table 4.1.4).

Table 4.1.4 IPM and organic purchase in the last six months by gender

	Purchased	Total		Male		Female	
Organic	Yes	470	71.5%	174	66.2%	296	75.1%
	No	187	28.5%	89	33.8%	98	24.9%
IPM	Yes	132	25.9%	65	32.3%	67	21.7%
	No	377	74.1%	136	67.7%	241	78.3%

Source: authors' elaboration on questionnaires' data

According to the data, less than 30% of respondents have bought IPM products in the previous six months. Men are more likely (32.3%) than women (21.7%). However, if considering only those who have stated of being familiar with IPM, the 35% of interviewees have declared of having bought IPM products (40.6% of the familiar men and 31.5% familiar women). The contrary happens if considering organic products where the 72% of respondents have bought organic products (75% of the women against the 66% of men).

According to the data on the purchase of IPM and organic products in the last six months, more than a half of respondents (52.8%) prefer organic products to IPM, those who have preferred IPM products to organic are only the 3.1%.

Among those respondents who have stated of having bought IPM products, the main reasons that have influenced the purchase decision are the greater perceived safety of those products (79.5%), followed by ethical reasons (47%), higher quality (28%) and the lower environmental impact (27.9%). Among those respondents who have stated of having not bought IPM products, the reasons are instead the lack of knowledge about IPM, which results to be the main reason for their not purchasing (56.8%), followed by the belief that conventional products are good as well (23.2%) and the fact that they are too expensive (10.3%) (Table 4.1.5).

Table 4.1.5 Reasons to buy (or not to buy) IPM products

		Purchased IPM	
		Yes	No
Causes	Healthier products	79.5%	
	Ethical reasons	47%	
	Higher quality	28%	
	Low environmental impact	27.3%	
	They were in offer	7.6%	
	Not interested to buy	0.8%	
	Other	12.1%	
	Products unknown		56.8%
	Conventional products are good too		25.9%
	Too expensive		10.3%
	No offers		1.4%
	Not trust in the certification		0.3%
	Not interested		0.3%
	Other		5%

Source: authors' elaboration on questionnaires' data

For what concerns organic products, there is not a predominant reason on why respondents did not purchase them. In general, people consider them too expensive (29.1%) and believe that conventional products are good too (24.1%).

One of the main results is that consumers buy IPM and organic products because they consider them healthier than conventional products.

In our sample, the great majority (84.4%) either considers IPM products totally or partially safe, no significant differences in the answers between males and females are highlighted. The same happens considering organic products: the great majority (87.7%) either considers totally or partially safe (Table 4.1.6).

Respondents who do not consider IPM products safe believe that there is still the possibility of using pesticides (54.6%).

Table 4.1.6 IPM and organic safety perception

	Safety	Total			Safety	Total	
IPM	Yes	144	40.1%	Organic	Yes	226	42.7%
	Partly yes	160	44.6%		Partly yes	238	45%
	No	12	3.3%		No	16	3%
	Don't know	43	12.0%		Don't know	49	9.3%

Source: authors' elaboration on questionnaires' data

Considering organic products, more than a third of the interviewees do not consider them totally safe. The main reason concerns the presence of chemicals (copper, cyanide, etc.). Around 20% of respondents do not trust the certification because of lack of controls.

To conclude, the last analysis concerns respondents who have declared of taking into consideration the environmental certification when purchasing food. What emerges is that only few people consider the environment during their purchases (about the 25% of the sample).
Therefore, what matters for consumers in the purchase of IPM products is their safety perception, the environmental certification comes after.

4.2 Regression analysis

The results of the regression of the IPM familiarity dummy on the dummy variables indicating whether the interviewee is willing to pay a higher price for IPM cereals and for fruits, vegetables, and the vector of controls described are reported in Table 4.2.1[8].

Table 4.2.1. Regressions of IPM familiarity on willingness to pay (Annex 1)

Variables	**(1)** **IPM_familiar_17**	**(2)** **IPM_familiar_17**	**(3)** **IPM_familiar_17**	**(4)** **IPM_familiar_17**
d_cereal_hp_1	0.0974**	0.0899*	0.0937*	0.0875*
	(0.0475)	(0.0480)	(0.0481)	(0.0479)
d_fruit_hp_1	0.115**	0.118**	0.0974*	0.0772
	(0.0573)	(0.0581)	(0.0590)	(0.0590)
Observations	557	546	542	539
R-squared	0.240	0.245	0.254	0.279

Source: authors' elaboration on questionnaires' data

What emerges is the existence of a correlation between the willingness to pay a higher price for IPM cereals and the knowledge of such products. In the four specifications, in fact, the coefficient of the IPM cereal dummy is positive and statistically significant at 0.1 level. In fact, people willing to spend more have a higher probability (+8.8%) to consider themselves more informed about IPM

[8] The regression of the dummy *d_actually_familiar* stating whether the interviewee is actually familiar with IPM shows the lack of correlation between the willingness to pay a higher price for IPM products and the actual knowledge of IPM. This variable is able to capture the real (and not perceived) knowledge of respondents on the IPM method.

methods. Conversely, the IPM fruit and vegetables dummy is not statistically significant but only in the fourth specification.

More in detail, men are 7.6% more likely to consider themselves familiar with IPM methods.

In addition, young people present a negative correlation with the perceived familiarity with these products, this could be due to the fact that young people are in most cases not in charged with the food purchase of their family (only the 34% of the sample under 30 years old is in fact responsible for the food choice).

In addition, a positive correlation between IPM familiarity and high education level has been detected: in particular, high-educated people have a higher probability (+39%) to think knowing IPM method.

All the three dummy variables related to the employability are significant and positive as well as the one concerning the horticultural diet.

The last significant regressor is the one related to the frequency with which the respondent is responsible for the food choices of his/her family for which there is a positive relation.

The lack of significance of the income variables implies that there is no correlation between the household economic conditions and the perceived knowledge of IPM.

Table 4.2.2 shows the results of the regressions of the dummy indicating whether the interviewee is willing to pay a higher price (of at least 1%) for cereals and derived products and for fruits and vegetables grown through IPM methods on the IPM familiarity dummy in the four different specifications.

Table 4.2.2 Regressions of willingness to pay for IPM cereals and fruit and vegetables on IPM familiarity (Annex 2 and 3)

Variables	(1) d_cereal_hp_1	(2) d_cereal_hp_1	(3) d_cereal_hp_1	(4) d_cereal_hp_1
IPM_familiar_17	0.181***	0.176***	0.167***	0.141***
	(0.0461)	(0.0470)	(0.0475)	(0.0482)
Observations	564	553	549	546
R-squared	0.067	0.065	0.071	0.102
Variables	**(1) d_fruit_hp_1**	**(2) d_fruit_hp_1**	**(3) d_fruit_hp_1**	**(4) d_fruit_hp_1**
IPM_familiar_17	0.158***	0.156***	0.138***	0.115***
	(0.0386)	(0.0392)	(0.0391)	(0.0397)
Observations	558	547	543	540
R-squared	0.111	0.117	0.145	0.168

Source: authors' elaboration on questionnaires' data

The first results confirm the existence of a positive correlation between the perceived knowledge of the IPM method and the higher willingness to pay of consumers for cereal and derived products. In fact, in all specifications, the coefficient of the variable *IPM_familiar_17* is positive and statistically significant at 0.01 level. Specifically, those consumers who have stated a familiarity with the IPM methods are more likely to pay a higher price for IPM cereal and derived products (+14.1%) when taking into account all controls.

The positive correlation however disappears when including in the model the dummy reporting the actual (and not perceived) knowledge of IPM.

For those consumers who usually purchase food directly from the producer/farmer or through ethical purchasing groups, a higher willingness to pay for IPM products (+7.7%) is associated. This result is in line with the expectations since such consumers should be those moved by a more aware food purchasing choice. Consistent with the expectations is also the result of the variable *horticultural_diet_11*, in fact, those with a prevalent horticultural diet are more likely to be willing to spend more for IPM cereals and derived products (+8.8%). While those who consider the price a discriminating factor in the food purchasing choice are less likely to spend an extra price for IPM cereals and derived (-9.8%).

Unexpectedly both income variables are still not statistically significant. Therefore, it seems that the

higher willingness to pay for IPM cereal is not associated, on the one hand, with having a low income (below the national average), on the other hand, with consumer's perception on whether his/her income influences his/her purchasing choice. Another unexpected result is the non-statistical significance of the dummy variable for the high education; in fact, more educated people should be more aware of the environmental benefits of purchasing IPM products, and, therefore, should be more willing to pay a higher price for them.

The results of the second regressions also confirm the existence of a positive correlation between the statement to know about IPM method and the consumers' higher willingness to pay for what concerns fruit and vegetables. Those consumers who have stated a familiarity with IPM are more likely to pay a higher price for IPM fruits and vegetables (+11.5%). As before, the positive correlation however disappears (with the exception of the first specification) when including in the model the dummy variable reporting the actual knowledge of the IPM methods.

As before, consistently with the expectations those with a prevalent horticultural diet are more likely to spend more for IPM fruits and vegetables (+7.2%).

Differently from before the results of all occupation status dummies are all positive and statistically significant. This means that employees (+15.5%), self-employed (+18.7%) and students (+31.1%) are more likely to spend more to buy IPM fruits and vegetables.

Another important difference concerns the variable *income_low,* in this case, consistently with the expectations, its coefficient is negative and statistically significant. Therefore, those belonging to a family with an income lower respect to the national average are less willing to spend an extra price for IPM fruits and vegetables (-6.8%).

On the other hand, variables that in the previous model were significant such as *d13_ethical_producer* and *d14_price* are now not significant.

Table 4.2.3 Regressions of IPM purchase in the last six months on willingness to pay for IPM cereals and IPM fruit and vegetables (Annex 4)

Variables	**(1) purchased_IPM_6months**	**(2) purchased_IPM_6months**	**(3) purchased_IPM_6months**	**(4) purchased_IPM_6months**
d_cereal_hp_1	0.128**	0.122**	0.124**	0.108*
	(0.0532)	(0.0539)	(0.0548)	(0.0551)
d_fruit_hp_1	-0.0245	-0.0306	-0.0255	-0.0405
	(0.0699)	(0.0707)	(0.0747)	(0.0748)
Observations	443	433	414	412
R-squared	0.079	0.093	0.100	0.126

Source: authors' elaboration on questionnaires' data

Table (4.2.3) shows the results of the regression of IPM purchasing dummy on the dummy stating whether the interviewee is willing to pay a higher amount (at least 1% more) to buy IPM products (cereals and fruits and vegetables) in the four different specifications.

The results of the regressions show the existence of a correlation between the willingness to pay a higher price to buy IPM cereals and the purchase of IPM products. People willing to spend more have a higher probability (+10.8%) to buy IPM products. In addition, men are 10.6% more likely of purchasing IPM products than women. On the other hand, the dummy for the willingness to pay a higher price to buy IPM fruits and vegetables is not always statistically significant.
In addition, the dummy variable *d_family_high* presents a negative coefficient, therefore, families with a high number of people are less likely to buy IPM products (-14.1%).
What also emerges is that those consumers who usually purchase food ethically are more likely to having bought IPM products (+9.7%). This result is in line with the expectations since such consumers should be moved by a more aware food purchasing choice.
Consistent with the expectations is also that those with a prevalent horticultural diet are more likely to purchase IPM products (+7.4%) and that those who consider income as a determinant factor in their food choice, have a smaller probability to buy IPM products (-3.5%).

The last regressions (Table 4.2.4) take into account the dummy stating whether the interviewee consider the environmental certification a discriminating factor, the dummy on the willingness to pay a higher price (of at least 1%) for IPM products, the IPM purchasing dummy and the vector of controls.

Table 4.2.4 Regressions of environmental sensibility on IPM purchase in the last six months and willingness to pay for IPM cereals and fruits and vegetables

Variables	**(1)** **d14_environment**	**(2)** **d14_environment**	**(3)** **d14_environment**	**(4)** **d14_environment**
purchased_IPM_6months	0.0946*	0.0919*	0.122**	0.0938*
	(0.0490)	(0.0499)	(0.0508)	(0.0507)
d_cereal_hp_1	0.120***	0.132***	0.131***	0.107**
	(0.0463)	(0.0472)	(0.0488)	(0.0486)
d_fruit_hp_20	0.0833	0.0851	0.0794	0.0731
	(0.0535)	(0.0542)	(0.0545)	(0.0542)
Observations	443	433	414	412
R-squared	0.081	0.086	0.107	0.149

Source: authors' elaboration on questionnaires' data

The results show the existence of a correlation between both the willingness to pay a higher price for IPM cereals and the purchase of IPM products with the sensitivity to environmental certification. Therefore, people willing to spend more for IPM cereals (but not IPM fruits) have a higher probability (+9.4%) to be more sensible to the environmental certification; whereas, the probability associated to people who have purchased IPM food is 10.7%.

In line with the expectations, numerous families are less likely to take into consideration the environment when purchasing foods (-9.6%) and those consumers who usually purchase food directly from the producer/farmer or through ethical purchasing group, consider the environment an important factor in their food choices (+19.7% more likely).

The lack of significance of both income variables implies that there is no a relation between the household economic conditions and sensitivity to environmental certification.

4.3 Descriptive analysis on different patterns of behavior on food choice between European and Chinese respondents

In order to carry out a comparison between EU and China on consumers' behavior regarding the purchase of IPM products, a total of 644 respondents (566 European and 78 Chinese) have been taken into account.

A first comparison concerns the perceived and the actual familiarity with IPM products (Table 4.3.1).

Table 4.3.1 IPM familiarity and knowledge, EU and China

IPM familiarity							**IPM actual knowledge**						
	Total		**EU**		**China**		**Knowledge**	**Total**		**EU**		**China**	
Yes	368	57.1%	321	56.7%	47	60.2%	**Yes and correct**	193	52.4%	168	52.3%	25	53.2%
No	276	42.9%	245	43.3%	31	39.8%	**Yes, but incorrect**	175	47.6%	153	47.7%	22	46.8%

Source: authors' elaboration on questionnaires' data

Almost the 57% of the Europeans thought of being familiar with IPM, against the 60.2% of the Chinese. However, if looking at the actual knowledge, only the 52% of Europeans and the 53% of Chinese actually knows what IPM means.

Taking into account only those who have previously stated of being familiar with IPM methods, Table 3.3.2 shows the percentages of respondents who are willing to pay a higher price for IPM fruits and vegetables and IPM cereal and derived products.

There are significant differences between the two areas only for what concerns those who are willing to pay the 21%-50% more (less Chinese in percentage) and those who are instead not

willing to pay more (more Chinese in percentage). Approximately the 60% of the overall respondents are willing to pay a 1%-20% higher price for fruits and vegetables while more than 50% for cereal.

In addition, there are more respondents not willing to pay more for cereals (40.5% of Europeans and 18.9% of Chinese) than for fruits and vegetables (21.8% of Europeans and 6.2% of Chinese).

Table 4.3.2 Willingness to pay a higher price for IPM products, EU and China

	Willingness to pay a higher price	Total		EU		China	
Fruit and vegetables	0%	122	21.8%	119	23.4%	3	6.2%
	1%-20%	319	57.3%	290	57.1%	29	60.4%
	21%-50%	86	15.7%	72	14.2%	14	29.2%
	more than 50%	29	5.2%	27	5.3%	2	4.2%
Cereals	0%	217	38.5%	207	40.5%	10	18.9%
	1%-20%	290	51.4%	261	51.1%	29	54.7%
	21%-50%	44	7.8%	32	6.3%	12	22.6%
	more than 50%	13	2.3%	11	2.1%	2	3.4%

Source: authors' elaboration on questionnaires' data

The percentages related to the willingness to pay for organic products are not so different from those reported in Table 4.3.2; however, for both types of products the percentage of those who are not willing to pay a higher price for organic products is slightly lower than those for IPM products (both for Europeans and Chinese).

Another comparison refers to the percentage of respondents who have declared of having (or not) purchased IPM products and/or organic products in the last six months (in Table 4.3.3).

Table 4.3.3 IPM and organic purchase in the last six months, EU and China

	Purchased	Total		EU		China	
Organic	Yes	463	71.9%	416	73.5%	31	39.7%
	No	181	28.1%	150	26.5%	47	60.3%
IPM	Yes	132	26.3%	121	27.3%	11	19.3%
	No	369	73.7%	323	72.7%	46	80.7%

Source: authors' elaboration on questionnaires' data

Less than 27% of respondents have bought IPM products. Europeans are more likely to buy IPM products (27.3%) with respect to the Chinese (19.3%). The same trend occurs if considering organic products, but the percentage is much higher especially for the Europeans (73.5% against the 40% of Chinese). The majority of European and Chinese respondents familiar with IPM methods buy IPM products both because they consider them healthier (72% of Europeans and 66% of Chinese), for ethical reasons (Europeans are more sensitive to the ethical aspect, 49.2% against of 21.3% of Chinese), and because they are aware that they have a lower impact on the environment (Chinese present a higher percentage, 51.1% against 29.6% of Europeans) (Table 4.3.4).

Table 4.3.4 Reasons to purchase IPM products, EU and China

Reasons to purchase IPM	Total	EU	China
Healthier products	71.7%	72.6%	66.0%
Ethical reasons	45.7%	49.2%	21.3%
Low environmental impact	32.3%	29.6%	51.1%
Higher quality	16.8%	19.3%	0%
They were in offer	7.9%	5.6%	23.4%
Not trusting in certification	9.5%	10.9%	0%
Not interested to buy	5.2%	5.6%	2.1%
No IPM in supermarket	0.2%	0.3%	0%
No OGM	0.2%	0.3%	0%

Source: author's elaboration on questionnaires' data

The main reason for which respondents do not purchase IPM products remains the lack of knowledge and the inability to of recognize these products (44.1%); in particular, 51% of Chinese and 43% of Europeans stated so. The second main reason is related to the lack of offers (around 36% of Europeans and 28% of Chinese). Around 13% of Europeans and 7% of Chinese prefer organic products.

For what concerns organic products, there is not a predominant reason. The two main reasons are the following: people consider them too expensive (30% of Europeans and 25% of Chinese) and believe that conventional products are good too (35% of Europeans and 28% of Chinese).

As it is possible to see from Table 4.3.5, there are significant differences in the answers between European and Chinese respondents also for what concerns the safety perception of IPM and organic products. Around the 40% of Europeans consider IPM products safe against only the 17% of Chinese. Moreover, there is a smaller number of Europeans who think that IPM is not safe (2.9% against 7.5%). The trend related to organic products present a similar behavior.

Principally, respondents do not consider IPM products safe because there is still the possibility of using pesticides (more than a half of the interviewees). Chinese respondents tend to be more afraid about the safety of products with respect to the Europeans; however, they are less afraid about the use of pesticides (8% against 64%).

Table 4.3.5 IPM and organic safety perception, EU and China

				Country			
	Safety	**Total**		**EU**		**China**	
IPM	Yes	142	40.1%	135	43%	7	17.5%
	Partly yes	157	44.4%	128	40.8%	29	72.5%
	No	12	3.4%	9	2.9%	3	7.5%
	Don't know	43	12.1%	42	13.4%	1	2.5%
Organic	Yes	216	41.9%	195	44.1%	21	28.4%
	Partly yes	235	45.5%	189	42.8%	46	62.1%
	No	16	3.1%	13	2.9%	3	4.1%
	Don't know	49	9.5%	45	10.2%	4	5.4%

Source: authors' elaboration on questionnaires' data

Considering organic products, the main problem is related to the fear that they still might contain chemicals (copper, cyanide, etc.). Around the 17% of respondents do not trust the certification because of the lack of controls. There are no significant differences between the two considered areas.

5. Discussion and conclusions

Many different insights have been found through the data analysis of the survey. Most of them are consistent with the mainstream literature; however, some of the results are different from those of other studies.

Gender, age and level of education affect the perceived familiarity with IPM. Highly educated people are more likely to know IPM. Other studies have previously highlighted this attitude (Ma and Qin, 2009; Zhang, 2011). On the contrary, young people are less likely to know the methodology. Lastly, in contrast with the predominant literature, there is a higher number of male who considers themselves familiar with IPM. However, a research conducted by Ma and Qin (2009) has found the same contrasting result. Moreover, people who have a diet based on fruits and vegetables are more likely to be aware of it.

In strong contrast with the prevailing literature, income is not correlated with consumption choices, but a similar result was given by the studies conducted by Smith *et al*. (2009) and McCarthy (2015). However, the size of the household affects the probability to buy IPM products: the larger is the family, the smaller is the probability. Household size can be considered as a proxy for income. The size is a factor often found as significant in many researches such as Zhang and Han (2009).

Another interesting result is given by the fact that people are willing to pay a higher price to buy IPM food; however, the increase must not exceed the 20%.

Moreover, a better knowledge of the methodology generates an increase in the purchase and safety perception is more important than environmental certifications. This could be caused by the high number of food scandals occurred in China and EU in the previous years.

Lastly, it is interesting to note that even if in the EU the Directive 2009/128/EC introduced the requirement to implement IPM principles, that means that all food present in the market should be IPM, none of the respondents mentioned it, highlighting the lack of awareness.

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Appendix

Annex 1

VARIABLES	(1) IPM_familiar_17	(2) IPM_familiar_17	(3) IPM_familiar_17	(4) IPM_familiar_17
d_cereal_hp_1	0,0974**	0,0899*	0,0937*	0,0875*
	(0,0475)	(0,0480)	(0,0481)	(0,0479)
d_fruit_hp_1	0,115**	0,118**	0,0974*	0,0772
	(0,0573)	(0,0581)	(0,0590)	(0,0590)
d_gender	0,0640*	0,0613	0,0542	0,0761*
	(0,0383)	(0,0387)	(0,0392)	(0,0397)
d_age1	-0,203***	-0,198***	-0,254***	-0,239***
	(0,0558)	(0,0574)	(0,0672)	(0,0677)
d_age2	-0,0472	-0,0449	-0,0673	-0,0542
	(0,0514)	(0,0520)	(0,0539)	(0,0538)
d_rChina	0,0455	0,0294	0,0421	0,0675
	(0,101)	(0,104)	(0,105)	(0,106)
d_rFrance	0,0864	0,0792	0,0791	0,0608
	(0,0870)	(0,0897)	(0,0898)	(0,0898)
d_rItaly	0,207**	0,198**	0,164*	0,144
	(0,0908)	(0,0930)	(0,0942)	(0,0938)
d_rSpain	0,0343	0,0108	0,0162	0,0169
	(0,0882)	(0,0902)	(0,0908)	(0,0903)
d_high_education	0,406***	0,393***	0,397***	0,390***
	(0,0496)	(0,0508)	(0,0511)	(0,0508)
d_family_high	-0,00945	-0,0253	-0,0424	-0,0428
	(0,0431)	(0,0445)	(0,0454)	(0,0456)
income_low		-0,0258	-0,0144	-0,00715
		(0,0415)	(0,0422)	(0,0422)
incomeinfluence_16		-0,0192	-0,0200	-0,0171
		(0,0160)	(0,0160)	(0,0160)
d_employee			0,138**	0,140**
			(0,0696)	(0,0695)
d_enterpreneur_freelance			0,168*	0,167*
			(0,0968)	(0,0965)
d_student			0,218**	0,234**
			(0,0922)	(0,0919)
d13_mass_distribution				-0,0274
				(0,0771)
d13_retail_distribution				0,0178
				(0,0408)
d13_ethical_producer				0,0457
				(0,0431)
horticultural_diet_11				0,0824***
				(0,0300)
d_food_choice				0,138*
				(0,0807)
Constant	0,279***	0,362***	0,270**	-0,0439
	(0,105)	(0,115)	(0,124)	(0,179)
Observations	557	546	542	539
R-squared	0,240	0,245	0,254	0,279

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Annex 2

VARIABLES	(1) d_cereal_hp_1	(2) d_cereal_hp_1	(3) d_cereal_hp_1	(4) d_cereal_hp_1
IPM_familiar_17	0,181***	0,176***	0,167***	0,141***
	(0,0461)	(0,0470)	(0,0475)	(0,0482)
d_gender	-0,0327	-0,0294	-0,0453	-0,0195
	(0,0422)	(0,0428)	(0,0434)	(0,0445)
d_age1	-0,0941	-0,107*	-0,153**	-0,120
	(0,0613)	(0,0631)	(0,0750)	(0,0765)
d_age2	-0,0190	-0,0257	-0,0422	-0,0250
	(0,0565)	(0,0574)	(0,0595)	(0,0596)
d_rChina	0,0946	0,0871	0,0968	0,119
	(0,111)	(0,114)	(0,115)	(0,116)
d_rFrance	-0,131	-0,139	-0,137	-0,157
	(0,0963)	(0,0997)	(0,100)	(0,100)
d_rItaly	-0,0331	-0,0279	-0,0403	-0,0762
	(0,101)	(0,104)	(0,105)	(0,105)
d_rSpain	-0,168*	-0,175*	-0,179*	-0,168*
	(0,0972)	(0,0998)	(0,101)	(0,100)
d_high_education	-0,0229	-0,0376	-0,0363	-0,0456
	(0,0576)	(0,0591)	(0,0596)	(0,0596)
d_family_high	0,0461	0,0285	0,0121	0,00697
	(0,0473)	(0,0491)	(0,0503)	(0,0505)
income_low		-0,0184	-0,0223	-0,00359
		(0,0457)	(0,0465)	(0,0467)
incomeinfluence_16		0,0106	0,00881	0,0157
		(0,0178)	(0,0178)	(0,0181)
d_employee			0,0465	0,0532
			(0,0765)	(0,0764)
d_enterpreneur_freelance			0,134	0,124
			(0,107)	(0,107)
d_student			0,114	0,108
			(0,101)	(0,101)
d13_mass_distribution				-0,0215
				(0,0865)
d13_retail_distribution				-0,0261
				(0,0450)
d13_ethical_producer				0,0770*
				(0,0482)
horticultural_diet_11				0,0879***
				(0,0334)
d_food_choice				-0,0650
				(0,0900)
d14_price				-0,0978**
				(0,0456)
Constant	0,625***	0,646***	0,633***	0,559***
	(0,111)	(0,123)	(0,134)	(0,197)
Observations	564	553	549	546
R-squared	0,067	0,065	0,071	0,102

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Annex 3

VARIABLES	(1) d_fruit_hp_1	(2) d_fruit_hp_1	(3) d_fruit_hp_1	(4) d_fruit_hp_1
IPM_familiar_17	0,158***	0,156***	0,138***	0,115***
	(0,0386)	(0,0392)	(0,0391)	(0,0397)
d_gender	-0,0374	-0,0447	-0,0630*	-0,0350
	(0,0352)	(0,0356)	(0,0355)	(0,0366)
d_age1	0,0897*	0,0894*	-0,0333	-0,00217
	(0,0513)	(0,0527)	(0,0616)	(0,0629)
d_age2	0,0252	0,0256	-0,00791	0,0121
	(0,0471)	(0,0477)	(0,0489)	(0,0491)
d_rChina	0,0781	0,0671	0,0875	0,0844
	(0,0930)	(0,0952)	(0,0950)	(0,0963)
d_rFrance	-0,0869	-0,0688	-0,0657	-0,0847
	(0,0799)	(0,0824)	(0,0815)	(0,0818)
d_rItaly	0,00566	0,0345	-0,00581	-0,0417
	(0,0838)	(0,0859)	(0,0859)	(0,0860)
d_rSpain	-0,162**	-0,158*	-0,144*	-0,144*
	(0,0808)	(0,0826)	(0,0822)	(0,0820)
d_high_education	0,0756	0,0485	0,0562	0,0505
	(0,0481)	(0,0491)	(0,0489)	(0,0490)
d_family_high	0,0384	0,00966	-0,0205	-0,0232
	(0,0396)	(0,0409)	(0,0412)	(0,0415)
income_low		-0,0913**	-0,0873**	-0,0675*
		(0,0379)	(0,0381)	(0,0385)
incomeinfluence_16		0,00264	-0,00121	0,00105
		(0,0147)	(0,0145)	(0,0148)
d_employee			0,144**	0,155**
			(0,0629)	(0,0630)
d_enterpreneur_freelance			0,183**	0,187**
			(0,0877)	(0,0877)
d_student			0,314***	0,311***
			(0,0829)	(0,0831)
d13_mass_distribution				-0,0129
				(0,0707)
d13_retail_distribution				0,0475
				(0,0370)
d13_ethical_producer				0,0552
				(0,0395)
horticultural_diet_11				0,0720***
				(0,0273)
d_food_choice				-0,000511
				(0,0738)
d14_price				-0,0377
				(0,0376)
Constant	0,658***	0,715***	0,640***	0,455***
	(0,0922)	(0,101)	(0,109)	(0,161)
Observations	558	547	543	540
R-squared	0,111	0,117	0,145	0,168

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Annex 4

VARIABLES	(1) purchased_IPM_6months	(2) purchased_IPM_6months	(3) purchased_IPM_6months	(4) purchased_IPM_6months
d_cereal_hp_1	0,128**	0,122**	0,124**	0,108*
	(0,0532)	(0,0539)	(0,0548)	(0,0551)
d_fruit_hp_1	-0,0245	-0,0306	-0,0255	-0,0405
	(0,0699)	(0,0707)	(0,0747)	(0,0748)
d_gender	0,0866*	0,0816*	0,0894*	0,106**
	(0,0442)	(0,0447)	(0,0464)	(0,0469)
d_age1	-0,0574	-0,0742	-0,0633	-0,0502
	(0,0651)	(0,0673)	(0,0831)	(0,0837)
d_age2	0,0338	0,0469	0,0420	0,0445
	(0,0581)	(0,0593)	(0,0626)	(0,0628)
d_rChina	-0,132	-0,170	-0,192	-0,161
	(0,114)	(0,117)	(0,121)	(0,125)
d_rFrance	-0,112	-0,165	-0,193*	-0,206*
	(0,0984)	(0,103)	(0,106)	(0,106)
d_rItaly	0,0619	0,0398	0,0633	0,0471
	(0,107)	(0,111)	(0,116)	(0,117)
d_rSpain	0,0830	0,0357	0,0441	0,0561
	(0,104)	(0,108)	(0,112)	(0,113)
d_high_education	-0,0459	-0,0469	-0,0235	-0,0166
	(0,0572)	(0,0588)	(0,0614)	(0,0615)
d_family_high	-0,117**	-0,146***	-0,143**	-0,141**
	(0,0514)	(0,0538)	(0,0566)	(0,0571)
income_low		0,0159	0,0278	0,0436
		(0,0488)	(0,0512)	(0,0518)
incomeinfluence_16		-0,0346*	-0,0377*	-0,0347*
		(0,0187)	(0,0193)	(0,0193)
d_employee			-0,0575	-0,0867
			(0,0976)	(0,0991)
d_enterpreneur_freelance			-0,188	-0,226*
			(0,135)	(0,136)
d_student			-0,142	-0,180
			(0,120)	(0,122)
d_full_time			-0,0529	-0,0839
			(0,0622)	(0,0631)
d13_mass_distribution				-0,0433
				(0,0887)
d13_retail_distribution				0,0258
				(0,0496)
d13_ethical_producer				0,0967*
				(0,0496)
horticultural_diet_11				0,0774**
				(0,0364)
d_food_choice				-0,0189
				(0,100)
Constant	0,309**	0,444***	0,560***	0,446*
	(0,126)	(0,137)	(0,172)	(0,227)
Observations	443	433	414	412
R-squared	0,079	0,093	0,100	0,126

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Annex 5

VARIABLES	(1) d14_environment	(2) d14_environment	(3) d14_environment	(4) d14_environment
purchased_IPM_6months	0,0946*	0,0919*	0,122**	0,0938*
	(0,0490)	(0,0499)	(0,0508)	(0,0507)
d_cereal_hp_1	0,120***	0,132***	0,131***	0,107**
	(0,0463)	(0,0472)	(0,0488)	(0,0486)
d_fruit_hp_20	0,0833	0,0851	0,0794	0,0731
	(0,0535)	(0,0542)	(0,0545)	(0,0542)
d_gender	-0,0193	-0,0317	-0,0471	-0,0486
	(0,0452)	(0,0459)	(0,0472)	(0,0473)
d_age1	-0,107	-0,0851	-0,147*	-0,142*
	(0,0660)	(0,0689)	(0,0842)	(0,0839)
d_age2	-0,0113	0,00302	-0,0233	-0,0380
	(0,0591)	(0,0607)	(0,0632)	(0,0629)
d_rChina	0,0328	0,0137	0,0469	0,136
	(0,116)	(0,120)	(0,123)	(0,125)
d_rFrance	0,177*	0,169	0,185*	0,157
	(0,100)	(0,106)	(0,108)	(0,107)
d_rItaly	0,153	0,123	0,0617	0,0908
	(0,109)	(0,114)	(0,117)	(0,117)
d_rSpain	0,0812	0,0685	0,0595	0,107
	(0,106)	(0,110)	(0,113)	(0,113)
d_high_education	0,0794	0,0832	0,0777	0,0931
	(0,0578)	(0,0599)	(0,0617)	(0,0613)
d_family_high	-0,0894*	-0,0827	-0,0921	-0,0964*
	(0,0526)	(0,0556)	(0,0577)	(0,0576)
income_low		0,0120	0,00912	-0,000374
		(0,0499)	(0,0518)	(0,0519)
incomeinfluence_16		-0,0267	-0,0226	-0,0184
		(0,0192)	(0,0196)	(0,0194)
d_employee			0,119	0,0815
			(0,0985)	(0,0991)
d_enterpreneur_freelance			0,250*	0,202
			(0,136)	(0,136)
d_student			0,248**	0,207*
			(0,121)	(0,121)
d_full_time			0,00611	-0,0234
			(0,0628)	(0,0632)
d13_mass_distribution				0,00391
				(0,0895)
d13_retail_distribution				-0,0528
				(0,0494)
d13_ethical_producer				0,197***
				(0,0499)
horticultural_diet_11				0,0338
				(0,0367)
d_food_choice				-0,0461
				(0,100)
Constant	0,123	0,167	0,0490	0,0392
	(0,124)	(0,137)	(0,173)	(0,227)
Observations	443	433	414	412
R-squared	0,081	0,086	0,107	0,149

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1