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Diversity and selection of wild food plants in six regions of Northwestern Iberian Peninsula (Spain and Portugal)

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This paper compares the traditional knowledge and use of wild edible plants in six rural regions of the Northwest of the Iberian Peninsula. Five of them are in Spain: *Campoo*, *Picos de Europa*, *Piloña*, *Sanabria* and *Caurel* and the sixth is in Portugal, *Parque Natural de Montesinho*. Through semi-structured interviews with local informants, data on the use of 97 species were collected. A semi-quantitative approach was used to document the relative importance of each species and to indicate differences in the selection criteria for consuming wild food species in the regions studied. Social, economic and cultural factors need to be taken into account when trying to understand why some wild edible plants have been consumed while others have not. The data indicate that a high percentage of species are used in most regions (17 species are used in 5 or 6 regions). These shared species include many wild fruit plants (e.g. *Rubus ulmifolius* Schott, *Fragaria vesca* L.) and the most popular species of each category of use [e.g. vegetables such as *Rumex acetosa* L., condiments such as *Origanum vulgare* L., or plants used to prepare herbal teas such as *Chamaemelum nobile* (L.) All.].

Key words: wild edible plants, quantitative ethnobotany, Spain, Portugal

Despite the primary reliance of agricultural societies on crop plants, the tradition of consuming wild plants has not been completely eliminated. Many people still gather wild edibles as a supplement of their poor diets while in other places, they still enjoy collecting and consuming them for their flavour, more than for their caloric input. Their nutritional role has been reported in many surveys from around the world (Arenas 2003; Bonet and Vallès 2002; Crowe 2001; Ertuğ 2004; Guarrera 2003; Lockett, Carvelt, and Grivetti 2000; Ogle et al. 2001; Ogoye-Ndegwa and Aagaard-Hansen 2003; Pieroni et al. 2005; Tardío, Pascual, and Morales 2005; Turner 1975). These plants have been important supplements to the diet, providing trace elements, vitamins and minerals.

Most studies on wild edible plants focus on the role of these plants within one culture, one ethnic group and little emphasis has been given to the comparison of food plants in various cultures, ethnic groups or communities (Ladio and Lozada 2003; Díaz-Betancourt et al. 1999). This kind of comparative studies are very useful to understand why edible species are either consumed or rejected.

The aim of this study is to compare the diversity of wild edible plants historically gathered for food purposes in six areas of the Northwest of the Iberian Peninsula (including Spain and Portugal) and to analyze the similarities and differences among them. This comparative method provides interesting insights of the selection criteria for

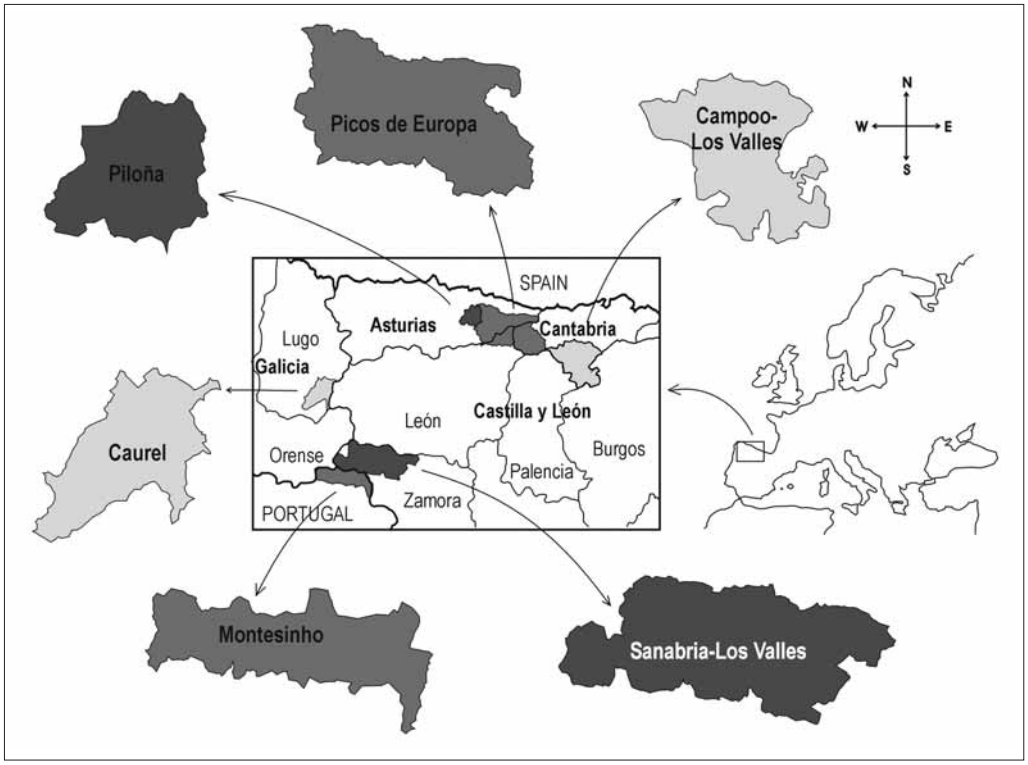

Fig. 1 Location of the six study regions.

food, and it is useful in determining the cultural importance of a particular plant as opposed to others in the same usage category.

Material and methods

Information was obtained through semi-structured interviews with key informants during the two last decades. Informants with a good traditional knowledge of useful wild plants were sought - mostly elderly people who had lived and worked in the region for many years. Open questions were asked about the consumption of wild foods to gain insight into their present-day use, ways of consumption and preparation, the time of collection and the places where each species was gathered.

For the present study, data were grouped into the following categories of edible plants based on folk perceptions: vegetables, plants whose leaves, stems or even unripe fruits or seeds were consumed; wild fruits or seeds consumed when ripe; home-made liqueurs or other alcoholic drinks; herbal teas, used in general as *digestifs*; plants used for seasoning; finally flowers and roots, both eaten for their sweet flavour. Every plant species mentioned by one informant within one category of use was counted as one use-report (UR) (see Kufer et al. 2005). For the purposes of the present comparison the species with only one UR at all has been rejected.

All studies were conducted in rural areas of the Northwest of the Iberian Peninsula (five in Spain and one in Portugal): *Campoo* in the South of the province of Cantabria (Pardo-de-Santayana 2003); *Picos de Europa*, a region that includes areas of the provinces of Asturias, Cantabria and León (Lastra 2003; authors personal observations); *Piloña* in central-eastern Asturias (San Miguel 2004); *Caurel*, in the South East of the province of Lugo (Blanco 1996); *Sanabria* in the North West of the province of Zamora (Blanco and Diez 2005) and *Montesinho* in the North East of Portugal (Carvalho 2005), close to Zamora province.

Their landscapes include a mosaic of meadows, forests, rivers and high mountain vegetation growing on varied geological materials and soils. Several types of beech and oak forest [*Quercus robur* L., *Q. petraea* (Matt.) Liebl. and *Q. pyrenaica* Willd.], broom scrubland [*Cytisus scoparius*

(L.) Link, *C. multiflorus* (L´Hér.) Sweet, *Genista florida* L.], and heath [*Erica cinerea* L., *E. vagans* L., *E. australis* L., *E. umbellata* L., *Calluna vulgaris* (L.) Hull] dominate the landscape.

Until few decades the economy of the regions was based on agriculture, cattle breeding and a number of minor activities. Many fields that were used to grow cereals (for bread), pulses and potatoes have now given way to pasture for cows. While the household economy was largely subsistence-based, additional income was derived from the sale of animals, eggs, butter and handicrafts.

All the studied areas are culturally and biologically rich regions, most included in protected areas, such as National Park of Picos de Europa, Natural Park of Sanabria Lake and Natural Park of Montesinho. These areas are located on the border between the Mediterranean and Eurosiberian floristic regions.

Voucher specimens were deposited at the herbariums of the Royal Botanical Garden of Madrid (MA, Real Jardín Botánico), the University of Oviedo (FCO, Universidad de Oviedo) and the School of Agricultural Engenieering of Bragança (BRESA, Escola Superior Agrária).

Results and discussion

Table 1 shows the overall numerical results of each of the ethnobotanical works and some geographical features of the different surveyed areas. It can be seen that the number of species and the number of URs recorded within these regions varies greatly. Taking into account that a similar methodology was followed in all the ethnobotanical works, this variation on the results might be due to differences in sample size (number of localities visited and informants interviewed), geographical characteristics of the surveyed regions (surface and population), but also to the disparity in knowledge and use of wild edible plants among different human groups.

Table 2 includes the correlations among all of these variables. It shows a clear and positive correlation ($r=0.84$, $p<0.05$) between the number of wild edible species obtained in the different areas and the number of informants interviewed and also between the latter variable and the number of localities visited. These facts seems to be quite logical and at least until reaching a maximum value, the higher number of informants are interviewed and the higher number localities are visited,

Table 1. Overall numerical results and geographical features of each surveyed areas

Surveyed areas	N. Species	N. Use-report	Informants	Localities	Surface (km^2)	Population
Campoo	57	474	107	42	1012	23000
Caurel	21	114	39	19	100	1200
Picos de Europa	54	571	131	67	1920	19900
Piloña	34	219	94	51	283	8600
Montesinho	50	905	90	28	786	9172
Sanabria	30	131	44	20	2120	15000

Table 2. Correlation matrix among all the variables

	N. Species	N. Use-report	Informants	Localities	Surface	Population
N. Species	1.00					
N. Use-report	0.77	1.00				
Informants	0.84*	0.62	1.00			
Localities	0.56	0.28	0.90*	1.00		
Surface	0.39	0.11	0.20	0.23	1.00	
Population	0.81	0.29	0.65	0.53	0.70	1.00

Marked correlations (*) are significant at $p < 0.05$

the higher botanical knowledge will be registered. Although not so significant, there is also a high correlation (r=0.81, p=0.05) between the number of plants used and overall population of each region.

However, in our analysis the number of species is not correlated with the surface of the surveyed area (r= 0.39), the contrary as could be expected. A larger area will have in general a richer flora that will probably yield a higher number of useful plants. The cited deviation in the correlation coefficient is clearly originated by the study of Sanabria, because this work is only a preliminary survey with a too small ethnobotanical sample for the great surface of the region, as can be seen in Table 1. This could be demonstrated if we calculate the correlations among the same variables but without the study of Sanabria. That way the correlation coefficient between the number of species and the surface area would be much higher (r=0.79, p=0.11).

Therefore, if only rapid ethnobotanical studies can be made, the best way of obtaining the biggest diversity of plants is to select a large and diverse study area and to visit as many scattered localities as possible in the available time. For the same number of people interviewed, it will certainly provide more plants than if a little area is surveyed. In the former case we can only expect to get a preliminary list of the plants used that will includes the most popular plants of each area, with very little redundant data.

This analysis shows that the size of the sample must be selected to best suit the objectives of the project. If all the plants used for a certain purpose want to be documented, the correct number of informants must be interviewed in order not to waste time and work. The number of informants must be selected according to the population and extension of the study area.

Botanical analysis

The use of 97 plant species, belonging to 25 botanical families, has been registered in all these areas. Regarding to the diversity of the species gathered Rosaceae was the most important family, with 19 species, mainly collected for eating their mature fruits or preparing liqueurs. Other important families were Lamiaceae, with 13 species, used as condiments and digestive infusions and Asteraceae, with six species ingested as green vegetables or in infusions. Five species of Polygonaceae were mainly consumed as vegetables and other five species of Apiaceae were employed in many categories of use.

All the species gathered were autochthonous except for *Mespilus germanica* L., and *Prunus cerasus* L., which after centuries of cultivation, nowadays grow feral in the area. Many species such as *Corylus avellana* L., *Borago officinalis* L., *Laurus nobilis* L., *Castanea sativa* Mill., *Rubus idaeus* L., *Taxus baccata* L., *Ulmus minor* Mill., *Mespilus germanica* L., *Prunus avium* L., *P. insititia* L., *Ribes uva-crispa* L. and *Origanum vulgare* L. are either collected from the wild or cultivated in gardens.

Plants that have been consumed in five or more of the regions studied, can be considered the most relevant or popular species of the whole surveyed area (Table 3). They include many wild fruits such as nuts (chestnut and hazelnuts, both species which are managed or semi domesticated), berries (such as wild strawberry, blackberry or blueberry), cherries and plums. Other species consumed in most of the regions are those gathered for preparing liqueurs (dwarf cherry and blackthorn), the most appreciated vegetables (watercress, sorrel), condiments (bay leaves, oregano), herbal teas (camomile) and fennel that is used for many purposes.

If we consider the number of URs, the list of plants with the highest number of use-reports is similar than the list of plants that are consumed in most regions. Species with the highest number of URs also include the most important species of each category of use. They do not include any species of certain categories such as flowers, sucked for obtaining their sweet nectar, and roots and other underground sweet parts.

Other species have a quite high number of URs but are only popular in one or two regions. This is the case of some vegetables, such as *Montia fontana* L., consumed raw in salads in Sanabria and Montesinho, or *Bryonia dioica* Jacq., very popular in Montesinho for preparing omelettes, soups and stews.

Nearly all of the most common food species of the region are also widely consumed in the whole Spain and the Mediterranean area. An exception is

Rumex acetosa L., which although in Piloña and Campoo is the vegetable most cited, it is not so commonly gathered in the rest of Spain (Tardío, Pardo-de-Santayana, and Morales 2006). However, some edible species that are commonly consumed throughout the Iberian Peninsula such as *Asparagus officinalis, Scolymus hispanicus* L., *Silene vulgaris* (Moench) Garcke, *Taraxacum officinale* Weber, *Hypochoeris radicata* L., *Bryonia dioica* Jacq. or *Portulaca oleracea* L., are not gathered in the regions studied or only seldom collected, although they grow in all of them. On the other hand, species such as *Mespilus germanica* L., *Romulea bulbocodium* (L.) Sebast. et Mauri, *Sideritis hyssopifolia* L., *Trifolium alpinum* L. are mainly consumed in the Northern regions. This shows that the consumption or rejection of some species, especially wild vegetables, can be used as indicators for establishing cultural "homogeneous or related" areas.

Unusual foods

Some of the food species eaten in these Northwestern regions have been scarcely documented before as food plants in the ethnobotanical literature. That is especially true for the plants used as sweets, either roots or flowers. *Crocus nudiflorus* Sm., whose sweet roots are eaten, and many plants that were sought for their sweet nectar by children and shepherds such as *Pedicularis schizocalyx* (Lange) Steininger, *Fritillaria pyrenaica* L. and *Lamium purpureum* L. are included in this group of plants scarcely documented. Another interesting species is *Halimium lasianthum* (Lam.) Spach, whose flowering buds or immature fruits were chewed as a snack. However, in many cases other species of these genera are well-known edible species (Tardío, Pardo-de-Santayana, and Morales 2006; PFAF 2005). These plant uses are frequently ignored by researchers and not considered as proper food. The caloric value of nectar is high and, although many flowers should be sucked to obtain high caloric input, these species can have played a role in human nutrition, especially in children's diets.

But there are also unusual species within other food categories, such as plants used for seasoning. *Physospermum cornubiense* (L.) DC. is used in Montesinho to prepare liqueurs and to flavour different sorts of cakes made with chestnuts; the leaves and flowers *of Salvia sclarea* L. are employed in the same region for seasoning soups; and the flowers and young buds of *Pterospartum tridentatum* (L.) Willk. are still used there to prepare a local dish called "arros malandro", a soggy rice. This plant is also used to flavour game or to give a wild flavour to chicken or rabbit.

Other unusual food species is *Nymphaea alba* L., whose immature raw fruits were eaten in Sanabria in the same way as it was documented in the eastern region of Comunidad Valenciana (Pellicer 2001). The edible use of *Tragopogon pratensis* L., *Rumex obtusifolius* L., *Malva tournefortiana* L. as vegetables are scarcely mentioned before as well.

In other cases, the species are well known in other areas as edible plants but the part consumed or the way of consumption is different. *Scandix australis* L., for instance, was known to be eaten as a vegetable in other Spanish regions (Tardío, Pardo-de-Santayana, and Morales 2006), but not to flavour liqueurs, to obtain aniseed liqueur.

Availability of species

As it was stated before, some edible plants that grow in a certain area are not consumed there. In *Caurel,* a little and isolated area, less than a third of the available species have been consumed, while in *Picos de Europa* four fifths of the available species have been consumed. Although isolated regions commonly show a higher knowledge transmitted orally, their isolation also leads to a lack of cultural interchange with other regions. At least at European latitudes, popular knowledge of plants is a mixture of oral traditions transmitted among generations and information provided by books or by foreigners to members of the community either of the living generations or of their ancestors. This fact suggests that cultural and not ecological reasons are responsible for the differences in the selection of species.

Interestingly, there are some differences among the categories of uses. The species used to prepare liqueurs or wild fruits, are usually consumed if available, while flowers or vegetables are commonly not consumed or rejected.

In past times, bad communications, lack of money and the hard climate conditions for growing fruit trees made it very difficult to obtain

cultivated fresh fruits. Therefore, people needed to gather it from the wild. In fact, only a little species of wild fruits are rejected in some of the areas, they include such as *Amelanchier ovalis*, rare in the region and the bitter and unpleasant acorns of *Quercus robur* L. and *Q. petraea* (Matt.) Liebl. However, the low demand for wild vegetables in the surveyed areas could be due to the easy availability of cabbage or lettuce in homegardens.

Table 3. Wild food plants utilized in five or more surveyed areas, with the number of informants that mention each food use. SAN: Sanabria; CAU: Caurel; PIL: Piloña; PIC: Picos de Europa; CPO: Campoo; MON: Montesinho

Family/Species (English name)	SAN	CAU	PIL	PIC	CPO	MON	Food use category	Part used, way of consumption
Apiaceae								
Foeniculum vulgare Mill. (fennel)	3	3	1	2		10	Liqueurs	Aerial part or seeds for liqueurs
				1	1		Vegetables	Tender leaves and stems, raw in salads or stewed
						32	Seasoning	Seeds for seasoning soups and stews
				2		23	Herbal teas	Aerial part or seeds for herbal teas or liqueurs
Asteraceae								
Chamaemelum nobile (L.) All. (Roman camomile)	4	6	26	34	17	13	Herbal teas	Inflorescences, as herbal tea
Betulaceae								
Corylus avellana L. (hazelnut)	2	13	10	34	13	3	Fruits	Fruits, eaten raw, dried, added to cakes
Brassicaceae								
Rorippa nasturtium-aquaticum (L.) Hayek (watercress)	6	3	1		11	28	Vegetables	Tender leaves and stems; raw in salads or stewed in soups
Ericaceae								
Vaccinium myrtillus L. (blueberry)	4		6	22	18		Fruits	Fruits, eaten raw and for making jam
	1	5		6			Liqueurs	Fruits, for making liqueurs
Fagaceae								
Castanea sativa Mill. (chestnut)	12	12	31	19	5	43	Fruits	Fruits, eaten raw, dried, roasted or added as a condiment for stews, sometimes ground into flour
Lamiaceae								
Origanum vulgare L. (oregano)	8	6	10	12	20	48	Seasoning	Inflorescences, for seasoning pork (black pudding, "chorizo", marinated pork), stews and roasted meat
			2		1	2	Herbal teas	Inflorescences, as herbal tea
Thymus pulegioides L. (wild thyme)	2	2		6	3	3	Herbal teas	Inflorescences, as herbal tea
				1		2	Seasoning	Inflorescences, for seasoning fish and meat stews and "chorizo"
Lauraceae								
Laurus nobilis L. (bay tree)	1	7	7	27	12	45	Seasoning	Leaves, for seasoning stews

Polygonaceae								
Rumex acetosa L. (sorrel)	5		22	15	35	18	Vegetables	Basal leaves, raw as a snack, in salads or stewed in soups
Rosaceae								
Crataegus monogyna Jacq. (hawthorn)	4		1	20	17	3	Fruits	Fruits, eaten raw
Fragaria vesca L. (wild strawberry)	2	4	5	21	10	30	Fruits	Fruits, eaten raw or desserts
						25	Liqueurs	Fruits, for making liqueurs
Prunus avium L. (cherry tree)	4	7	1	2	3	37	Fruits	Fruits, eaten raw as dessert
				3		2	Liqueurs	Fruits, for making liqueurs
Prunus cerasus L. (sour cherry tree)						11	Fruits	Fruits, for making jams
	2	3	12	4	5	7	Liqueurs	Fruits, for making liqueurs
Prunus spinosa L. (blackthorn)			6	17	16		Fruits	Fruits, eaten raw after stored
	9	8	9	21	14	6	Liqueurs	Fruits, for making liqueurs
Rosa canina L. (wild rose)			4	4	11		Vegetables	Young shoots, raw as a snack
	6			10	18	3	Fruits	Fruits, eaten raw
				1	1		Liqueurs	Fruits, for making liqueurs
Rubus ulmifolius Schott (blackberry)			5	6	14		Vegetables	Young shoots, raw as a snack
	4	9	7	29	16	27	Fruits	Fruits, eaten raw as dessert or for making jams
			2	4	1	6	Liqueurs	Fruits, for liqueurs

Conclusions

As a result of our comparison, it seems that the patterns of wild plant usage depend mainly on socio-cultural than on biological factors such as climate conditions or the richness of the wild edible flora. Social, economic and cultural factors need to be taken into account when trying to understand why some wild edibles are consumed while others are not. Availability of running water, free time to take care of homegardens, better communications and information exchange, direct contact with nature in everyday life, cultural values, fashion and tastes are some of the facts that explain why wild plants are either consumed or rejected.

Some wild species are still gathered, including those plants that have been historically consumed in all the regions with a high frequency of citation. They are the most important species of each category of use (fruits, vegetables, infusions or liqueurs), grow in all the regions and, in many cases, if not easily available from the wild they are even cultivated. They can be considered "key plants" or the core of wild food flora.

Many of the wild edible plants have been considered to be famine food. Rural people from Spain and Portugal frequently think that these plants are old fashioned, unprofitable, or too time-consuming, and prefer to used cultivated plants or buy their food. However, nowadays some species, such as *Sideritis hyssopifolia* L., are being regarded as local specialties, gourmet food or local food that reflect the regional identity and are becoming more popular.

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