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# Assessing consumer preferences for organic vs eco-labelled olive oils

## Abstract

In this study, a choice experiment has been performed to investigate consumers' preferences and willingness to pay for a set of eco-labels on extra-virgin olive oil. Specifically, we tested three possible types of eco-labels: i) a label indicating that olive oil has been obtained from ancient trees, ii) a label indicating that olive oil has been produced in mountainous areas, and iii) a label indicating that olive oil has been obtained with a sustainable water use. These eco-labels have been analysed jointly to the well-known organic label and other relevant attributes of extra-virgin olive oil. The choice experiment has been performed based on a consumer survey carried out in Italy, the largest olive oil consumer country in the world, during January-February 2017. A market research agency recruited a nationally-representative sample of 1,061 participants who have been involved in a web-based interview. Consumers' choices have been analysed by using a Random Parameter Logit model. The main result of the study is that, on average, Italian consumers are willing to pay a significant premium price for all the tested eco-labels on extra-virgin olive oil even if organic label is confirmed to be the most preferred eco-label. However, high heterogeneity in consumer preferences was also detected.

**Keywords:** eco-labels, sustainability, olive oil, choice experiment, Italy

## Introduction

Global food system is one of the main responsible for several environmental impacts such as greenhouse gas emissions, water pollution and consumption, soil erosion and degradation as well as biodiversity loss (Tilman et al. 2002). On the other hand, global food system is undergone to a growing pressure due to the dramatic increase in the world's population and changes in food consumption patterns (Godfray et al. 2010). To satisfy the rising food demand, supply chains have to improve their productivity, and this is often associated with an intensification of farming methods resulting in a significant increase of environmental impacts (Garnett et al. 2013).

Nowadays, environmental sustainability has become a matter of growing interest not only for scholars and policy makers but also for consumers (Codron et al. 2006; Nash 2009). More and more consumers are now concerned with the environmental impacts of the products they purchase, and they are also aware that own consumption choices can contribute positively or negatively to the global environmental impact (Verain et al. 2012; Vermeir and Verbeke 2006).

In this context, eco-labels emerged as an important tool to support consumers' food choices by providing information about whether a food product is more environmentally sustainable than others (Grunert et al. 2014; Thøgersen et al. 2010). This also allows producers to differentiate food products on the basis of a further quality dimension which depends on the presence of specific eco-friendly attributes (Prieto-Sandoval et al. 2016). Therefore, eco-labelling shares the objectives of generating added value for consumers and providing a competitive advantage for producers. At the same time, eco-labelling contributes in reducing environmental impacts of food production through a virtuous mechanism of market self-regulation (Prieto-Sandoval et al. 2016).

In the food domain, in addition to the well-known organic label, other eco-labels with different standards are being introduced into the marketplace (e.g. carbon footprint, water

51 footprint, rainforest alliance, etc.) (Grunert 2011). However, the level of sales of eco-labelled  
52 food products remains substantially low (Grunert et al. 2014). In fact, giving the opportunity  
53 of recognizing more sustainable alternatives does not necessarily imply that consumers will  
54 actually buy them. In the context of food choice, eco-labels compete with other issues such as  
55 sensory and nutritional properties, healthiness, and convenience (Grunert et al. 2014). In  
56 addition, consumers have to understand the meaning of different eco-labels and to make  
57 inference on what they really signify for themselves (Grunert 2011). In particular, because  
58 organic and other eco-labelled products can be both perceived by consumers as eco-friendly  
59 products, it is possible that consumers interested in environmental protection may consider  
60 organic and other eco-labelled products as substitutes. However, while organic foods are  
61 obtained according to a production method that minimizes environmental impacts as well as  
62 the risks for health of humans, plants, and animals, other eco-labels usually cover only certain  
63 aspects of the broader concept of environmental sustainability. Therefore, the success or  
64 failure of an eco-labelling scheme on food market may be attributed to the scheme itself, to  
65 the general contest in which it is implemented, and/or to the characteristics of consumers who  
66 use the ecolabel in their decision-making. Furthermore, there could be product-specific  
67 relationships between environmental attributes and the other features of food.

68 While consumers' preferences for organically produced olive oil have been largely analysed  
69 (Boncinelli et al. 2017; Del Giudice et al. 2015; Kalogeras et al. 2009; Panico et al. 2014;  
70 Roselli et al. 2018b; Tsakiridou et al. 2006), it seems that little research has been carried out  
71 to understand the trade-off between organic label and other eco-labels in food markets  
72 without exception in olive oil market.

73 In this study, consumers' preferences and willingness to pay for a set of eco-labels, including  
74 organic label, have been jointly analysed by using extra-virgin olive oil as case study. We  
75 focused on olive oil because this product has a relevant economic importance, particularly in  
76 Mediterranean countries such as Spain, Italy, Greece and Portugal, where olive farming  
77 covers a large share of agricultural land. In addition, depending on the level of production  
78 intensity, olive farming provides relevant environmental externalities, both positive and  
79 negative (Gómez-Limón et al. 2012; Pienkowski and Beaufoy 2000; Weissteiner et al. 2011).  
80 It should be noted that, although the increasing dominance of "intensive modern plantations",  
81 a large share of European olive farming is still represented by "low-input traditional  
82 plantations" with the following characteristics: i) low-density plantation with large-sized and  
83 ancient trees; ii) localization in hilly or mountainous areas, frequently on terraces; iii) not  
84 irrigated; iv) spare use of agro-chemicals; v) soil management with minimal tillage and/or  
85 grazing. As a result of their particular physical characteristics and farming practices, low-  
86 input traditional plantations have high natural value (biodiversity and landscape), high  
87 positive environmental impacts (i.e. prevention of soil erosion on sloping lands) and low  
88 negative environmental impacts (i.e. no exploitation of water resources and low use of agro-  
89 chemicals) (Pienkowski and Beaufoy 2000). However, these plantations are also the least  
90 viable in economic terms and hence most vulnerable to abandonment. Therefore, taking into  
91 account the growing consumer interest in environmental sustainability, it may be valuable to  
92 introduce an eco-label for differentiating olive oil obtained from low-input traditional  
93 plantations in order to support and preserve them for their important environmental benefits.  
94 However, this raises at least three main questions. First, how to formulate a specific eco-label  
95 for this purpose so that it is likely understandable and appealing for consumers? Second, are  
96 consumers really willing to pay a premium for this eco-label? Third, can there be a possible  
97 competition between organic label and another eco-label on olive oil market? A preliminary  
98 investigation of the potential that possible eco-labels on olive oil can have before their  
99 introduction into the marketplace may be extremely useful in order to prevent failures and  
100 subsequent waste of resources.

101 Although several studies have extensively investigated consumer preferences and willingness  
102 to pay for different quality attributes of olive oil, including organic label (Aprile et al. 2012;  
103 Carlucci et al. 2014; Casini et al. 2014; Chan-Halbrendt et al. 2010; Del Giudice et al. 2015;  
104 Di Vita et al. 2013; Krystallis and Ness 2005; Menapace et al. 2011; Roselli et al. 2016;  
105 Salazar-Ordóñez et al. 2018; Tsakiridou et al. 2006) empirical investigations on consumer  
106 preferences and willingness to pay for eco-labels on olive oil are particularly limited.

107

## 108 **Materials and methods**

### 109 *Methodology*

110 In order to investigate consumers' preferences and willingness to pay for different eco-labels  
111 on extra-virgin olive oil, we performed a choice experiment which consists of creating a  
112 hypothetical market situation where real consumers are asked to make choices between  
113 different product alternatives. The roots of choice experiments can be traced back to the  
114 theoretical framework proposed by Lancaster (1966), assuming that consumers derive utility  
115 directly from the characteristics or quality attributes embedded in a product rather than from  
116 the product itself. In other words, differentiated products are considered as a bundle of  
117 different quality attributes that are independently valued by consumers at the time of  
118 purchase. Accordingly, we assumed that consumers choose olive oil by considering different  
119 quality attributes, including possible eco-labels. In addition, according to Random Utility  
120 Theory (Thurstone 1927) consumers express individual preferences for product characteristics  
121 and maximize their utility under budget constraint. Therefore, consumers purchasing choices  
122 are assimilated to the solution of maximization problems for the utility that can be obtained  
123 from a set of available alternatives.

124 Specifically, we assume that in a given situation  $t$ , each individual  $n$  obtains utility  $[U_{nit}]$  from  
125 a product alternative  $i$ , and this utility is separable in a deterministic component  $[V_{nit}]$ ,  
126 depending on the specific mixture of product attributes, and a stochastic component  $[\varepsilon_{nit}]$ :

$$127 U_{nit} = V_{nit} + \varepsilon_{nit}$$

128 Considering a finite set of  $J$  alternatives, the individual  $n$  maximizes his utility by selecting  
129 the alternative that provides the highest utility. Specifically, the individual  $n$  will choose the  
130 preferred alternative by operating a pairwise comparison over the full set of alternatives: the  
131 alternative  $i$  will be preferred to the alternative  $j$  if the alternative  $i$  provides higher utility than  
132 the alternative  $j$  ( $U_{nit} > U_{njt}$ ;  $\forall j \neq i$ ). Given the stochastic nature of the hypothesized utility  
133 function, the maximization problem can be solved probabilistically. Therefore, considering a  
134 set of  $J$  alternatives, the probability that the individual  $n$  chooses the alternative  $i$  ( $P_{nit}$ ) is  
135 equal to the probability that the alternative  $i$  provides the highest utility:

$$136 P_{nit} = \text{Prob}[(V_{nit} + \varepsilon_{nit}) > (V_{njt} + \varepsilon_{njt})] > 0 ; \forall j \neq i , \forall J$$

137 The empirical counterpart of this theoretical problem is the estimation of a discrete choice  
138 model by using data collected through the implementation of a choice experiment (McFadden  
139 1986).

140

### 141 *The choice experiment*

142 In this study, a choice experiment has been performed based on a consumer survey carried out  
143 in Italy, the largest olive oil consumer country in the world, with about 20% of global  
144 consumption (IOC, 2016). In particular, during January-February 2017, a market research  
145 agency administered the choice experiment and a questionnaire by means of web-based  
146 interviews. The inclusion criteria for the target population were: i) being household  
147 responsible for food purchasing, and ii) have bought olive oil at least once in the last year. A  
148 total of 1,061 participants were recruited with a stratified quota sampling based on  
149 geographical area, municipal size, age, gender, and education, in order to ensure the

150 representativeness of the sample at national level. Table 1 summarises participants' socio-  
 151 demographics.

152 The choice experiment has been primarily designed to compare organic label, which is an  
 153 eco-label already existing on olive oil market, with three hypothetical eco-labels which were  
 154 formulated by taking into account the main eco-friendly characteristics of low-input olive  
 155 plantations. Specifically, these hypothetical eco-labels are: *i*) a label indicating that olive oil  
 156 has been obtained from ancient trees, *ii*) a label indicating that olive oil has been produced in  
 157 mountainous areas, and *iii*) a label indicating that olive oil has been obtained with sustainable  
 158 use of water. In addition, as shown in a recent literature review (Del Giudice et al. 2015),  
 159 country-of-origin indication plays a key role in consumer choice behaviour for extra-virgin  
 160 olive oil. Therefore, two different country-of-origin indications, namely "Italy", and "EU  
 161 countries", were also included in the choice experiment. Finally, we considered the price with  
 162 six levels representing the range of market prices directly detected on supermarket shelf at the  
 163 time of the study. It should be taken in mind that consumers purchasing behaviour can result  
 164 in a very complex pattern, which is the case of extra-virgin olive oil market (Del Giudice et  
 165 al. 2015). The explorative aim of this study led the final choice sets during the choice  
 166 experiment to be as simple as possible. As matter of fact, each eco-friendly attribute was  
 167 assumed mutually exclusive while other relevant attributes such as geographical indications  
 168 were excluded. The selected attributes with related levels are reported in Table 2.

169

170 Table 1. Socio-demographic characteristics of the sample.

	Sample		Italian population*
	N.	%	%
<i>Total</i>	1,061	100	100
<i>Geographical area</i>			
North-West	279	26	27
North-East	202	19	19
Centre	238	23	23
South	342	32	31
<i>Municipal size (inhabitant)</i>			
<= 5000	170	16	17
5001-20000	313	29	30
20001-100000	315	30	30
>= 100000	263	25	24
<i>Age</i>			
Mean (Std dev)	44 (14)	-	51
<i>Gender (female)</i>			
Mean (Std dev)	0.50 (0.50)	-	0.52
<i>Education</i>			
Primary	120	11	41
Secondary	538	51	42
Tertiary	403	38	17

\* Source: Italian Institute of Statistics – ISTAT (2014)

171

172 Table 2 - Attributes and levels of the choice experiment.

Attributes	Levels
Eco-labelling	organic; from ancient trees; mountain product; sustainable water use; no eco-label
Country of origin	Italy; EU countries
Price (per litre)	€3.90; €5.90; €7.90; €9.90; €11.90; €13.90

173  
 174 Attributes and their levels have been combined to create hypothetical products to be presented  
 175 at participants as “choice sets”. In order to avoid excessive fatigue of participants and to  
 176 optimize the research work, a D-optimal design was performed to select the best subset of all  
 177 possible combinations of choice sets (Kanninen 2002). This allowed to select only six choice  
 178 sets among all possible combinations, each including four product alternatives to be presented  
 179 to all participants. Each choice set has been presented in the form of a choice card with photo-  
 180 realistic images showing four hypothetical olive oils (option A, B, C, D), as well as the “no-  
 181 choice” option that allows to avoid constrained choices when none of the proposed  
 182 alternatives are considered sufficiently attractive to be purchased. An example of choice card  
 183 is shown in Figure 1. Prior to making their choice, participants were invited to consider  
 184 themselves in a real purchase situation and to have to choose between different products, all  
 185 represented by extra-virgin olive oils with the own preferred brand and packaged in 1 litre  
 186 glass bottle. So, participants were asked to choose the preferred alternative from each choice  
 187 set.

188  
 189 **Fig. 1** – Example of choice card.  
 190



191  
 192  
 193 *Estimation and willingness-to-pay*  
 194 In this study, consumers’ choices have been modelled using a Random Parameter Logit model  
 195 (RPL) which is a highly flexible model capable of approximating any Random Utility Model  
 196 (RUM) by relaxing the assumption of homogenous individual preferences (McFadden and  
 197 Train 2000). In fact, as highlighted in previous studies (Scarpa and Del Giudice 2004), it is  
 198 very likely that individual preferences for extra-virgin olive oil are heterogeneous. In the RPL  
 199 model, taste variation among individuals is explicitly treated, and, in particular, the utility  
 200 function of the individual  $n$  for the alternative  $i$  at given situation  $t$  is specified as follows:

201 
$$U_{nit} = \beta'X_{nit} + \varepsilon_{nit}$$

202 where  $\beta'$  is a vector of random parameters, with known mean and variance, that represents  
 203 heterogeneity in individual preferences,  $X_{nit}$  is the vector of product attributes embedded in  
 204 the  $i^{\text{th}}$  alternative, and  $\varepsilon_{nit}$  is the error term.  
 205 Following Train (2009), the probability for the individual  $n$  of choosing the alternative  $i$  at  
 206 given situation  $t$  is computed as follows:

$$208 \quad P_{nit} = \int \frac{\exp(V_{nit})}{\sum_j \exp(V_{njt})} f(\beta) d\beta$$

209 where the distribution  $f(\cdot)$  of the random parameters  $\beta$  is specified by the analyst.  
 210 Specifically, for the model formulation, we assumed that all parameters have a triangular  
 211 distribution. In addition, the price (PRICE) was treated as a continuous variable, while the  
 212 other product attributes were coded as dummy variables. Specifically, for the eco-labelling  
 213 attribute, five dummy variables were created (ORGANIC, ANCIENT, MOUNTAIN,  
 214 SUST\_WATER\_USE, NO\_ECOLABEL); the option "NO\_ECOLABEL" has been used as  
 215 reference level. Likewise, for the country-of-origin attribute, two dummies were created  
 216 (ITALY and EU), keeping EU origin as reference. Finally, a dummy variable (ASC) was also  
 217 included in the model in order to capture respondents' preferences for the "no-choice" option.  
 218 The parameter estimates are interpreted in relative terms and they represent changes in utility  
 219 (or in choice probability) due to the presence of a given attribute compared to the omitted  
 220 alternative, all other characteristics being equal. The willingness-to-pay (WTP) has been  
 221 computed through the ratio of the estimate for each attribute and the estimate for the price:

$$223 \quad WTP_k = -\frac{\beta_k}{\beta_p}$$

224 In the above expression,  $WTP_k$  is the willingness-to-pay for the  $k^{\text{th}}$  attribute,  $\beta_k$  represents the  
 225 estimated parameter of the  $k^{\text{th}}$  attribute, and  $\beta_p$  is the estimated coefficient for price.  
 226 Confidence intervals at 95% for the WTP estimates have been calculated by using the method  
 227 proposed by Krinsky and Robb (1986).

## 229 **Results and discussion**

230 Estimation results of the RPL model are shown in Table 3. The model was estimated through  
 231 the software package NLOGIT 6 with simulated maximum likelihood using Halton draws  
 232 with 1000 replications. The model is statistically significant (Chi-squared statistic equal to  
 233 6375.68 with a p-value much lower than 0.01) and shows a good capability in fitting data  
 234 (McFadden Pseudo R-squared equal to 0.31).

235 The price coefficient is negative in sign and statistically significant. As expected, all other  
 236 characteristics being equal, increasing price is associated to a lower utility, and this implies a  
 237 lower choice probability. Similarly, the "no-choice" option is negative in sign and statistically  
 238 significant. Effectively, not choosing any of the four possible olive oils presented in the  
 239 choice sets decreases the probability that a product alternative is chosen. The country-of-  
 240 origin indication has a large impact on consumers' choices, and, in particular, a home bias  
 241 effect is detected considering that the indication of Italian (domestic) origin increases the  
 242 probability of choosing an extra-virgin olive oil. This also means that consumers associate  
 243 higher utility to extra-virgin olive oil with Italian origin rather than from EU countries, in line  
 244 with Del Giudice et al. (2015) findings. Regarding the impact that our selected eco-labels  
 245 have on consumers' choices, estimates reveal that all of them have a positive and statistically  
 246 significant effect, even though different in terms of magnitude. This means that the presence  
 247 of an eco-label on extra-virgin olive oil is associated to higher utility compared to the  
 248 alternative without any eco-label, and this also imply that when an olive oil shows an eco-  
 249 label its choice probability increases.

250 Estimates of the RPL model also provides insights on the heterogeneity of consumers’  
 251 preferences, and, in particular, it is possible to observe that, for all parameters, standard  
 252 deviations are statistically significant. This confirms that there is heterogeneity in individual  
 253 preferences for all attributes, and the relative high magnitude of standard deviations for all  
 254 parameters also implies that, for each attribute, consumers may have reverse preferences. In  
 255 particular, country-of-origin indication reported the highest standard deviation of parameter  
 256 distribution.

257 A better understanding of the role of each attribute in consumer choice is provided by results  
 258 of WTP estimations reported in Table 4. The highest values of WTP are observed for organic  
 259 label (7.1 €/L) and Italian origin (6.1 €/L), both well-known and familiar to consumers.  
 260 However, results also reveal that consumers are willing to pay a premium for the other tested  
 261 eco-labels, even though lower compared to that consumers are willing to pay for organic  
 262 label. In fact, the label “from ancient trees” gains a premium price of 5.8 €/L, the label  
 263 “sustainable water use” gains a premium price of 4.2 €/L, and the label “mountain product”  
 264 gains a premium price of 3.9 €/L.  
 265  
 266

Table 3 – Estimation results of RPL model.

	Coefficient	Standard Error	z	Prob.  z >Z*	95% Confidence Interval	
Random parameters in utility functions						
ORGANIC	2.68186***	0.315	8.520	0.000	2.065	3.298
SUST_WATER_USE	1.56366***	0.334	4.680	0.000	0.909	2.218
MOUNTAIN	1.47375***	0.386	3.820	0.000	0.717	2.230
ANCIENT	2.17615***	0.357	6.090	0.000	1.476	2.877
ITALY	2.29820***	0.381	6.040	0.000	1.552	3.044
PRICE	-0.37545***	0.061	-6.140	0.000	-0.495	-0.256
Non-random parameters in utility functions						
ASC	-1.41942***	0.098	-14.420	0.000	-1.612	-1.227
Standard deviations of parameter distributions						
ORGANIC	2.86979***	0.310	9.25	0.000	2.261	3.477
SUST_WATER_USE	2.54050***	0.314	8.07	0.000	1.923	3.157
MOUNTAIN	3.64484***	0.310	11.73	0.000	3.035	4.254
ANCIENT	3.23696***	0.278	11.63	0.000	2.691	3.782
ITALY	5.36211***	0.242	22.08	0.000	4.886	5.838
PRICE	0.94693***	0.051	18.45	0.000	0.846	1.047
Log likelihood function		-7056.23				
Chi-squared		6375.68				
Significance level		.00000				
McFadden Pseudo R-squared		0.31				

Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

267

268 Table 4 – Willingness to pay.

WTP	Coefficient	Standard Error	z	Prob.  z >Z*	95% Confidence Interval	
ORGANIC	7.14***	1,376	5,190	0,000	4,447	9,839
SUST_WATER_USE	4.16***	0,983	4,240	0,000	2,238	6,091
MOUNTAIN	3.92***	1,156	3,400	0,001	1,660	6,190
ANCIENT	5.79***	1,278	4,540	0,000	3,292	8,300
ITALY	6.12***	1,291	4,740	0,000	3,591	8,651

269 Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

270

271 Another interesting finding can be detected in the correlation matrix of random parameters  
 272 (Table 5). It shows that there are significant correlations in the heterogeneity of individual  
 273 preferences between attributes. In particular, it should be noted that the parameter of the  
 274 attribute ORGANIC is inversely correlated with the parameter of the attribute ITALY. This  
 275 means that consumers who express high preference for organic label on extra-virgin olive oil  
 276 also express low preference for Italian origin and vice versa. In addition, the parameter of the  
 277 attribute ORGANIC is highly correlated with the parameters of the attributes  
 278 SUST\_WATER\_USE and MOUNTAIN, while it is not correlated with the parameter of the  
 279 attribute ANCIENT. This means that consumers who express high preference for organic  
 280 label on extra-virgin olive oil also express high preference for the labels “sustainable water  
 281 use” and “mountain product”. Conversely, consumers who express high preference for  
 282 organic label on extra-virgin olive oil and consumers who express high preference for the  
 283 label “from ancient trees” seem to be different. Therefore, the label “from ancient trees”  
 284 seems to be not in competition with organic label and, at the same time, this eco-label gains  
 285 the highest premium price after that for organic label.

286  
 287 Table 5 – Correlation matrix of random parameters

	ORGANIC	SUST_WATER_USE	MOUNTAIN	ANCIENT	ITALY
ORGANIC	-				
SUST_WATER_USE	5.739***				
MOUNTAIN	4.194***	-2.027			
ANCIENT	1.038	-3.427***	8.928***		
ITALY	-4.154***	-3.762***	0.185	-1.289	-

Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

288

## 289 Conclusions

290 In this study, we conducted a choice experiment to investigate consumers’ preferences and  
 291 willingness to pay for different eco-labels on extra-virgin olive oil. Specifically, we tested on  
 292 Italian market three possible types of eco-labels: i) a label indicating that olive oil has been  
 293 obtained from ancient trees, ii) a label indicating that olive oil has been produced in  
 294 mountainous areas, and iii) a label indicating that olive oil has been obtained with a  
 295 sustainable water use. These eco-labels have been analysed jointly to the well-known organic  
 296 label and country-of-origin indication affecting consumers’ choices for extra-virgin olive oil.  
 297 The main result of the study is that, on average, Italian consumers appreciate all these eco-  
 298 labels on olive oil and they are willing to pay a significant premium price for them even if ,  
 299 organic label is confirmed to be the most preferred eco-label. Currently, the only eco-label  
 300 used for olive oil is the organic label while olive oil obtained from other types of extensive  
 301 and more eco-friendly olive groves is mixed to the conventional olive oil without any  
 302 differentiation and valorisation.

303 This study also demonstrated that, among the possible eco-labels that can be used to  
 304 differentiate olive oil obtained from low-input traditional plantations, the label “olive oil  
 305 obtained from ancient trees” seems to have the greatest probability of success for two reasons:  
 306 first, it seems to be the eco-label for which consumers are willing to pay the highest premium  
 307 price after organic label; second, it seem to be not in competition with organic label, which is  
 308 the most preferred eco-label on olive oil.

309 Introduction of this eco-label into the marketplace could provide relevant benefits: producers  
 310 who have the possibility of using this eco-labels could achieve a competitive advantage,  
 311 consumers could be more aware in choosing their preferred olive oils, and the olive groves  
 312 with positive externalities could be preserved from the abandonment or the progressive  
 313 substitution with intensive production systems with higher environmental impact. Obviously,

314 before the introduction of such eco-label, it is necessary to create a specific voluntary scheme  
315 that should clearly describe the characteristics of olive groves that can be actually considered  
316 as “ancient”.

317

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322

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