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Plants for veterinary use in the Montaña Palentina region (Palencia, Spain)

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Profound social changes that have occurred in recent decades in rural society have led to the abandonment of ethno veterinary practices and knowledge, traditionally used to treat and prevent animal diseases. The main objective of this ethno botanical work is to document the traditional veterinary uses of plants in the Montaña Palentina region (Palencia, Spain). The data obtained has been compiled through 139 semi-structured interviews, with a total of 187 people, of whom 97% were over 60 years old. The results of the study collect a total of 61 plant species with veterinary uses, belonging to 32 botanical families, with Asteraceae being the family with the highest representation in terms of number of species (13), and also in terms of number of records of use (72). There were a total of 202 records of use, distributed in 11 use categories, with the result that the treatment of diseases of the digestive system had the highest number of recorded uses at 56 (28% of the total), followed by skin and subcutaneous cell tissue uses at 44 (22% of the total). The plant species with the highest number of records of use was *Gentiana lutea* (33), divided between the cure and prevention of diseases of the digestive (20) and respiratory systems (8), and infectious and parasitic diseases (5). The study may help to preserve traditional ethno veterinary knowledge in the Iberian Peninsula, as well as promote studies that consider clinical herbal medicine in animal health care.

Key words: Ethnoveterinary, veterinary herbal medicine, traditional knowledge, Palencia, Iberian Peninsula.

INTRODUCTION

The use of plants for a medicinal purpose is not only limited to the treatment of human diseases, but also extends to the treatment of diseases in livestock (Pieroni et al., 2006). The traditional uses of numerous plants have been corroborated in recent years by scientific evidence (Bischoff et al., 2007).

Popular Veterinary Medicine or Ethnoveterinary Medicine (EVM) is the scientific term that defines traditional animal health care by integrating people's knowledge, related skills, and personalised procedures for the purpose of treating and preventing animal diseases (McCorkle, 1986; Mathias, 2004; Wanzala et al., 2005; Davidovic et al., 2011). The importance and effectiveness of this knowledge in livestock development are beyond dispute, being valued and documented by various professionals, offering a useful tool in the search for suitable solutions in local development projects (Martin et al., 2001).

The transfer of this knowledge has usually been carried out orally from generation to generation. However, the

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depopulation and sociocultural changes of recent decades have created a new relationship with the environment, endangering this chain of transmission of knowledge, and so it has become necessary to collect and analyse this cultural legacy before it is lost (Pardo and Gómez, 2003).

To stop this loss, an increasing number of research studies related to veterinary medicine have been undertaken, both worldwide (Viegi et al., 2003; Wynn and Fouguere, 2006; Pieroni et al., 2006; Mayer et al., 2014), and at the national level, where the Spanish Inventory of Traditional Knowledge (IECT) has been developed, with the task of recovering and compiling ethno botanical knowledge (Pardo et al., 2014, 2018a, b, c; Tardío et al., 2018). These studies addressing EVM are necessary to maintain local cultural identity (Farnsworth et al., 1985; Etkin, 2000), and are also justified by the possibility of generating useful information to develop livestock healing practices and methods adapted to the local environment. They may also be a veterinary resource to promote the use of new medicines derived from plants and could contribute to the conservation of biodiversity (Tabuti et al., 2003; Menale et al., 2016; González et al., 2020).

Despite all these studies, this knowledge is still to be expanded, especially in rural areas situated in isolated geographical regions where the economy of self-sufficiency is widespread (Mathias, 2007). In general, studies in these areas show the vast knowledge that the inhabitants have about the local flora and its use (Romero et al., 2013). The store of knowledge depends on the collective memory of a few people, since it is not common knowledge for everybody. In addition, the knowledge is the collective and community property of ancestors and is kept in the custody of the elderly within a community (Wanzala et al., 2005). For generations, farmers have closely observed their animals and their environment, getting to know in detail each animal's yield and its state of health, naming different diseases in a particular way and developing methods of prevention and treatment to keep their animals healthy and productive (Molina, 2004). The plants involved in EVM in the Montaña Palentina region are considered in the present study, which has the following objectives: documentation of knowledge concerning plants for veterinary use, dissemination of results within the scientific community and contributing to the conservation of biodiversity.

Study region

The Montaña Palentina is located on the southern slopes of the Cantabrian Mountains, whose western end extends into the province of León while the eastern one extends into the province of Burgos. Its northern limit is made up of the provincial border while the southern one corresponds to the change from mountainous landscape to smooth and undulating high plateau. This limit coincides in the western part with the railway line, León–Bilbao, known as the La Robla train. It is located between the coordinates 42° 11’ 25’’ and 43° 04’ 05‘’ N and between 3° 59’ 26’’ and 4° 54’ 12’’ W (Figure 1). It occupies an area of 1,576 km^2, encompasses 16 municipalities and 116 localities, and is made up of four morpho-structural units: Fuentes Carrionas-La Peña, La Pernía, La Braña and La Lora (Diputación de Palencia, 2011c).

The main characteristic of the region in terms of relief is its mountainous character, with a strong contrast between the valley plains and the altitudes of the mountains formed by alpine orogeny, producing steep slopes to the west and gentler slopes to the east. Several summits with altitudes of more than 2,000 m stand out, such as those of El Infierno (2,537 m), Curavacas (2,528 m) or Espigüete (2,450 m). In addition, the Montaña Palentina is the hydrographic origin of the two most important rivers in the province, the Carrión to the west and the Pisuerga to the east, and in it are the reservoirs and the watersheds of the Cantabrian slopes of the Duero and Ebro (Diputación de Palencia, 2011a, b).

The fundamental aspects in the demographic behaviour of the study area are the population decline, the decrease in population density, aging and the decrease in the rate of vegetative growth, and the concentration of the population in three nuclei- Aguilar de Campoo, Cervera de Pisuerga and Guardo- the municipalities with the greatest number of inhabitants, in which industrial activity has made up a considerable amount of the economy of the area. The population has decreased by 43%, from the 1960s to the present day, with the population density of the area standing at 13.15 inhabitants/km^2 (Diputación de Palencia, 2011e).

Extensive livestock farming constitutes the most significant agricultural use in the area, while taking advantage of grazing resources in high mountain areas. The traditional economy until a few years ago consisted of family farms based on rain-fed crops and the communal exploitation of land for extensive livestock farming. Cows or oxen were fundamental for working the land and transport. Other cattle were exploited extensively and collectively in meadows and communal areas. The most abundant breed of cattle in the area is the Braunvieh, although there is also Friesian, Tudanca and crossbreeds. During the colder months, from December to March, the cattle are housed, with a diet based on fodder, straw and hay, and the rest of the year the cattle remain in the mountains (Alcalde, 1981, 1982, 1991, 1992). Lastly, mining was also of great importance until the 1990s in terms of employed labour and wealth creation (Diputación de Palencia, 2011d).

MATERIAL AND METHODS

Data collection

Field data was collected through semi-structured interviews, from April 2010 to August 2018, resulting in a total of 139 interviews, with

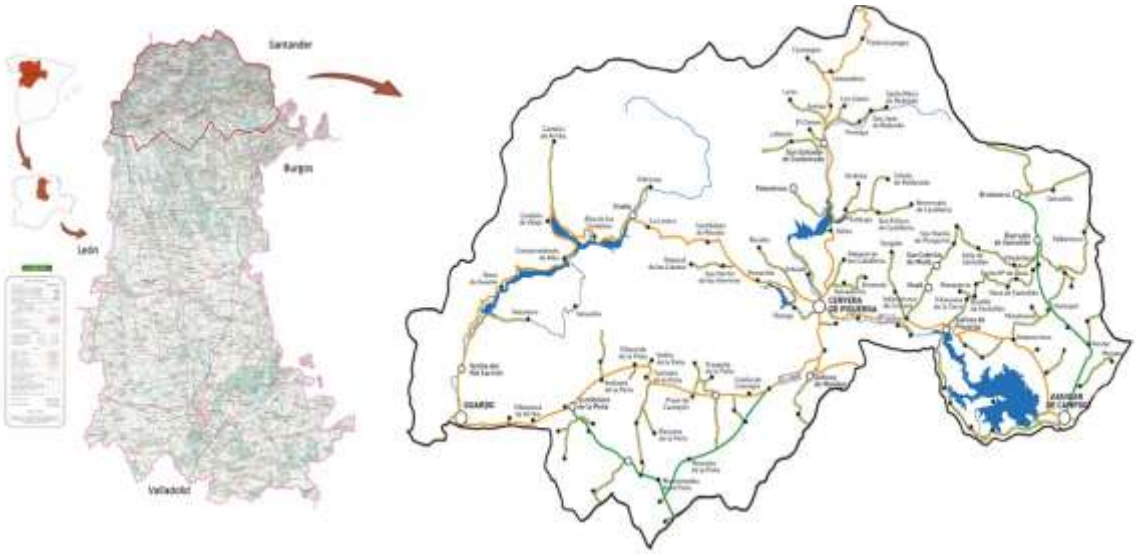

Figure 1. Geographic location of the Montaña Palentina region and locations where interviews were conducted.

187 people being interviewed. The selection of the informants was not random. It was a premeditated sampling, asking in each locality visited by the people with the greatest knowledge on the subject, directing this sample towards people older than 60 years (97%). The mean age of the informants was 80 years, with 88% of the interviewees over 70 years old, 9% between 60-69 years old and only 3% of the people under 60 years old and generally with little knowledge of local traditions.

For botanical identification, "Flora Ibérica" (Castroviejo et al., 1986) and "Claves ilustradas de la Flora del País Vasco y territorios limítrofes" (Aizpuru et al., 1999) were used. Subsequently, the scientific names of the plants were updated and included in their corresponding family according to the fourth approach on the ordering of the Angiosperm Phylogenetic Groups (APG IV, 2016) criteria collected in *The Plant List* database (2013). A total of 60 specimens were deposited as vouchers in the Herbarium of the Botany department of the Palencia Campus of the University of Valladolid (PALAB).

Data analysis

The collected data was analysed following the criteria established in the Spanish Inventory of Traditional Knowledge related to Biodiversity (Pardo et al., 2014), grouping the uses according to the bodily organ or system on which they act, and so obtaining references in the 11 categories of use indicated in Table 1. Furthermore, the data obtained were compared with those found in the bibliographic review carried out on EVM in the Iberian Peninsula and in other regions of the Mediterranean area. In the quantitative analysis of the data, the use records (UR) were counted taking into account that a use record represents each reference made by an informant about a species in a specific use category.

RESULTS AND DISCUSSION

Considering all the categories in which some use of an ethnoveterinary nature has been mentioned, a total of 61 plant species belonging to 32 botanical families were compiled, as shown in Table 2, in which the flora protection category is also indicated (BOCyL, 2007). A total of 202 use records (UR) were collected, of these, 50 species were obtained from the wild, which represents 81% of the total, and the other 11 are cultivated. The 50 species obtained from the wild constitute 2.5% of the 1982 estimated taxa existing in the flora of the Montaña Palentina (Anthos, 2012).

The families with the highest representation in terms of number of species were: Asteraceae, Lamiaceae and Poaceae, with 13, 4 and 4 species respectively, while the family with the highest number of use records was Asteraceae with 72, or 35% of the total use records. The preponderance of this family in EVM coincides with other ethnobotanical studies carried out, in which it was also the most represented family, both in the Iberian Peninsula (such as, Blanco et al., 1999; Aceituno-Mata, 2010; González et al., 2011; Romero et al., 2013; Pascual Gil, 2016) and in other regions of the Mediterranean area (such as, Viegi et al., 2003; Pieroni et al., 2006; Bullitta et al., 2007). The 202 UR obtained are divided into 11 categories as indicated in Figure 2, resulting in the digestive system receiving the highest number of records with 56, or 28% of the total, followed by skin and subcutaneous cell tissue with 44, or 22% of the total.

This result is similar to the findings of other ethnoveterinary studies (Blanco et al., 1999; Ertug, 1999; Viegi et al., 2003; Bonet and Vallès, 2007; González et al., 2011; Pascual Gil, 2013).

The species with the highest number of use records in the veterinary categories are represented in Figure 3. The species with the most records of use was *Gentiana lutea* L. with 33, divided between the digestive system (20), the respiratory system (8) and infectious and

Table 1. Categories of use represented in Veterinary Medicine.

Subcategories
Digestive system
Genito-urinary system
Conception, pregnancy and birth
Respiratory system
Musculature and skeleton
Skin and subcutaneous cellular tissue
Sense organs
Infectious diseases and parasites
“Cultural” diseases
Intoxication and poisonings
Other veterinary uses

parasitic diseases (5). One aspect to take into account is the part of the plant used for therapeutic purposes, in this sense, it is indicated in decreasing order: leaves, inflorescence/flowering tops, roots/rhizomes, fruit, seeds and latex. Results coincide with other studies carried out in the Iberian Peninsula (Blanco et al., 1999; Latorre, 2008; Akerreta et al., 2010; González et al., 2011; Pascual Gil, 2019).

The most common form of preparation in the area is extraction using a boiling liquid, generally water, although this procedure has also been documented with milk or wine. Note that for the interviewees, the terms infusion or extract are synonyms, although there is a more frequent use of the term infusion when the parts used are the parts above ground with flowers, inflorescences or flower tops and when, in addition, the type of application is internal. Other preparation methods that were recorded were poultices based on compresses or towels, and ointments based on frying in oil, fat or butter, both methods applied externally in all cases. A small number of preparations were done through the inhalation of aromatic smoke. All these preparation methods are traditionally used in EVM, and do not require apothecary knowledge to prepare them (Pardo, 2004).

The EVM of the region showed that internal use applications are slightly higher (52%) than those for external use (47%) due to the importance of treatments of the digestive system, respiratory system and the genito-urinary system when caring for cattle. Most of the externally applied remedies were in the skin and subcutaneous cellular tissue categories, as well as in musculature and skeleton. Veterinary plants were mainly used to solve diseases of cattle (39%). Their health was a matter of vital importance, since they were essential to carry out tasks in the fields and provide food, and were consequently considered as members of the family. Other animals treated with significance were pigs (10%), essential in providing food within the family nucleus, and sheep (15%) and goats (13%), whose use in the area lost relevance over the course of time. The least number of citations comes from the treatment of animals such as poultry (5%) and rabbits (5%).

Digestive system

There were 56 UR collected, corresponding to 20 plant species from 16 different botanical families, 16 plant species from the wild and four cultivated, representing 28% of the total records of veterinary uses. The species with the highest number of UR was genciana (*Gentiana lutea*), the same as in the province of Asturias where it is the most popular plant for the treatment of digestive problems in livestock (Dopico et al., 2008). This is frequently used as an appetiser for livestock, as loss of appetite is common in recently weaned animals.

The most frequent digestive disorders in cattle are those derived from indigestion, cramps or colic that causes severe pain in the abdominal cavity. They are treated with extracts of manzanillas (*Anthemis arvensis*, *Chamaemelum nobile*), té (*Sideritis hyssopifolia*), lino (*Linum usitatissimum*) or ramagón (*Rumex pulcher*), which are served warm with great skill by the farmer by placing a bottle under the animal’s tongue. One of the diseases that most troubled farmers was tympanism (swelling of the abdomen of cattle) caused by the accumulation of gases produced during microbial fermentation in the rumen and which, if not expelled in time, could cause the death of the animal. Various methods were used to expel the gas, from introducing a ball of fat with malva (*Malva sylvestris*), gardincha (*Echium vulgare*) or pimentón (*Capsicum annuum*), a cynipid wasp gall developed on zarzas (*Rosa* spp.), or an infusion of anís (*Scandix australis*). For laxative remedies, extracts of rotten cebollas (*Allium cepa*) with manzanilla (*Helychrisum stoechas*) or extracts of the leaf of tiraña (*Pinguicula grandiflora*) are used, with this remedy also being referenced in the Asturian municipality of Piloña (San Miguel, 2004). However, a interesting method was found to stop diarrhoea in sheep: tying a

Table 2. List of plant species used in Veterinary Medicine.

Family/*Scientific name* (voucher)	Common name	Use category	Disease or condition	UR	Part used	Preparation	Application	Livestock
Adoxaceae								
Sambucus ebulus L. (PALAB 2626)	Nuezgo, yezgo	Musculature & skeleton	Contusions	1	PAG	Poultice used after extraction	E	o, v
		Respiratory system	Catarrh	1	Inflorescence	Aromatic smoke	E	v
Sambucus nigra L. (PALAB 2608)	Saúco, saúgo, sabúgo, taco	Musculature & skeleton	Contusions, swelling	6	Inflorescence	Poultice used after extraction Aromatic smoke	E	o, v
		Skin & subcutaneous cellular tissue	Wounds	3	Inflorescence	Wash with infusion	E	c, o, v
Amaryllidaceae								
Allium cepa L. (PALAB 821)	Cebolla	Digestive system	Laxative	1	Bulb	Extract	I	v
Allium sativum L. (PALAB 287)	Ajo	"Cultural" diseases	"*Traidora*"	1	Dry stems	Aromatic smoke	E	v
Apiaceae								
Angelica sylvestris L. (PALAB 2455)	Angélica, chiflato	Digestive system	Indigestion, gas	1	Inflorescence	Extract	I	v
		"Cultural" diseases	"*Traidora*"	1	Inflorescence	Extract	I	v
Scandix australis L. (PALAB 2407)	Anís, anís de lastra	Digestive system	Gas	1	PAG with fruit	Macerate in *orujo*	I	v
Araceae								
Arum italicum Mill. (PALAB 1984)	Hierba de la culebra	Skin and subcutaneous cellular tissue	"*Babón*"	4	Root	Poultice	E	e, v
Aspleniaceae								
Asplenium trichomanes L. (PALAB 2278)	Golondrillo, golondrino	Conception, pregnancy & birth	Delivery of placenta	2	Fronds	Extract	I	v
		Respiratory system	Congestion	1	Fronds	Extract	I	v
Asteraceae								
Achillea millefolium L. (PALAB 1232)	Milenrama, birlenda	Digestive system	Colic	3	PAG	Extract	I	v
		Genito-urinary system	Retention of urine	1	PAG	Infusion	I	v
Anthemis arvensis L. (PALAB 1497)	Margarita, manzanilla	Digestive system	Indigestion	12	Inflorescence	Extract	I	v
		Genito-urinary system	Mastitis	1	Inflorescence	Poultice used after frying in oil	E	v
Arctium minus (Hill) Bernh. (PALAB 2009)	Amargacho, capacho	Skin & subcutaneous cellular tissue	Castration wounds	1	Root	Wash used after extraction	E	p
Calendula officinalis L. (PALAB 2076)	Maravilla, caléndula, clavel	Genito-urinary system	Mastitis	1	Inflorescence	Fried with fat or butter	E	v
Centaurea calcitrapa L. (PALAB 2590)	Cardo de arzolla	Musculature & skeleton	Trauma	1	Inflorescence	Poultice used after extraction	E	e, o, v
		Skin & subcutaneous cellular tissue	Wounds	1	Inflorescence	Wash used after extraction	E	c, o, v
Centaurea lagascana Graells (PALAB 2466)	Arzolla, cardo de arzolla	Musculature & skeleton	Trauma	2	Plant	Poultice	E	c, e, o, v
		Skin & subcutaneous cellular tissue	Wounds	14	Plant	Wash used after extraction	E	a, c, cu, e, o, p, v
Chamaemelum nobile (L.) All. (PALAB 2902)	Manzanilla	Digestive system	Colic	5	Inflorescence	Infusion	I	v
		Genito-urinary system	Retention of urine	3	Inflorescence	Infusion	I, E	v

Table 2. Cont'd

			Mastitis			Poultice used after frying in oil		
		Sense organs	Watery eyes	1	Inflorescence	Wash with infusion	E	c, e, o, v
Cirsium eriophorum (L.) Scop. (PALAB 1994)	Cardo, cardo burriquero	Respiratory system	Cough	1	Inflorescence	Infusion	I	v
Helichrysum stoechas (L.) Moench (PALAB 2609)	Manzanilla	Digestive system	Laxative	2	Flower tops	Extract	I	v
Inula helvetica Grauer [pa] (PALAB 2488)	Árnica	Skin & subcutaneous cellular tissue	Wounds	1	PAG	Wash used after macerating in *orujo*	E	a, c, cu, e, o, p, v
Inula montana L. (PALAB 2405)	Árnica	Musculature and skeleton	Trauma	17	PAG	Poultice used after extraction	E	c, e, o, v
Jacobaea vulgaris Gaertn. (PALAB 2349)	Bujanera	Infectious diseases and parasites	Pediculosis & bites	2	PAG	Wash used after extraction	E	o, v
Jurinea humilis (Desf.) DC. (PALAB 2323)	Arzolla	Skin & subcutaneous cellular tissue	Wounds & infections	3	PAG	Wash used after extraction	E	c, o
Betulaceae								
Betula pubescens Ehrh. (PALAB 1567)	Abedul	Genito-urinary system	Elimination of liquids	1	Young leaves	Extract	I	v
Boraginaceae								
Echium vulgare L. (PALAB 2543)	Gardincha	Digestive system	Gas	1	Fruit	Direct: wrapped in butter	I	v
Caryophyllaceae								
Paronychia kapela (Hacq.) A.Kern. (PALAB 2559)	Sanguinaria, flor de papel	Genito-urinary system	Retention of urine	1	PAG	Extract	I	v
Crassulaceae								
Sempervivum vicentei Pau (PALAB 2053)	Siempreviva, suelda	Skin & subcutaneous cellular tissue	Wounds	1	Leaves	Direct: poultice	E	a, c, cu, e, o, p, v
Umbilicus rupestris (Salisb.) Dandy (PALAB 2378)	Sombrerillos	Skin & subcutaneous cellular tissue	Wounds	1	Leaves	Direct: juice	E	a, c, cu, e, o, p, v
Cucurbitaceae								
Bryonia cretica L. (PALAB 1979)	Uva de perro, nueza	Skin & subcutaneous cellular tissue	Swelling and lameness	2	Root	Poultice used after extraction	E	v
Ericaceae								
Arctostaphylos uva-ursi (L.) Spreng (PALAB 1925)	Gayuga, agayuga	Genito-urinary system	Retention of urine	3	Leaves & fruit	Extract	I	v
Gentianaceae								
Gentiana lutea L. [rh] (PALAB 1972)	Junciana, genciana	Digestive system	Loss of appetite & indigestion	20	Rhizome	Extract	I	p, v
		Respiratory system	Catarrh, cough & pneumonia	8	Rhizome	Extract and Direct: fresh	I	v
		Infectious diseases and parasites	Worms	5	Rhizome	Extract and Direct: fresh	I	p
Hypericaceae								
Hypericum perforatum L. (PALAB 1815)	Hipérico, bergaula, pericón	Genito-urinary system	Retention of urine	5	PAG	Infusion	I	v
		Skin & subcutaneous cellular tissue	Wounds	2	PAG	Wash used after extraction	E	a, c, cu, e, o, p, v
		Infectious diseases and parasites	Tinea	2	PAG	Wash used after macerating in oil	E	c, cu, o, pe
Juglandaceae								

Table 2. Cont'd

Juglans regia L. (PALAB 483)	Nogal	Skin & subcutaneous cellular tissue	Wounds	2	Leaves	Poultice used after extraction	E	a, c, cu, e, o, p, v
Lamiaceae								
Lamium album L. (PALAB 2226)	Ortiga blanca, chupón	Skin & subcutaneous cellular tissue	Wounds	1	PAG	Wash used after extraction	E	a, c, cu, e, o, p, v
Origanum vulgare L. (PALAB 1437)	Orégano	Genito-urinary system	Refusal to breastfeed	1	Flower tops	Infusion in milk	I	v
		Respiratory system	Cough	1	Flower tops	Infusion	I	v
Rosmarinus officinalis L. (PALAB 992)	Romero	Genito-urinary system	Blood in the urine	4	PAG	Extraction in wine	I	v
Sideritis hyssopifolia L. th (PALAB 1435)	Té, té de roca, té de lastra	Digestive system	Colic	1	PAG	Infusion	I	v
Lentibulariaceae								
Pinguicula grandiflora Lam. (PALAB 2568)	Tiraña, hoja de la tiraña	Digestive system	Laxative	1	Leaves	Extract	I	v
		Conception, pregnancy and birth	Delivery of placenta	1	Leaves	Extract	I	v
Liliaceae								
Lilium martagon L. (PALAB 2459)	Antojil, azucena	Skin & subcutaneous cellular tissue	Wounds	2	Bulb	Wash used after extraction	E	c, o
Linum usitatissimum L. (PALAB 1345)	Lino	Digestive system	Indigestion	1	Seeds	Extract	I	v
Malvaceae								
Malva sylvestris L. (PALAB 884)	Malva, flor de malva	Digestive system	Gas	1	PAG	Infusion	I	v
		Respiratory system	Pneumonia	1	PAG	Infusion	I	v
		Skin & subcutaneous cellular tissue	Wounds	2	PAG	Extraction and wrapped in butter	I	a, c, cu, e, o, p, v
Papaveraceae								
Chelidonium majus L. (PALAB 1619)	Planta del yodo, celidonia	Skin & subcutaneous cellular tissue	Wounds	1	Latex	Direct	E	a
Plantaginaceae								
Plantago lanceolata L. (PALAB 1118)	Hoja de lentén, llantén, lentel	Genito-urinary system	Blood in the urine	1	PAG	Extract	I	v
		Skin & subcutaneous cellular tissue	Wounds	1	Leaves	Direct	E	a, c, cu, e, o, p, v
Poaceae								
Brachypodium phoenicoides (L.)Roem.&Schult. (PALAB 1264)	Hierba perruna	Other veterinary uses	Purge	2	Leaves	Direct	I	pe
Dactylis glomerata L. (PALAB 1353)	Grama	Genito-urinary system	Retention of liquids	1	Root	Extract	I	v
Triticum aestivum L. (PALAB 568)	Trigo, mesino, tremesino	Digestive system	Indigestion	1	Grains	Extract	I	v
Zea mays L. (PALAB 625)	Maíz	Genito-urinary system	Retention of urine	1	Stigmas	Extract	I	v
Polygonaceae								
Rumex crispus L. (PALAB 1983) *Rumex obtusifolius* L. (PALAB 1879)	Amargaza, acerón, ramagón	Skin & subcutaneous cellular tissue	Wounds	1	Root	Wash used after extraction	E	a, c, cu, e, o, p, v
Rumex pulcher L. (PALAB 2023)	Ramagón	Digestive system	Indigestion	1	Root	Extract	I	v
Ranunculaceae								

Table 2. Cont'd

Aconitum napellus L. [tp] (PALAB 2119) *Aconitum vulparia* Rchb. [tp] (PALAB 2198)	Hierba piojera, acónito	Infectious diseases and parasites	Pediculosis	1	PAG	Wash used after extraction	E	v
Rosaceae								
Rosa spp.	Zarza, espino, rosal	Digestive system	Rumination disorder	1	Galls	Direct	I	v
Rutaceae								
Ruta montana (L.) L. [po] (PALAB 2365)	Ruda	Genito-urinary system	Mastitis	1	PAG	Ointment used after frying in oil	E	v
Santalaceae								
Viscum album L. [tp] (PALAB 1026)	Muérdago, maraojo, mingojo	Conception, pregnancy & birth	Delivery of placenta	1	Plant	Extract	I	v
		Skin & subcutaneous cellular tissue	Wounds	1	Plant	Poultice used after extraction	E	a, c, cu, e, o, p, v
Scrophulariaceae								
Verbascum lychnitis L. [nh] (PALAB 1546)	Gordolobo, guardalobo	Digestive system	Loss of appetite	1	Leaves	Extract	I	v
V. pulverulentum Vill. [nh] (PALAB 1751)		Conception, pregnancy & birth	Placenta hygiene	1	Plant	Wash used after extraction	E	v
V. thapsus L. [nh] (PALAB 1360)		Intoxication & poisonings	Insect stings	1	Leaves	Poultice used after extraction	E	o
Solanaceae								
Capsicum annuum L. (PALAB 885)	Pimiento	Digestive system	Gas	1	Ground fruit	Direct wrapped in fat	I	v
Hyoscyamus niger L. [tp] (PALAB 1777)	Beleño	Genito-urinary system	Mastitis	4	Seeds	Ointment used after frying in oil	E	v
		Musculature & skeleton	Inflammation	1	Seeds	Ointment used after frying in oil	E	c, e, o, v
		Intoxication & poisonings	Bites	6	Seeds	Ointment used after frying in oil	E	c, e, o, v
Nicotiana tabacum L. (PALAB 1901)	Tabaco	Infectious diseases & parasites	Pediculosis	2	PAG	Wash used after extraction	E	v
Thymelaceae								
Daphne laureola L. [tp] (PALAB 2334)		Digestive system	Colitis	1	PAG	Direct	I	o
Vitaceae								
Vitis vinifera L. (PALAB 1463)	Parra	Conception, pregnancy & birth	Delivery of placenta	1	Fruit	Hot wine	I	v
		Respiratory system	Catarrh	2	Fruit	Wine with fat	I	v

They are arranged alphabetically by family, indicating category of use, disease or condition, number of records of use (UR), part used, preparation, application and livestock (a = poultry; c = caprine; cu = leporine; e = equine; o = ovine; p = porcine; pe= canine; v = bovine), poisonous plants (tp = toxic and poisonous; nh = not highly poisonous; po= poisonous), and flora protection category (pa= preferential attention; rh = regulated harvest). PAG: Part above ground; E: external; I: Internal.

branch of spurge laurel (*Daphne laureola*) at the base of the tail of the affected animal. Another species of the same genus, *Daphne gnidium*, is used in the same way in many regions of Spain (González et al., 2020).

Genito-urinary system

There were 29 UR documented, corresponding to 15 plant species from 11 different botanical families, 12 plant species from the wild and three cultivated, representing 14% of the total records of veterinary uses. To resolve haematuria, a disease of cattle whose dominant and characteristic symptom is the emission of bloody urine, two species are used: extracts of the above-ground parts of romero (*Rosmarinus officinalis*) in wine and extracts of llantén (*Plantago lanceolata*). Plants with diuretic properties are recommended for general disorders of urine and especially for retention of urine, often described in cattle. Infusion of hipérico (*Hypericum perforatum*) is administered in the same way as in Lleida (Agelet, 1999), extract of gayuga (*Arctostaphylos uva-ursi*) as in Huesca (Villar et al., 1987), and infusion of manzanilla (*Chamaemelum nobile*), root of grama (*Dactylis glomerata*), stigmas of maíz (*Zea mays*)

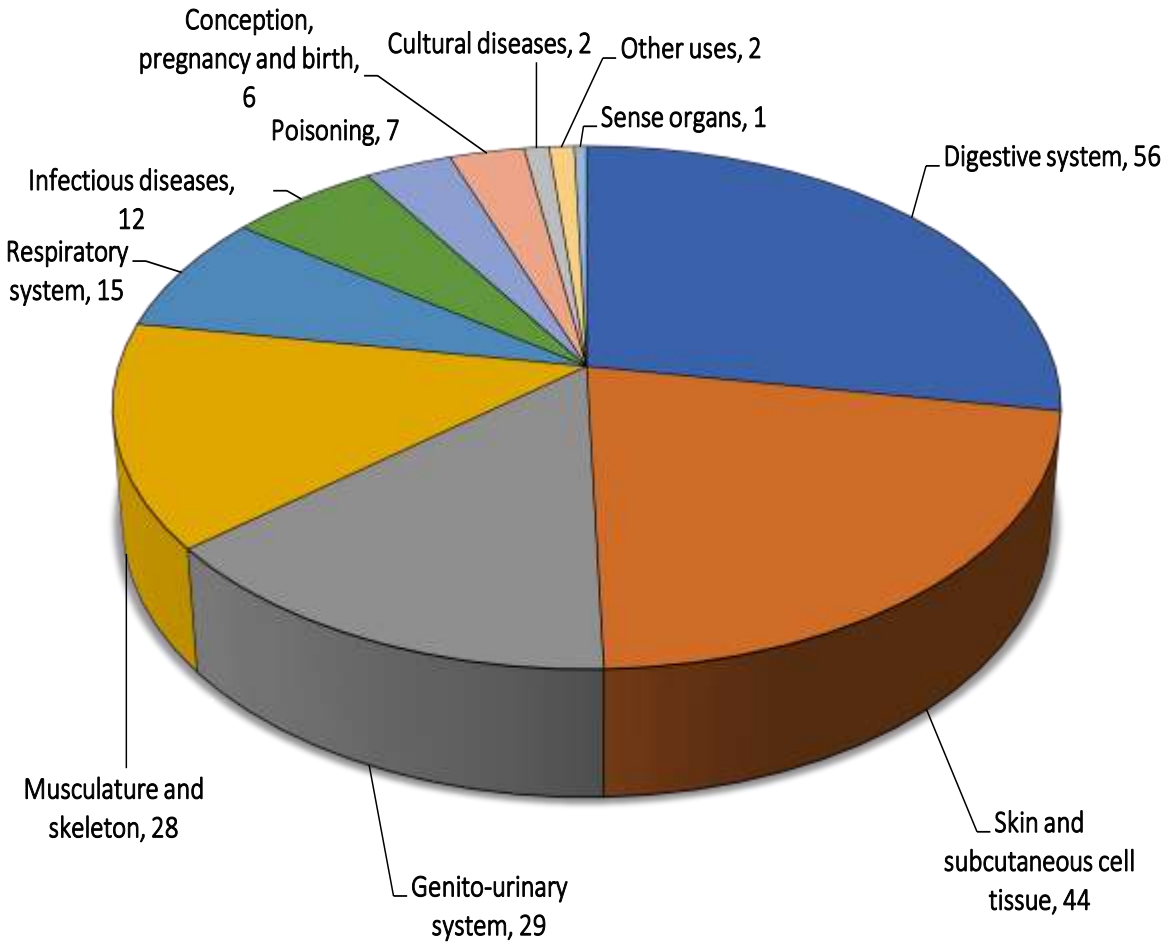

Figure 2. Use records for the use categories represented in the EVM of the Montaña Palentina region.

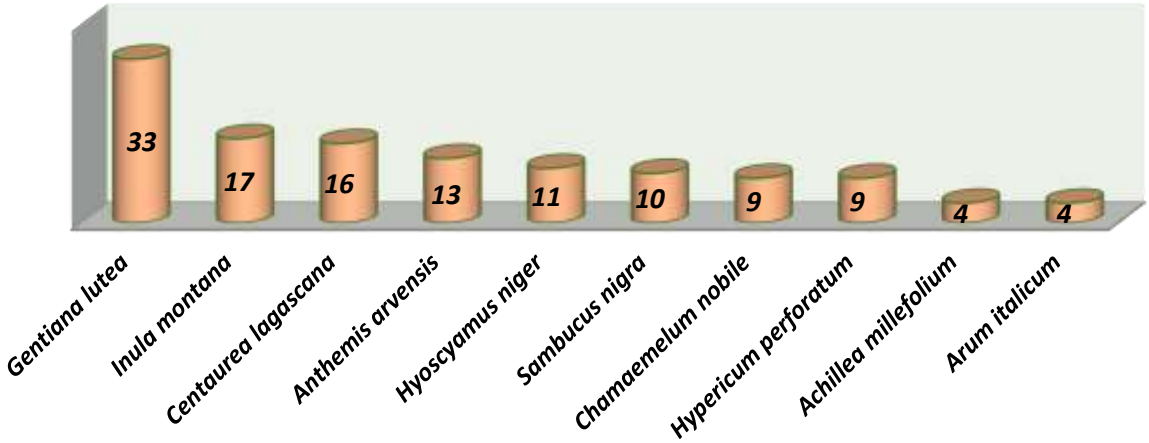

Figure 3. Plant species with the highest number of veterinary uses in the Montaña Palentina region.

or leaves of abedul (*Betula pubescens*) similarly to those used in the Campoo district (Cantabria) (Pardo, 2008).

Regarding mastitis, to prevent the loss of the affected teat and therefore milk production, remedies based on the frying in oil of beleño seeds (*Hyoscyamus niger*), margarita flowers (*Anthemis arvensis*), manzanilla flowers (*Chamaemelum nobile*) or maravillas (*Calendula officinalis*), or the above-ground part of the ruda (*Ruta*

montana) were described using a cloth or cotton swab to then apply the oil on the inflamed udders. In Alba de los Cardaños, orégano (*Origanum vulgare*) mixed with sugary milk was used when the calves do not want milk and refuse to suckle from the mother's udder.

Conception, pregnancy and birth

There were 6 UR documented, corresponding to 5 plant species from 5 different botanical families, four plant species from the wild and one from cultivation, representing 3% of the total records of veterinary uses. Up to four species were documented to help cows deliver the placenta (also known in popular slang as "clean out or cast out"). These are general species with some toxicity so that their ingestion causes the purge of the animal: among the most frequently cited are golondrillo (*Asplenium trichomanes*), tiraña (*Pinguicula grandiflora*), and muérdago (*Viscum album*). Hot wine (*Vitis vinifera*) is also used according to Pardo (2008) who states that some get the animal drunk in order to better withstand the painful ordeal. Sometimes the cows suffered a detachment of the womb (prolapse) and before being expertly reintroduced, it was washed with the extract of gordolobo (*Verbascum* spp.). In Pallars (Agelet, 1999) gordolobo was used to deliver the placenta, but its use for cleaning the womb is not mentioned.

Respiratory system

There were 15 UR documented, corresponding to six plant species from six different botanical families, four plant species from the wild and two cultivated, representing 7% of the total records of veterinary uses. Most of the remedies were described in cattle. The species with the highest number of records of use is genciana (*Gentiana lutea*). Useful for almost any respiratory disorder, it was administered as an extract of the rhizome or chopped and directly mixed with a little feed. Another popular remedy was to make cows inhale the smoke from saúco (*Sambucus nigra*), produced by burning flowers on coals. This use is similar in other areas of the north of the Iberian Peninsula such as Navarra (Akerreta, 2009) or Cantabria (Pardo, 2008). To alleviate cough, extracts of cardo (*Cirsium eriophorum*), or infusions of orégano (*Origanum vulgare*) were mentioned, and infusion of malva (*Malva sylvestris*) to treat pneumonia. Wine was also given to mitigate the animal's cold.

Musculature and skeleton

There were 28 UR collected, corresponding to seven plant species from three different botanical families, all plant species from wild sources, representing 14% of the total records of veterinary uses. The most frequently applied therapy is the placement of poultices in the affected area using the extract of some of the recommended plants: árnica (*Inula montana*), saúco (*Sambucus nigra*), arzollas (*Centaurea calcitrapa*, *C. lagascana*) or nuezgo (*Sambucus ebulus*), showing that the two families Asteraceae and Adoxaceae are the ones that monopolise the majority of species in this use category. To treat swellings of unknown origin, the affected part was bathed in the smoke of saúco inflorescence (*Sambucus nigra*), in a similar way carried out in the province of Albacete (Fajardo et al., 2000), or rubbed with oil after frying beleño seeds (*Hyoscyamus niger*).

Skin and subcutaneous cellular tissue

There were 44 UR documented, corresponding to 18 plant species from 13 different botanical families, 17 plant species from the wild and one cultivated, representing 22% of the total records of veterinary uses. Plants with disinfecting properties are used to wash superficial wounds such as saúco (*Sambucus nigra*), nogal (*Juglans regia*), malva (*Malva sylvestris*) or hipérico (*Hypericum perforatum*), this plant is cited with the same use in the Serranía de Cuenca (Fajardo et al., 2007), and plants with wound healing properties for deeper wounds that also need to regenerate tissue, the well-known arzollas being recommended in these cases (*Centaurea calcitrapa, C. lagascana* and *Jurinea humilis*). These species are also used to wash deep wounds caused by wolves, and after disinfecting the affected area it heals quickly. For this same purpose, the bulb of the antojil (*Lilium martagon*) was cited, a healing remedy also referenced in Palacios del Sil (León) (García Jiménez, 2007).

Other remedies mentioned for minor wounds or scratches consist of using succulent leaves of species of the Crassulaceae family, such as siempreviva (*Sempervivum vicentei*) or sombrerillos (*Umbilicus rupestris*) placed on wounds, and also the latex of the planta del yodo (*Chelidonium majus*) which is placed on wounds caused by pecks between chickens. In Villanueva de la Torre, wounds on pigs caused by castration were washed with extract of amargacho (*Arctium minus*), with Font Quer (1962) pointing out healing properties for this species when used externally.For lameness in cattle, a plaster with the root of hierba de la culebra (*Arum italicum*) or uva de perro (*Bryonia cretica*) is used to heal the "*babón*", a wound in the hoof of cows that causes limping and strong swelling.

Reference is made in the region to "sores" in cows, in which lumps appear on the neck, caused by infected ganglion according to Pardo (2008). In the town of Arbejal, this was treated with a handful of crushed grass (plants mostly in the grass family from a mowed meadow) collected from the family barn, which was boiled and

placed on the swollen area.

Sense organs

Just one use record was collected, corresponding to one wild plant species of the Asteraceae family, representing 0.5% of the total records of veterinary uses. This record of use refers to manzanilla infusion (*Chamaemelum nobile*) being used to wash the watery eyes of cattle, goats, mares and sheep. We consider it probable that the hierba de la nube (*Trifolium pratense*) has been used to treat “nube” (cataracts) in animals, since its common name provides information on the use, although its only use in people to treat eye infections has been mentioned.

Infectious diseases and parasites

There were 12 UR documented, corresponding to five plant species from five different botanical families, four plant species from the wild and one cultivated, representing 6% of the total records of veterinary uses. Pediculosis affecting cattle is treated with hierba piojera (*Aconitum napellus*, *A. vulparia*), which is mainly recommended for younger calves, prone to this infection. The animal is washed well with the extract and the lice disappear after a short time. Other suitable plants are the bujanera (*Jacobaea vulgaris*) and the tobacco plant (*Nicotiana tabacum*), administered in a similar way to hierba piojera.

The anthelmintic virtue of genciana (*Gentiana lutea*) is well known in the study area, it being the species with the highest number of records of use in this category. Worms affect pigs to a greater extent, which are served fragments of genciana rhizome directly with food or after cooking, a remedy also used in Montseny (Catalonia) (Bonet, 2001). Myiasis, a parasitic disease caused by fly larvae that affects tissue causing lumps and swelling, was treated with bujanera (*Jacobaea vulgaris*). In the province of Segovia, Blanco (1998) documents the use of this species in EVM to cure “cattle worm”, by direct application to the wound. The worms died as the grass dried.

For fungal infections such as tinea, oil of hipérico (*Hypericum perforatum*) is applied to the affected area. References show infections in sheep, pigs and rabbits.

“Cultural” diseases

There were two records of use collected, corresponding to two plant species from two different botanical families, one plant species from the wild and one cultivated, representing 1% of the total records of veterinary uses. “*Traidora*” is the only cultural illness documented in the study area. This is a disease of cattle well known to stockbreeders. It was also said that it “took” cows when they were not given treatment. The symptoms are nervousness, rage, anxiety and swelling. Angélica (*Angelica sylvestris*) and ajo (*Allium sativum*) reduced the symptoms by purifying the animal. In the first case, extract of the inflorescence is given, and in the second case the animal was bathed in the smoke given off by burning the strings (braided stems) of garlic. In the Campoo region (Cantabria) "*traidora*" is known by the name "*solengua*" and refers to the same symptoms as those reported in the study area (Pardo, 2008).

Intoxications and poisonings

There were seven UR documented, corresponding to two wild plant species from two different botanical families, representing 3,5 % of the total records of veterinary uses. The most popular remedy in the region to treat inflammation in cattle caused by the bite of harmful animals (vipers, weasel, etc.) was made with beleño seeds (*Hyoscyamus niger*). This same remedy is mentioned in the musculature and skeleton category for the general treatment of inflammation. The analgesic power of these seeds has also been indicated in the Picos de Europa National Park (Lastra, 2003).

A poultice soaked in extract of leaves of gordolobo (*Verbascum* spp.) is used for the treatment of insect stings. The remedy is similar to the one indicated in Terra Chá (Galicia) for horsefly stings (Anllo, 2011).

Other veterinary uses

There were two records of use documented in this category, corresponding to one wild plant species in the Poaceae family, representing 1% of the total records of veterinary uses. Plants that animals use for self-medication include hierba perruna (*Brachypodium phoenicoides*), which dogs use to purge themselves.

Dogs with indigestion eat *B. pinnatum* (L.) P.Beav. in the Sierra del Caurel (Galicia) (Blanco, 1996).

Conclusions

This research shows the importance of documenting plants used in EVM, pointing out the urgent need to intensify research, both to corroborate the efficacy of the indicated treatments and their viability in safe and effective terms, as well as to expand traditional knowledge concerning plants related to animal health care. The break in the chain of knowledge transmission of plants with veterinary use is evident, with very little of it still being preserved among older people linked to the culture of stockbreeding. This knowledge is in danger of disappearing due to depopulation, abandonment of traditional practices and the spread of professional veterinary care. The importance of cattle farming stands

out in the region, with them receiving the best health care, since the loss of any specimen could be disastrous to the family economy. Pig farming is also relevant in this subsistence economy but its loss has been assumed with resignation. Regarding sheep and goats, most of the remedies mentioned were for wound or trauma treatments. This is true for poultry and rabbits as well, although they were also treated for infectious diseases. The poor economic development of the Montaña Palentina region has provided valuable and interesting data on traditional veterinary knowledge, which can help to promote studies that consider clinical herbal medicine in addressing and improving animal health challenges.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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