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1 **A matter of taste: Local explanations for the consumption of wild food plants in the**
2 **Catalan Pyrenees and the Balearic Islands**

3 **Short title:** Motivations for the consumption of wild edibles

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27 **Abstract**

28 Previous research has documented different trends in the consumption of wild food
29 plants but has rarely analyzed the motivations behind their continued (or lack of)
30 consumption. In this article, we use empirical data to explore the factors driving the
31 consumption of a selected set of wild food plants. We start by analyzing the different trends
32 (i.e., abandonment, maintenance, and valorization) across 21 selected species with different
33 food uses. We then explore the reported motivations that drive such trends using data
34 collected among 354 respondents in three Catalan-speaking rural areas. The consumption of
35 wild food plants is decreasing in the three study areas and across the categories of food use
36 analyzed. Respondents listed sociocultural factors, rather than environmental or economic
37 factors, as more prominent determinants of consumption trends: taste preferences seem to
38 be the most relevant motivation for those who continue to consume wild food plants,
39 whereas a myriad of motivations related to changes in lifestyle were provided by those who
40 explain the abandonment of their consumption.

41

42 **Key words:** Edible wild plants; ethnobotany; motivations; quantitative analysis; Spain

43

44 **Cuestión de gusto: ¿Qué explica el consumo de plantas silvestres? Estudio en los**
45 **Pirineos catalanes y las Islas Baleares**

46

47 **Resumen**

48 Se han documentado diferentes tendencias en el consumo de plantas silvestres
49 comestibles, pero raramente se han analizado las razones que explican por qué algunas
50 plantas se siguen consumiendo y otras no. En base a una selección de plantas silvestres
51 comestibles, en este artículo exploramos los factores que explican las tendencias en el
52 consumo de plantas silvestres. En la primera parte analizamos las tendencias de consumo
53 (abandono, mantenimiento y valorización) de un grupo de 21 especies con diferentes usos
54 alimentarios y en la segunda exploramos las motivaciones esgrimidas por 354 habitantes de
55 tres áreas rurales catalanoparlantes en relación a estas tendencias. El consumo de plantas
56 silvestres parece haber sufrido una reducción generalizada en las áreas prospectadas. Para
57 todas las especies, los encuestados mencionaron factores socioculturales, más que
58 ambientales o económicos, como importantes a la hora de explicar sus patrones de
59 consumo. Específicamente, el sabor parece ser el principal argumento para aquellos que
60 continúan consumiendo plantas silvestres mientras que una combinación de motivos
61 relacionados con cambios en estilos de vida predominan entre las explicaciones de aquellos
62 que han abandonado su consumo.

63 **Introduction**

64 Over the last decades, wild food plants (including semi-wild and naturalized taxa)
65 (hereafter WFP) have been widely studied, both in developing (Joshi et al., 2015;
66 Teklehaymanot and Giday, 2010; Termote et al., 2010) and developed countries (Ghirardini
67 et al., 2007; Poe et al., 2013; Rigat et al., 2009). In addition to providing inventories and
68 descriptive accounts, such studies have also shown: a) the contribution of WFP to
69 household food security (Bharucha and Pretty, 2010; Bonet and Vallès, 2002) and local
70 economy (Łuczaj et al., 2013; Shackleton, 2003); b) their nutritional value (Heinrich et al.,
71 2005; Pardo-de-Santayana et al., 2007; Vardavas et al., 2006); and c) their relevance for
72 biodiversity conservation (Demissew, 2011; Paton and Lughadha, 2011).

73 Researchers have documented changes in the consumption of WFP both in
74 developing countries (Bhattarai et al., 2009; Cruz-García, 2014; Joshi et al., 2015) and -
75 more intensively- in the developed world, where the mechanization of agricultural
76 production and the increasing availability of foods through market transactions have greatly
77 affected the consumption and gathering of WFP (Reyes-García et al., 2015; Rigat et al.,
78 2009; Tardío et al., 2006). Nowadays, most WFP seem to be only sparsely collected in rural
79 areas of developed countries (Bharucha and Pretty, 2010; Reyes-García et al., 2015; Schulp
80 et al., 2014). This general trend does not affect all WFP equally, and thus the gathering of
81 some specific plant species has gained in popularity. For example, some authors have
82 argued that some WFP are becoming local delicatessens and markers of cultural identity
83 (Aceituno-Mata, 2010; Kalle and Soukand, 2013), some are entering commercial circuits
84 (Acosta-Naranjo, 2008; Łuczaj et al., 2012; Molina et al., 2012), and some are so
85 appreciated to be collected in unconventional spaces such as urban parks (Poe et al., 2013).

86 These examples have led researchers to hypothesize that WFP consumption could
87 follow, at least, three different paths: abandonment, maintenance, and valorization
88 (Aceituno-Mata, 2010; Acosta-Naranjo, 2008; Pardo-de-Santayana et al., 2007).
89 Abandonment refers to the decrease in WFP consumption. For example, in the southern
90 Italian village of Castelmazzano, Pieroni et al. (2005) found that the ancient practice of
91 eating the roasted kernels of *Quercus virgiliana* (Ten.) Ten. (a synonym of *Quercus*
92 *pubescens* Willd.), has been discontinued. Maintenance refers to the lack of observable
93 changes when comparing the current consumption of a specific WFP with its consumption
94 in the recent past. And valorization refers to the increase when comparing the current
95 consumption of a specific WFP with its consumption in the recent past, as for example the
96 case of *Allium ursinum* L. and *Epilobium angustifolium* L. in Poland, where these wild
97 species are nowadays largely sold in health food stores (Łuczaj et al., 2012).

98 Although researchers have documented changes in WFP consumption, few offer
99 explanations for the changes (see Schunko et al., 2015 for a recent exception), and less so at
100 the level of the species. *A priori*, one could categorize the factors that drive the
101 consumption of WFP (or their abandonment) as environmental, economic and
102 sociocultural. Environmental factors refer to WFP ecological abundance or scarcity;
103 economic factors refer to material costs and benefits associated with the collection and
104 consumption of WFP; and sociocultural factors refer to cultural considerations, such as
105 associating WFP consumption with famine, better health, preferred taste, or enjoyable pass
106 time.

107 The goal of this article is to identify factors driving abandonment, maintenance, or
108 valorization of some WFP. We start by analyzing the different trends (i.e., abandonment,
109 maintenance, and valorization) across selected species and different food-use categories

110 and then we explore the reported motivations that might drive such trends. Understanding
111 people's motivation to consume WFP or not is essential not only for understanding why
112 WFP continue to be gathered, but also for predicting gathering trends in relation to certain
113 species.

114

115 **Case studies**

116 Our study examines three Catalan-speaking regions: Alta Vall del Ter (AVT) and
117 Alt Empordà (AE) in northeastern Iberian Peninsula, and eastern Mallorca (EM) in the
118 Balearic Islands (Fig. 1).

119

INSERT FIGURE 1

120 The Alta Vall del Ter valley, an area of about 294 km², is located on the southern
121 flanks of the Pyrenees in the Ripollès district. Its population is 4,497 (IDESCAT, 2014).
122 Hydrographically, the valley corresponds to the watersheds of the Ter and Ritort rivers
123 (Rigat et al., 2009). The vegetation of the area is shaped by the climatic conditions of
124 mountainous area. Although the nival stage is rare, i.e., snow is rarely found all year round,
125 abundant representative species of the alpine (e.g., *Festuca* sp. and other grasses) and
126 subalpine stages (e.g., *Pinus mugo* Turra subsp. *Uncinata* (Ramond ex DC. in Lam. et DC.)
127 *Domin* and *Abies alba* Mill.) are common. Raising livestock is the most important
128 economic activity in the area. Nowadays, most arable surface (including home gardens) has
129 been reclaimed to build secondary residences and tourist facilities (Rigat et al., 2009).
130 Previous research on WFP in the area has documented 84 taxa used for human
131 consumption, mostly eaten raw, although some species were also used as condiments or in
132 the elaboration of jams or alcoholic beverages (such as *ratafia*, a traditional liquor of
133 Catalonia) (Rigat et al., 2009). According to the aforementioned work, commonly used

134 wild or naturalised species include *Cynara cardunculus* L., *Laurus nobilis* L., *Mentha*
135 *spicata* L., *Molopospermum peloponnesiacum* (L.) W.D.J.Koch, *Origanum vulgare* L.,
136 *Taraxacum dissectum* (Ledeb.) Ledeb., *Thymus vulgaris* L., and *Urtica dioica* L.

137 Alt Empordà is the easternmost district of northern Catalonia, opening eastwards to
138 the Mediterranean Sea, limited northwards by the French Pyrenees and westwards by the
139 Garrotxa district, with low-level mountain ranges that connect with the Pyrenees (Parada et
140 al., 2011). It is one of the largest districts in Catalonia with around 141,351 inhabitants who
141 live in 68 municipalities in an area of 1,358 km² (IDESCAT, 2014). With a coastal
142 Mediterranean climate, the area is affected by the strong northerly wind called *tramuntana*.
143 Biogeographically, the flora and vegetation correspond to the Mediterranean region (e.g.,
144 *Quercus ilex* L. and *Q. suber* L.), but it also contains species typical of Eurosiberian regions
145 (e.g., deciduous *Quercus* sp. and *Fagus sylvatica* L.). Historically, the most important
146 economic activity of the area was agriculture, although since the 18th century, industry
147 (especially related with cork) grew in importance. Over the last decades, and despite the
148 recent economic crisis, tourism -especially on the seaside- has become the main economic
149 activity. Researchers have recorded 211 species used for human consumption (Parada,
150 2007; Parada et al., 2011), among which the most common are *Juglans regia* L., *Chondrilla*
151 *junceae* L., *Asparagus acutifolius* L., *Rosmarinus officinalis* L. and *Silene vulgaris*
152 (Moench) Garcke.

153 The last study area was located in Mallorca, the largest island of the Balearic
154 archipelago, east of the Iberian Peninsula. Mallorca has a total population of 858.313
155 inhabitants (IBESTAT, 2014) in 3,622 km². The landscape of the island belongs to the
156 Mediterranean biogeographical region, with presence of *Quercus ilex* and associated
157 communities. The area is also characterized by the important influence of the marine

158 habitat (with seaweeds and land plants, such as *Crithmum maritimum* L.). Before the tourist
159 boom, agriculture and services were the fundamental economic activities of the island, but
160 since the 1960's, it experienced an intense economic growth based nearly exclusively on
161 tourism (Mayol and Machado, 1992). Mallorca is now one of the most famous tourist
162 hotspots in Europe. The study conducted by Carrió (2013) compiled 65 wild food plants
163 used in Mallorca, the most common being *Foeniculum vulgare* Mill., *Arbutus unedo* L.,
164 *Laurus nobilis*, *Rubus ulmifolius* Schott and *Cichorium intybus* L.

165

166 **Methods**

167 Fieldwork expanded from July 2012 to March 2013, included two phases, and
168 followed the guidelines of the code of ethics of the International Society of Ethnobiology.
169 In each of the two phases of study, we followed different sampling strategies. In the first
170 phase we used semi-structured interviews (Newing, 2011) to collect data on past and
171 present uses of WFP, as well as information on the connotations associated to the
172 gathering, consumption and commercialization of such plants. Data on past and present
173 uses of WFP have been published by Rigat et al. (2009) from AVT, by Parada et al. (2009)
174 from AE, and by Carrió (2013) from EM. In the second phase, we used information from
175 these interviews to construct a survey addressing past and present consumption of selected
176 WFP and motivations for WFP consumption (or abandonment).

177 For the purpose of this study, we use the term “wild” to refer to wild native species
178 growing in their natural habitat, but also to managed as well as introduced species that have
179 been naturalized. As our study centers on local perceptions, we also included trees and

180 shrubs that were planted long ago and are now harvested as if they were wild, like *Juglans*
181 *regia*.

182 *Sample of participants*

183 Our total sample for all three sites included 354 respondents, recruited in 30
184 different villages or small towns of the three study areas. People were approached at public
185 areas (i.e., parks or bars). After approaching a person, we first explained the goal of the
186 study and requested consent to ask some questions. Given that randomization was not
187 feasible, the sample was stratified according to criteria that might affect use and
188 consumption of WFP. Specifically, in each site we included women and men, adults of
189 different age ranges ($\geq 16 \leq 40$, $\geq 41 \leq 60$, and ≥ 61), and people with different occupations
190 (including students, farmers, unemployed people, and people working in construction,
191 domestic service, industry, tourism, or liberal professions) (Table 1).

192 INSERT TABLE 1

193 *Species selection*

194 Survey questions referred to seven wild food species specific to each study area.
195 Therefore, in total we asked about the use of 21 plants (with some overlap between areas).
196 To increase the comparability of the results, the seven species were chosen using the
197 following criteria: i) all selected species have a prominent food use (rather than medicinal
198 or other uses); ii) the selected plant species had to be collected or bought in the area, but not
199 largely commercialized; and iii) each questionnaire included at least one species from each
200 of the following categories of use defined by Tardío et al. (2006), i.e., vegetables (or
201 species in which any of the vegetative parts is consumed raw or cooked), fruits (or species
202 in which the fresh or dry fruit is eaten, raw or cooked), beverages (or species in which any

203 part is used to prepare liquor or infusions), and seasonings (or species in which any part is
204 used for food seasoning). Some WFP have several edible uses, but we only considered the
205 most common one. For example, we asked about the stems of *Foeniculum vulgare*, but not
206 about its seeds, which in some areas are also used as seasoning. Vouchers of all taxa used
207 in this study are deposited in the herbarium BCN, of the Centre de Documentació de
208 Biodiversitat Vegetal, Universitat de Barcelona.

209 The final survey is based in a total of 21 wild food-uses (where the same use in a
210 different area is counted twice) (Table 2). We compare WFP that represent the same
211 category of use (Table 2). For example, each survey included a species that has been
212 traditionally used to elaborate alcoholic beverages: in AE and AVT the complete and
213 immature raw fruits of *Juglans regia* (walnuts) are used to elaborate *ratafia* and in EM the
214 shoots of *Foeniculum vulgare* are used to prepare *herbes*, both traditional alcoholic drinks
215 elaborated with aromatic plants. Each survey also included two WFP whose fruits could be
216 consumed raw: *Rubus ulmifolius* was included in the three surveys and *Arbutus unedo* in
217 AE, *Fragaria vesca* L. in AVT and *Quercus ilex* in EM. Similarly, two WFP used for
218 seasoning were included in each survey: *Cynara cardunculus*, common across the three
219 sites, and *Origanum vulgare* in AE and AVT and *Crithmum maritimum* in EM. Finally, two
220 more WFP were included as vegetables: the young leaves of *Reichardia picroides* (L.)
221 Roth, *Taraxacum dissectum* and *Cichorium intybus* are eaten raw as salad and *Foeniculum*
222 *vulgare*, *Carlina acanthifolia* All. and *Chamaerops humilis* L. are eaten as snacks. Two
223 species (*Rubus ulmifolius* and *Cynara cardunculus*) were included in the surveys conducted
224 in the three areas and two more (*Juglans regia* and *Origanum vulgare*) were common to
225 both continental areas. *Foeniculum vulgare* was included in the surveys of AE and EM, but
226 representing different categories of use. The remaining species are specific to each area.

227

INSERT TABLE 2

228 *Survey*

229 The survey addressed three main topics: 1) participant's socioeconomic information
230 (e.g., sex, age, occupation); 2) past and present consumption of selected WFP; and 3)
231 motivations for consumption (or abandonment) of WFP. To enquire about past and present
232 consumption of selected WFP, we showed a visual stimulus where the food part could be
233 easily recognized. When possible, we used the fresh plant, but when not available, we used
234 a herbarium specimen or pictures. Respondents were asked to identify the species by their
235 Catalan name, the language most frequently used during interviews. To reduce biases
236 associated to problems recognizing the visual stimulus, if the informant could not identify
237 the species, we provided the local name of the WFP and asked again if the person knew it.
238 If the person could recognize the plant, either from the stimulus or when the name was
239 provided, then we asked about its uses. If the person could not recognize the plant or did
240 not mention its food-use, we moved to the next item in the survey. If the plant was
241 recognized and the food-use listed, we asked: "Have you eaten the plant in the last 12
242 months?" and "Had you eaten it in the past?"

243 Questions on motivations for consumption depended on previous answers. If the
244 respondent reported having consumed the WFP during the last 12 months, then we asked:
245 "Why do you consume this plant?" However, if the respondent reported having consumed
246 the plant in the past, but not in the 12 months previous to the survey, then we asked: "Why
247 did you not consume this plant anymore?" In case the survey respondent did never consume
248 the plant, we asked: "Why have you never consumed this plant?" We noted *verbatim*
249 answers to those different questions.

250 *Data analysis*

251 Data were aggregated at the WFP level, where each food-use per area corresponds
252 to one observation (n=21=7 plants *3 areas). To analyze the different WFP consumption
253 trends we used responses to questions about present and past WFP consumption.
254 Specifically, we created two variables: the variable *ever consumed* refers to the percentage
255 of people who had ever consumed the species, either currently or in the past; the variable
256 *consumption change* refers to the difference between the percentage of informants who
257 consume a species now minus those who consumed it in the past. We used the value of the
258 variable *consumption change* to assess consumption trends defined as ‘abandonment’ when
259 the value of *consumption change* was lower than -10%; ‘maintenance’ when the value was
260 between -10% and 10%; and ‘valorization’ when the value of the variable was higher than
261 10%. To qualify how noticeable is the trend, we talk about a *slight* change when the value
262 of *consumption change* is between 10% and 40% and about a *deep* change when is higher
263 than 40%.

264 In the second part of the analysis, we explored the factors that might drive such
265 trends using information from the third part of the survey. We first clustered similar
266 responses and assigned them a code. For example, answers such as “we used to eat them
267 because they were free” and “there is no need to buy vegetables, you can get them free
268 from nature” were both coded as “it is free.” The coded motivations were then classified
269 according to two criteria: direction and type. Direction refers to whether the motivation
270 listed explains why the consumption of the species was continued or discontinued and type
271 refers to whether the motivation listed was environmental, economic, or sociocultural.
272 Since the consumption of WFP can be driven by several motivations, and since some
273 motivations can potentially be classified in more than one type, before doing the

274 classification, we agreed on the meaning of each category using the Delphi method
275 (Linstone and Turoff, 2002). The agreement reached was to include under environmental
276 motivations mentions to environmental conditions such as climate, species abundance or
277 scarcity, and seasonality; under economic motivations reasons such as commercial value or
278 monetary and time-related costs associated to the harvesting and preparation of WFP; and
279 under sociocultural motivations explanations that respond to cultural perceptions, such as
280 use associated to particular activities or of given cultural significance.

281 **Results**

282 *Trends in the consumption of WFP*

283 More than 50% of people answering the survey in each site had *ever consumed* most
284 of the WFP in our lists. Exceptions are *Taraxacum dissectum*, which had only been
285 consumed by 30% of informants in AVT, and *Cichorium intybus* only consumed by 40% of
286 informants in EM. Overall, 16 out of the 21 WFP in the survey had been consumed by
287 more than 75% of people interviewed.

288 The analysis of the variable *consumption change* suggests a significant general
289 decrease in the consumption of WFP (Table 3). According to our classification, 10 of the
290 plant-uses included in the survey seem to have experienced a deep abandonment (*difference*
291 $< -40\%$), eight seem to have experienced a slight abandonment (*difference* $\geq -40\%$ & $\leq -$
292 10%), and three seem to be maintained (*difference* $\geq -10\%$ & $\leq 10\%$).

293 **INSERT TABLE 3**

294 Two of the three WFP that seem to be maintained are used to elaborate beverages.
295 Thus, the use of *Juglans regia* to elaborate *ratafia* continues alive in AE and AVT
296 (*consumption change* $\geq -10\%$ in both cases), whereas the use of *Foeniculum vulgare* to

297 elaborate *herbes* in EM seems to have experienced a slight abandonment (*consumption*
298 *change*=-14%).

299 Overall, WFP included as *fruits* seem to have been very popular in the past, as they
300 have reportedly been consumed by most people interviewed (>75%). However, the
301 relatively high values of the variable *consumption change* (<-35%) signal the steep
302 abandonment of the consumption of WFP in this category. This is the case even for the
303 very popular *Rubus ulmifolius*, with values of *consumption change* ranging between -39%
304 and -45%.

305 Among the WFP included in the category of *seasoning*, *Origanum vulgare*
306 continues to be largely consumed in AE (*consumption change*=-2.2%), but the use is
307 slightly abandoned in AVT (-20.2%). The equivalent species in EM, *Crithmum maritimum*,
308 seems to have been very popular in the past (with 97% of people reporting its use), but its
309 use have been deeply abandoned nowadays (*consumption change*= -44%). Differently, the
310 use of *Cynara cardunculus* for seasoning seems to have been popular only in AVT (where
311 90% of informants report its use), but it seems now largely abandoned in the three study
312 areas.

313 Overall, the consumption of the six WFP included as vegetables seems to be
314 decreasing too, although it is worth noticing that some of the uses in this category were
315 never very popular (i.e., two species in this food use category displaying the lowest values
316 in the variable *ever consumed*). Nevertheless, the values of the variable *consumption*
317 *change* suggest that all the WFP in this category have experienced some level of
318 abandonment, a trend that is similar for vegetables eaten as snack, such as *Foeniculum*
319 *vulgare* in AE (*consumption change* =-38.8%) and *Carlina acanthifolia* (-42.1%), and for

344 Thus, the most common arguments given to explain WFP consumption (56.8%) or
345 abandonment (37%) were sociocultural. Furthermore, among the sociocultural
346 explanations, informant's appreciation of the flavor and aroma of WFP was the most
347 frequently cited motivation (44.3% of all the answers).

348 Interestingly, the second most popular category refers to exactly the opposite: 6.4%
349 of all responses correspond to informants who have abandoned the consumption of WFP
350 because they did not like their taste. Other explanations given for the abandonment of the
351 consumption of WFP include not going to the field or the mountains where WFP grow
352 (5.2%), lack of sufficient knowledge to recognize the plant in the field (5.2%), or the
353 consideration that it as a children's food (2.5%) (Table 5).

354 Apart from their taste, explanations of why people continue to consume WFP
355 included the association of the gathering of WFP with other activities (e.g., walking on the
356 mountains) or celebrations (2.9%) and the medicinal (2.8%) or health-related (2.2%)
357 properties of the WFP selected.

358 The type and direction of the motivations did not vary substantially between the
359 three case studies, with some concrete exceptions. For example, some explanations were
360 only relevant in one of the study sites. Thus, in AE 1.2% of the explanations referred to the
361 cited the rough texture of WFP, in AVT 1.9% related to the lack of time, and in EM 1.7%
362 of the explanations referred to the fact that the WFP mentioned were considered fodder.

363

364 **Discussion**

365 Various authors have claimed that in modern industrial Europe there is a
366 valorization of the consumption of wild edible foods (Schunko et al., 2015) resulting of the
367 growing interest in incorporating wild food plants into the diet and on local cuisines

368 (Acosta-Naranjo, 2008; Łuczaj, 2012). Such valorization trend has been also documented in
369 the consumption of certain wild species in some areas of the Iberian Peninsula (Aceituno-
370 Mata, 2010; Parada et al., 2011; Rigat et al., 2009). Results from the work presented here,
371 however, do not confirm this finding. Rather, findings from this work suggest that, in the
372 selected study areas, there is an overall decreasing trend in the consumption of WFP. The
373 trend seems irrespectively of the food use given to the species.

374 It is possible that methodological and sampling differences explain the mismatch
375 between our results and results from previous research. Thus, the above-cited works consist
376 on compilations of ethnobotanical information, which report valorization of certain species
377 based on qualitative data. While qualitative information might provide nuanced and expert
378 information, it does not allow to quantifying changes for a given species, as it has been
379 done in the present work. Furthermore, it is also possible that the contradictory findings
380 point to sampling selection differences. Thus, qualitative work conducted with targeted
381 groups of respondents such as knowledgeable elders or WFP consumers can only provide
382 information from the selected groups. The results presented here have a more general
383 character, as the sample –without being statistically representative- included sectors of the
384 population not necessarily targeted in conventional ethnobotanical studies. So, while it is
385 possible that a specific WFP is revalorized, or that the overall value of WFP grows among
386 specific groups, our results suggest that this trend is not generalizable neither to the
387 diversity of WFP nor to the general population. We argue that future work aiming at
388 quantifying overall trends in the consumption of WFP should use a larger number of WFP
389 and a statistically significant sample of the population.

390 With those caveats in mind, we discuss the second important finding of this work:
391 that the decreasing trend in WFP consumption is mostly driven by sociocultural, rather than

392 by environmental or economic factors. Previous authors have provided evidence of the
393 importance of sociocultural motivations in explaining the consumption of WFP (i.e.,
394 Łuczaj, 2010; Pieroni, 2001). For example, Pardo-de-Santayana et al. (2007) documented
395 that in Piloña (northwestern Spain) people had stopped eating *Nasturtium officinale* R. Br.,
396 which they associated with times of starvation; and Pieroni (2001) reported that older
397 generations of Italians regarded eating wild greens as particularly healthy. In the same vein,
398 recent work has found that WFP providing cultural services, such as recreation and sense of
399 place, being markers of cultural identity, or present in culinary traditions are less likely to
400 experience a consumption decrease than WFP that do not provide such cultural services
401 (Schulp et al., 2014, Reyes-García et al., 2015, Schunko et al., 2015).

402 While our finding is not new, the novelty of our work lies in the ability to provide a
403 quantification of arguments across the different species selected. Based on qualitative data,
404 researchers have highlighted elements such as the importance that some food wild plants
405 play as childhood food (Kalle and Soukand, 2013), or the negative connotations associated
406 with WFP consumption, which in some areas are considered famine foods (i.e., Kalle and
407 Soukand, 2013; Cruz-García, 2014). Interestingly, although such motivations were
408 sporadically mentioned by our informants, they were not the most frequently cited. Rather,
409 our results indicate that changes in lifestyles and habits concentrate a large number of
410 explanations of why people are abandoning the consumption of the selected WFP. Thus,
411 some respondents argued that, in the past, they used to eat or gather WFP when going to the
412 fields for another activity (e.g., agriculture or keeping livestock). The fading of these
413 activities reduces people's chances to go to places where WFP are found. This is the case,
414 for example, of *Carlina acanthifolia*, which was specially consumed by shepherds, farmers
415 and children (who usually were in charge of the livestock). Or the case of *Cynara*

416 *cardunculus*, which was traditionally used to process milk in order to obtain cheese; as
417 nowadays most people buy cheese, the species is not used anymore, except in AE, where a
418 local cheese producer has reintroduced its use.

419 One last important finding deserves discussion. While respondents provided a
420 myriad of answers to explain why they have abandoned WFP consumption, they were
421 rather consistent in their responses to explain the maintenance of WFP consumptions:
422 people who continue to consume WFP do so because they like their taste. Such results
423 resonate with findings from research in Italy suggesting that taste is a main factor involved
424 in the prevalence of consumption of wild food plants (Ghirardini et al., 2007) and with
425 findings regarding the consumption of landraces grown in home gardens in the Pyrenees
426 (Calvet-Mir et al., 2011). If, as several authors have pointed, taste is culturally developed
427 (Ghirardini et al., 2007; Lewis, 1988), our finding contributes to reinforce the importance
428 of examining the links between local cultures and the different elements of their
429 environments.

430

431 **Conclusion**

432 The work presented here aimed at finding general trends and exploring the relative
433 importance of the different motivations behind the consumption or abandonment of WFP.
434 Overall, our work supplements the limited pool of current ethnobotanical literature on WFP
435 transitions through documenting and understanding how different plants and uses change
436 over space and time especially in the light of a generalized abandonment of their usage. It
437 also provides a deeper understanding of transformations through detailing the changing
438 ethnobotanical systems surrounding the studied areas, a research subject which is virtually

439 non-existent in postindustrial societies. Importantly, this kind of analysis is ideally suited to
440 raising public understanding of the significance of sociocultural parameters to the study of
441 the diversity and complexity in ethnobiological contexts.

442 While the aim of this work was to map general trends and motivations behind the
443 consumption of WFP, it is possible that such motivations play a different role across
444 different sectors of the population (as Schunko et al., 2015 suggest). While the sample used
445 for this work is too fragmented to systematically explore the issue, we argue that this line of
446 research is worth pursuing in future works.

447

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- 568
569

570 **Table 1** Sample description by study area (n=353)

Study area	N	% women	% per age group			% agriculture
			<40	41-60	>61	
Alt Empordà	101	48	38	27	36	15
Alta Vall del Ter	100	51	18	36	46	22
Eastern Mallorca	152	45	38	30	32	6

571

Table 2 Species included in the survey, per study site

Use ¹	Alt Empordà		Alta Vall del Ter		Eastern Mallorca	
	Species	Voucher	Species	Voucher	Species	Voucher
B	<i>Juglans regia</i> L.	BCN 29877	<i>Juglans regia</i> L.	BCN 24908	<i>Foeniculum vulgare</i> Mill.	BCN 95541
F	<i>Rubus ulmifolius</i> Schott	BCN 29938	<i>Rubus ulmifolius</i> Schott	BCN 24978	<i>Rubus ulmifolius</i> Schott	BCN 29938
F	<i>Arbutus unedo</i> L.	BCN 29836	<i>Fragaria vesca</i> L.	BCN 24889	<i>Quercus ilex</i> L.	BCN103497
S	<i>Cynara cardunculus</i> L.	BCN 29860	<i>Cynara cardunculus</i> L.	BCN 24759	<i>Cynara cardunculus</i> L.	BCN 29860
S	<i>Origanum vulgare</i> L.	BCN 29742	<i>Origanum vulgare</i> L.	BCN 24939	<i>Crithmum maritimum</i> L.	BCN104272
V	<i>Reichardia picroides</i> (L.) Roth	BCN 29933	<i>Taraxacum dissectum</i> (Ledeb.) Ledeb.	BCN 25016	<i>Cichorium intybus</i> L.	BCN 29660
V	<i>Foeniculum vulgare</i> Mill.	BCN 29867	<i>Carlina acanthifolia</i> All. subsp. <i>cynara</i> (Pourr. ex Duby) Arcang.	BCN 24738	<i>Chamaerops humilis</i> L.	BCN 23832

¹B= Beverage, F=Fruit, S=Seasoning, V=Vegetable

Table 3 Trends in consumption of selected WFP, per study site

Use ¹	Alt Empordà				Alta Vall del Ter				Eastern Mallorca			
	Species	Ever consumed	Change	Trend ²	Species	Ever consumed	Change	Trend ²	Species	Ever consumed	Change	Trend ²
B	<i>Juglans regia</i>	97.03	-4.95	M	<i>Juglans regia</i>	99.01	-9.00	M	<i>Foeniculum vulgare</i>	94.81	-14.07	SA
F	<i>Rubus ulmifolius</i>	89.90	-39.39	SA	<i>Rubus ulmifolius</i>	98.02	-44.55	DA	<i>Rubus ulmifolius</i>	92.72	-45.03	DA
F	<i>Arbutus unedo</i>	75.00	-56.58	DA	<i>Fragaria vesca</i>	98.02	-34.65	SA	<i>Quercus ilex</i>	74.13	-46.85	DA
S	<i>Cynara cardunculus</i>	60.00	-32.50	SA	<i>Cynara cardunculus</i>	90.57	-73.59	DA	<i>Cynara cardunculus</i>	50.00	-40.62	DA
S	<i>Origanum vulgare</i>	94.57	-2.17	M	<i>Origanum vulgare</i>	88.89	-20.20	SA	<i>Crithmum maritimum</i>	96.72	-44.26	DA
V	<i>Reichardia picroides</i>	77.78	-64.45	DA	<i>Taraxacum dissectum</i>	29.85	-26.86	SA	<i>Cichorium intybus</i>	40.21	-32.99	SA
V	<i>Foeniculum vulgare</i>	80.90	-34.84	SA	<i>Carlina acanthifolia</i>	92.63	-42.11	DA	<i>Chamaerops humilis</i>	90.43	-48.94	DA

¹ B= Beverage, F=Fruit, S=Seasoning, V=Vegetable

² M=Maintenance, SA= Slight abandonment, DA= Deep abandonment

Table 4 Percentage of responses according to type and direction of the motivations for the consumption of WFP

Direction Type	Discontinue		Continue		Total	
	N	%	N	%	N	%
Environmental ¹	49	2.82	10	0.57	59	3.39
Economic ²	21	1.21	28	1.61	49	2.82
Sociocultural ³	643	37	989	56.84	1632	93.79
Total	713	41	1027	59	1740	100

¹Climate, abundance, scarcity

²Commerce availability, investment of time, prize

³Flavor/aroma/texture, association with animal/children's/ scarcity/ local food, fashionable/ healthy/ traditional consideration, changes in resources management, habit/dietary changes, etc.

Table 5 Classification of motivations for the consumption of WFP

Direction	Motivation	Example	AE		AVT		EM		Overall		
			N	%	N	%	N	%	N	%	
Environmental											
Discontinue	It is scarce	There are very few	8	1.90	27	5.24	6	0.75	41	2.36	
	It is protected or its recollection is not allowed	It is prohibited	0	0.00	0	0.00	7	0.87	7	0.40	
	Non accessible/ It grows in difficult to access places	It grows at very high altitudes	1	0.24	0	0.00	0	0.00	1	0.06	
Continue	It is abundant	There are many	0	0.00	2	0.39	0	0.00	2	0.11	
	Accessible/ It grows in easy to access places	It is handy	1	0.24	5	0.97	2	0.25	8	0.46	
Economic											
Discontinue	It cannot be found in the market now	It used to be sold in sweet shops but now it cannot be found	0	0.00	0	0.00	2	0.25	2	0.11	
	It is laborious to collect/prepare	It is small and it takes a long time to collect	2	0.48	0	0.00	2	0.25	4	0.23	
	It is expensive/ It has never been given/brought to them	I only eat it when someone offers it to me	0	0.00	0	0.00	4	0.50	4	0.23	
	Lack of time	I have no time to collect them	1	0.24	10	1.94	0	0.00	11	0.63	
Continue	It can be bought	If available in the market, I buy them	0	0.00	2	0.39	19	2.36	21	1.21	
	It is free/ It was a gift	We ate it when we were children as it was free	0	0.00	1	0.19	6	0.75	7	0.40	
Socio-cultural											
Discontinue	Unpleasant flavor/aroma	I do not like it	34	8.08	31	6.02	47	5.85	11	6.44	
	It is consumed by outsiders	Urbanites go collecting them	0	0.00	1	0.19	1	0.12	2	0.11	
	It is associated with times of scarcity/ Other foods are now available	Before we were hungrier and ate it	6	1.43	6	1.17	12	1.49	24	1.38	
	It is only done occasionally	We do not eat it every year	8	1.9	17	3.3	58	7.21	83	4.7	

			0	0				7		
	It is considered food for animals	Rabbits eat it	2	0.48	0	0.00	14	1.74	16	0.92
	Food from the past/ Consumed during activities now in disuse	These are things of the past	1	0.24	1	0.19	15	1.87	17	0.98
	It is children's food	Eating it was a child's thing	3	0.71	2	0.39	39	4.85	44	2.53
	It has a rough texture	I do not like it; it has too many seeds	5	1.19	2	0.39	2	0.25	9	0.52
	Consumption associated to a specific place	We ate it when we lived in the country house	0	0.00	0	0.00	17	2.11	17	0.98
	Changes in resources management	We do not have cows anymore	11	2.61	16	3.11	3	0.37	30	1.72
	Unhealthy/ It has contraindications or restrictions for eating it	If you eat many you get drunk	2	0.48	4	0.78	2	0.25	8	0.46
	Consumption associated to a specific past activity	We do not make cheese anymore	9	2.14	5	0.97	14	1.74	28	1.61
	Collection is time consuming or inconvenient	I do not go to the fields anymore	23	5.46	49	9.51	19	2.36	91	5.23
	Consumption associated to a specific person not around anymore	I ate it when my mother used to prepare it.	0	0.00	0	0.00	10	1.24	10	0.57
	It is not within the person's habits	I do not use it	5	1.19	4	0.78	39	4.85	48	2.76
	Lack of specific knowledge of the use	I do not know well the plant	4	0.95	4	0.78	82	10.20	90	5.17
	Dietary changes	We have changed our diet	1	0.24	4	0.78	9	1.12	14	0.80
Continue	Pleasant flavor/aroma/texture	I like it	22	53.4	25	48.7	29	36.6	77	44.3
	Eaten as a social compromise	It was offered to me and I ate it	2	0.48	0	0.00	1	0.12	3	0.17
	Local food	This is very much from here	0	0.00	7	1.36	1	0.12	8	0.46
	Collection is a hobby	I never eat it but go to collect it for the family	0	0.00	1	0.19	2	0.25	3	0.17
	It is a tradition	It is our tradition here	1	0.24	4	0.78	11	1.37	16	0.92
	Specific cooking properties	Cheese prepared with it is tender	1	0.24	1	0.19	2	0.25	4	0.23

	It has become fashionable	All youngsters use it	0	0.0 0	1	0.1 9	0	0.00	1	0.0 6
	It is healthy/natural	It is good for health	18	4.2 8	11	2.1 4	10	1.24	39	2.2 4
	It has medicinal properties	It is good for cholesterol	23	5.4 6	24	4.6 6	1	0.12	48	2.7 6
	It is eaten to remember the past	I bought it because I get emotional with things of the past	0	0.0 0	1	0.1 9	0	0.00	1	0.0 6
	It is associated with festivities/specific activities	I eat it when I go collecting mushrooms	11	2.6 1	2	0.3 9	37	4.60	50	2.8 7
	Just because	I eat it just because	13	3.0 9	19	3.6 9	13	1.62	45	2.5 9
				421		515		804		1740

Figure 1 Location of studied areas