Check for updates

Received: 18 March 2024 | Revised: 6 August 2024 | Accepted: 24 September 2024

DOI: 10.1002/ppp3.10593

Plants People Planet PPP Open Access

RESEARCH ARTICLE

Beyond plant awareness disparity: Exploring intangible relationships with plants in the Catalan Pyrenees

Joaquim Querol i Mercadé[1] | Álvaro Fernandez-Llamazares[1,2] | Teresa Garnatje[3,4] | Ariadna Casadevall[5] | Alba Garet[5] | Sandrine Gallois[1]

[1]Institut de Ciència i Tecnologia Ambientals (ICTA-UAB), Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Barcelona, Spain

[2]Unitat de Botànica, Departament de Biologia Animal, Biologia Vegetal i Ecologia (BABVE), Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Barcelona, Spain

[3]Institut Botànic de Barcelona (IBB), CSIC-CMCNB, Barcelona, Spain

[4]Jardí Botànic Marimurtra - Fundació Carl Faust, Blanes, Spain

[5]Departament d'Antropologia Social i Cultural, Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain

Correspondence
Sandrine Gallois, Institut de Ciència i Tecnologia Ambientals (ICTA-UAB), Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Barcelona, Spain.
Email: sandrine.gallois@uab.cat

Funding information
Agència de Gestió d'Ajuts Universitaris i de Recerca, Grant/Award Number: BP2020-00216; Government of Catalonia; Universitat Autònoma de Barcelona; Generalitat de Catalunya; Spanish Ministry of Science and Innovation, Grant/Award Numbers: RYC2021-034198-I, CEX2019-000940-M

Societal Impact Statement

The phenomenon of "Plant Awareness Disparity"—often defined as people's inability to notice, recognize, and appreciate plants and their significance—has been described as one of the greatest challenges that botanists face in our joint mission to address the social-ecological crisis of our time. Encouraging plant awareness will entail a transformative and sustained shift across sectors in how plants and their multiple contributions to humans are recognized, affirmed, and valued. Working with traditional knowledge holders in rural areas offers an opportunity to explore pathways through which the nexus between people and plants can be nurtured and strengthened.

Summary

- This study explores the intangible relations between local ethnobotanical knowledge holders and plants at three levels—communal, familial, and individual—by considering diverse aspects of expressive culture such as stories, songs, and personal recollections anchored in lived experiences.
- We propose a methodological approach to document and characterize these intangible connections with plants and recognize them in the study of plant awareness disparity (PAD). In-depth interviews were conducted with 22 recognized ethnobotanical knowledge keepers in the Alt Ter valley (Catalan Pyrenees, northeastern Spain).
- Exhibiting high plant awareness, local knowledge keepers reported myriads of cultural, familial, and individual expressions of their bonds with the collective botanical heritage of the valley, including 36 distinct sayings, 53 narratives, 27 traditions, and 30 family customs about plants.
- Our findings cast light on the intricate relations between humans and plants in rural communities, underpinned mainly by strong emotional connections and a shared sense of cultural identity. These findings hold significant implications for studies aimed at gauging plant awareness and quantifying PAD levels, as they underscore the breadth and depth of humans' intangible relationships with the plant worlds around them.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.
© 2024 The Author(s). *Plants, People, Planet* published by John Wiley & Sons Ltd on behalf of New Phytologist Foundation.

KEYWORDS
ethnobotanical knowledge, human–plant relation, plant blindness, rural communities, traditional knowledge

1 | INTRODUCTION

Plants are crucial for human survival and well-being, yet their societal importance is often underestimated, especially in high-income countries (Jose et al., 2019). This sociopsychological phenomenon, widely referred to as plant blindness, or more recently as "plant awareness disparity" (hereinafter PAD; Parsley, 2020), is characterized by a lack of appreciation for the diversity and complexity of plant life, a failure to notice and/or recognize plants in our environment, and reduced engagement with plant-related topics in education (Fančovičová & Prokop, 2011; Parsley et al., 2022; Sanders, 2019). PAD, mostly studied among youth in urban, industrialized settings (Daniel et al., 2023), arguably illustrates a growing desensitization to environmental changes (Amprazis & Papadopoulou, 2020; Pedrera et al., 2023) and is concomitant to a broader nature-deficit disorder (Palomino et al., 2016). PAD is associated with lower pro-environmental attitudes (Amprazis & Papadopoulou, 2020; Jose et al., 2019; Thomas et al., 2021) and represents a substantive impediment toward a sustainable future (Margulies et al., 2019; Pedrera et al., 2023).

PAD has been mostly studied in educational settings among youth in high-income countries (Amprazis & Papadopoulou, 2020; Stagg & Dillon, 2022; Blue et al., 2023), with a strong bias toward knowledge-related content in educational curricula (Stagg et al., 2024) and toward practical and cognitive dimensions (Parsley, 2020). However, human's relations with plants encompass many other aspects (McDonough MacKenzie et al., 2019), as it also implies affective, sensory, and identity-based bonds (Kimmerer, 2013), as embraced under the concept of cultural intangible heritage (CSS-EBLA, 2019).

Many of the intangible relations with plants have been documented among Indigenous peoples and local communities around the world in whose cultures plants are highly valued in daily life (Reyes-García et al., 2006; Teixidor-Toneu et al., 2022). However, substantial pockets of traditional plant-related knowledge have often persisted in rural areas of industrialized countries from the Global North (Calvet-Mir et al., 2012; Gras et al., 2020). Such complex systems of plant-related knowledge are often grounded in lived experiences with plants, handed down intergenerationally through oral transmission (Gras et al., 2019). These intangible relations are anchored in expressive culture (Herrero & Cardaño, 2015; Ivanova et al., 2021), such as songs, stories, narratives, and sayings, which can be defined as oral traditions (Fernández-Llamazares & Cabeza, 2017; Gras et al., 2016). Additionally, magic and religious beliefs and practices linked to plants also underpin many intangible interactions between people and plant biodiversity (Gras et al., 2016).

Some studies suggest that people with strong emotional bonds with plants tend to show more plant awareness than people with higher PAD (Krosnick et al., 2018; Stagg et al., 2024). Yet, despite the growing recognition of PAD, a significant gap still exists in understanding how emotional and intangible plant-related knowledge interacts with this phenomenon. Emotions play a fundamental role in human experience, underlying many mental processes such as motivations and decision-making (Bright & Eames, 2021; Jacobs & Vaske, 2019). Through their emotions, humans can ascribe values to plants (Mckertich & Shilpa, 2016). Emotion-driven circuits substantially shape human attitudes and behaviors toward wildlife (Brick et al., 2023), and it has been demonstrated that environmental stewardship can be facilitated by establishing positive emotional connections with nature (Jacobs & Vaske, 2019). However, most research on PAD has been limited to studying the knowledge-based variables, leaving behind the emotional aspects of plant human relationships.

Therefore, this study aims to explore the intangible relations between humans and plants and to propose a method to document these oft-neglected relations. To do so, we worked with 22 ethnobotanical knowledge holders from the Alt Ter valley, northeastern Catalan Pyrenees, Spain. We developed a protocol to assess their level of PAD and evaluate the different intangible relations they maintain with plants at three levels (i.e., the valley, the family, and the individual) by exploring different forms of expressive culture in relation to plants.

2 | STUDY AREA

The Alt Ter valley encompasses 294 km^2 with a low population density (~24 inhab/km^2) (IDESCAT, 2022). This mountainous area is experiencing a progressive abandonment of cultivated lands, increased permanent pastures and forests (Gelabert et al., 2022), and expanded population centers (Rigat et al., 2009). Covering an altitudinal gradient from about 850 to 2900 m (Figure 1) with a Mediterranean climate influence, it holds rich levels of biodiversity. The plant landscape of this territory is diverse. In the lowest part, montane communities are importantly forests, dominated by deciduous trees (e.g., *Quercus pubescens*, *Quercus petraea*, *Fagus sylvatica*). At a higher altitude, subalpine vegetation is led by pine (*Pinus mugo* subsp. uncinata) forests with the presence of another conifer, *Abies alba*, in some places, and with abundant *Rhododendron ferrugineum* and other Ericaceae, such as *Vaccinium myrtillus*, in the undergrowth. In the highest places, we find alpine grasslands, with a relevant presence of several Festuca species (Gras et al., 2019).

Previous ethnobotanical research in the valley has documented 312 plant species used for different medicinal, cultural, and culinary purposes (among others), belonging to 71 botanical families (Gras et al., 2019; Rigat et al., 2007; Rigat et al., 2009). Deeply rooted ethnobotanical knowledge persists in the valley (Rigat et al., 2013), and home gardens are still an important source of medicinal plants (Garnatje et al., 2011; Rigat et al., 2011), similar to other Catalan regions (Agelet & Vallès, 2003; Calvet-Mir et al., 2015). Several

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

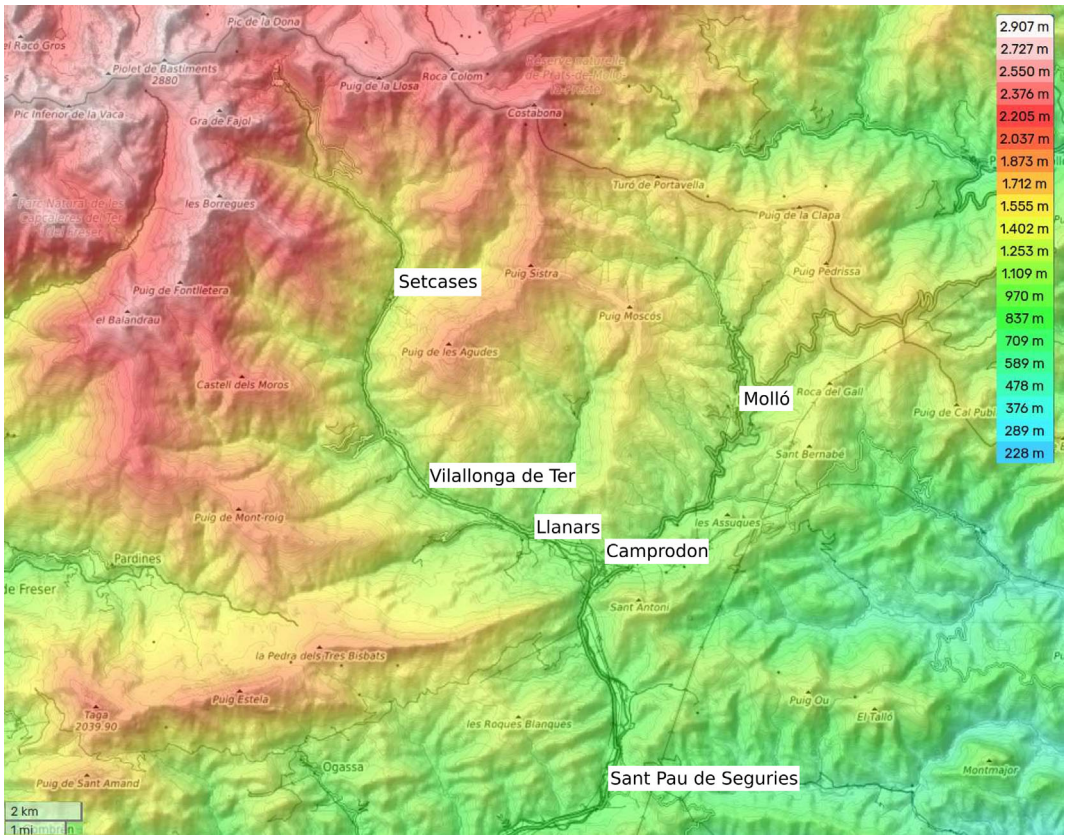

FIGURE 1 Topographic map of the Alt Ter valley. *Source*: Adapted from https://es-es.topographic-map.com.

cultural initiatives aim to maintain the rich botanical heritage ingrained within the valley's cultural tapestry (e.g., medicinal plant markets, Floralab https://www.floralab.eu/).

3 | METHODS

The research followed a cross-sectional design, offering a "snapshot" of the association between PAD and intangible relationships with plants in the study area. This approach allowed for an in-depth exploration of the area's unique features and contextual factors underpinning peoples' relations with plants.

Our informants were selected because they were recognized as ethnobotanical local knowledge holders by one of the co-authors (T. G.) who is local to the area and holds more than 30 years of experience working with different plant-related topics in the valley. Using an exploratory approach, the study employed an in-depth interview including a survey that consisted of 8 Likert scale questions related to PAD (Parsley et al., 2022) and 13 open-ended questions on peoples' intangible relations with plants.

The first part of our survey derived from the Plant Awareness Disparity Index (PAD-I), instrument developed by Parsley et al. (2022), approaching PAD with 25 statements belonging to four different dimensions: (Agelet et al., 2000) attention, (Amprazis & Papadopoulou, 2020) attitude, (Achurra, 2022) knowledge, and (Blue et al., 2023) relative interest (Figure 2). To gain insights on these four dimensions without overburdening the survey, we selected the two statements with the highest α scores for each dimension (see Parsley et al., 2022). All the questions were translated into Catalan and adapted to the local cultural context to eliminate possible biases caused by potential lack of pertinence (Method S1). The second section consisted of a series of questions aiming to explore our informants' intangible relations with plants at the valley, the family, and individual levels. We took into consideration the oral culture (sayings, songs, and legends), the valley and familial habits (e.g., flower gathering, certain funeral rituals), the individual emotional bonds through narratives, and memories with plants as well as individual representations and valuations of plants (See Supporting information S1: Method S1).

Before collecting data, we obtained the free, prior, and informed consent of all the participants (Supporting information S1: Method S2). In partnership with interviewees who were willing to participate, and who specifically provided us with their consent to be filmed, we produced a short dissemination video showcasing the rich ethnobotanical heritage held in the valley (available here), as a giving back measure to participants involved in this study.

We first analyzed the level of PAD among our informants by calculating the scores of all the questions explored. As our scale was from 1 to 5 (from 1 totally *disagreed* to 5 totally *agree*) we converted each answer into a 0–1 scale going from 0 as a significant plant

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

awareness and 1 an extreme presence of PAD. For the negative statement (viz., "it is more interesting to conserve animals than plants"), the conversion was reverted. We then calculated the mean and standard deviation for every question in this section.

To explore our informants' intangible relationships with plants, we used the second part of the survey and conducted a content analysis of all the answers for each informant independently. The first author explored and coded the characteristics of human–plant relationship, highlighting the values and meanings carried by plants, the interplay between these connections and the informants' realities, and the personal affective bonds with plants. The coding was reviewed by the last author and in our interdisciplinary team in case of further doubt. We then grouped these answers into three categories: oral culture of the valley (questions **(1)**, **(2)**, and **(6)**); valley traditions, familiar habits, and experienced narratives (questions **(3)**, **(4)**, and **(5)**); and individual memories, representation, and valuation of plants (questions **(7)** to **(13)**). For the three categories, we systematically examined the recurrent themes and patterns by merging and comparing our respondents' answers.

We reported the plant species that occurred in our interviews with vernacular names. Botanical identification of each of these local names was done a posteriori, based on the extensive ethnobotanical literature in the study area (See Table S1).

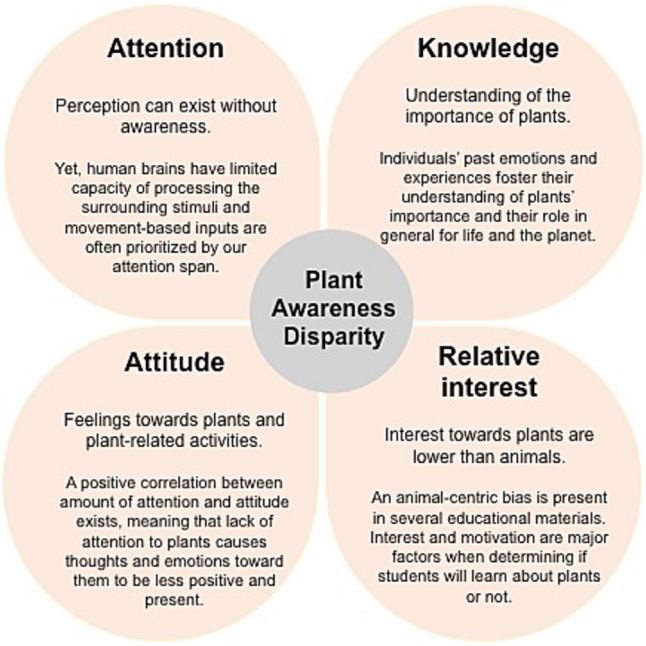

FIGURE 2 Definitions of the four components of plant awareness disparity (PAD). *Source*: adapted from Parsley et al. (2022).

4 | RESULTS

Twenty-two individuals participated in our study (10 women and 12 men), aging from 41 to 94 years old (average 69 years old). Our informants consistently showed high level of plant awareness through the different statements surveyed (Table 1). Informants' plant awareness assessment was higher in questions regarding knowledge ("Plants play an important role in our planet," "Animals could not survive without plants including us") and lower for questions related to the relative interest ("Is it more important to study plants than animals?"). For the latter, when asked why they did not agree with this statement, almost half of them ($n = 12$) stated that both plants and animals are important and should be studied, which attests to their awareness of the imbricate interconnections within the fabric of life.

4.1 | Intangible relations

Among the different insights of the intangible relations gathered in this study, 104 local names, corresponding to 99 plant species from 46 botanical families, were mentioned during our interviews (Table S1).

4.1.1 | Oral culture: Sayings, songs, and legends

Thirty-six sayings, 16 songs, and four legends were gathered, unevenly distributed among our informants (Figure 3). While many of the sayings and songs gathered were not always from the valley, all legends were.

TABLE 1 Average results of the Likert 5-scale and respective scores for the eight statements, *Source*: adapted from the Plant Awareness Disparity Index (PAD-I) (Parsley et al., 2022) (22 informants).

Dimension	Statement	Likert scale: Mean	Score: Mean (standard deviation)
Attention	When you are in a forest, you notice the different plants that belong to it and not just the forest as a whole.	1.41	0.10 (0.24)
	You pay attention to all plants around you, not only those you eat.	1.59	0.15 (0.25)
Attitude	You feel happy when you are close to plants.	1.14	0.03 (0.09)
	You have a lot of good memories related to plants.	1.45	0.11 (0.18)
Knowledge	Plants play an important role in our planet.	1.00	0.00 (0.00)
	Animals could not survive without plants.	1.00	0.00 (0.00)
Relative interest	It is more interesting to study plants rather than animals.	4.09	0.77 (0.34)
	It is more important to make conservation efforts for animals than for plants.	4.64	0.09 (0.14)

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

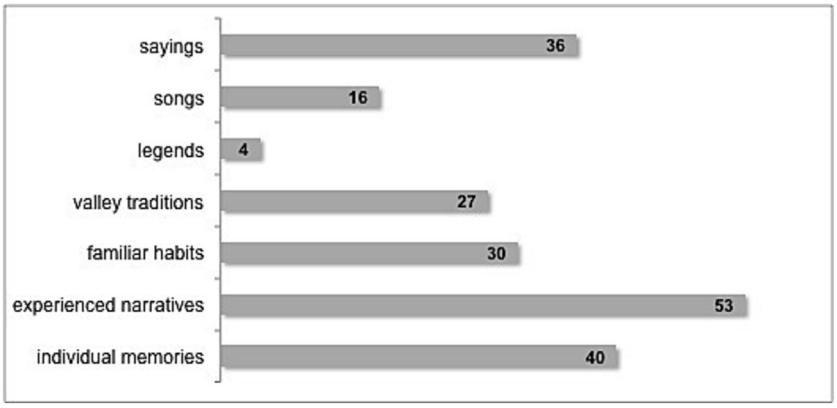

FIGURE 3 Number of items regarding intangible relations with plants gathered in our surveys (22 informants).

Most of the reported sayings convey wisdom or life lessons through metaphorical language ($n = 17$); related to seasonality ($n = 15$), and to a lesser extent to medicinal knowledge ($n = 2$). The rest convey specific characteristics of plants and associate them with human characteristics, such as baldness comparing it to trees in winter (see Supporting information S1: Dataset S1 for the complete list of sayings). Sayings comparing people to specific plants or using plant-related actions to describe human behavior convey moral and social values. For instance, "Swiss chards (bledes) in the garden, Swiss chards at home," bleda (*Beta vulgaris* L.) representing slow-minded people (Saying#36). When referring to season, sayings related to specific times of the year or seasonal activities, such as planting certain crops or harvesting fruits during specific months, as for instance: "if you want good garlic, plant it in February" (Saying#4).

The 15 songs prominently feature various plant species, such as lilies, roses, cherries, and peas. Plants' emotional and aesthetic aspects are consistently highlighted throughout the songs ($n = 5$). The emotional connections formed with plants, as seen in the song about cherries evoking singing and joy (Song#3, Supporting information S1: Dataset S1), emphasize how plants can elicit emotional responses. The four legends remembered by our informants incorporate supernatural elements, infusing the stories with a sense of mystery, carrying symbolic meanings, and conveying life lessons. They become metaphors for human experiences, behavior, and emotions, offering moral teachings and insights into human–nature relations. These elements often revolve around the mystical properties of trees (Legend#4) "To pass through the middle of an oak tree (roure, *Quercus petraea* (Matt) Liebl.) and then, with your clothes,(…) close the oak (…) cures the hernia," or the venom of a mythical creature (Legend#1) "There was a weasel that fought with a viper. After the fight, the weasel was poisoned so it went to roll in the espinacal (*Eryngium campestre* L.), a plant with many spines, and with the wounds it received, it made the viper's venom come out."

4.1.2 | Traditions, habits, and experienced narratives

The 27 traditions shared by our informants involved the use of specific plants ($n = 7$), such as boix (*Buxus sempervirens* L.), llorer (*Laurus nobilis* L.), gatsaule (*Salix caprea* L.), romaní (*Salvia rosmarinus* Spenn.) for various purposes. These traditions are rooted in cultural and spiritual beliefs, with practices aimed at protecting against evil, seeking blessings, or expressing devotion to saints and religious figures ($n = 15$) (See Tradition#21). They are also associated with specific seasonal celebrations, such as Palm Sunday, Saint John's bonfire, Town Festivities, and Easter (see Tradition#27). Plants play a role in socializing, as they involve active participation from community or family members ($n = 20$), as these customs often include communal gatherings, dances, or gift exchanges.

The 30 different familiar habits reported highlight the emotions linked to certain memories and show how they are intrinsically connected with practices such as plant harvesting, tending, and gardening. For example, "When my husband retired, the people from my school (…) gave him a pear tree. (…) It is the same age as my eldest grandson, 7 years old (…) One Sunday, when the whole family was here, I prepared a tray with the pears and called it the pear celebration. (…) But beyond that, there was this emotional value, linked to the land, to the fruits, and to giving thanks for having these foods" (FamTrad#6). Familiar traditions also serve to mark important life moments, they are not merely routine activities but are linked to fond memories, and a sense of belonging, as shown in FamTrad#2: "When my father died, I burned "sabuc" (*Sambucus nigra* L.) and placed it in the room where he had passed away. The scent of elderflower never leaves you. It was something I had heard around here, and that is why I did it."Sharing experiences with family members or friends were emphasized. The bonding they bring is what keeps them rooted in their minds. Whether making Christmas wreaths together or gathering plants on walks, these activities create opportunities for bonding and strengthen family ties. FamTrad#9 is particularly illustrative: "One thing I do (…) are Christmas wreaths. (…) In these wreaths, I put pinecones, fruits, whatever you want, small apples, those tiny apples, well, things I find while going for a walk, I collect them, and then I make Christmas wreaths that I give to everyone, everyone in my circle."

On the 53 individual narratives gathered, while most of them related to plants' uses ($n = 37$), 31 express emotional and personal connections with plants, associating specific plants with memories, experiences, and sentimental value. Plants were symbols of love, appreciation, and gratitude in 16 narratives, as Narrative#4 "We used

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

to have a practice at school where each class, (…) would pick some llenties d'aigua (water lentils, *Lemna minor* L.), bring them to the classroom, and have fun with those water lentils, they were really beautiful. Here in Camprodon, there's a pond called Font del Botàs, and there used to be plenty of water lentils, everything was green, and with the light, it was precious." and Narrative#6 "An endearing anecdote about my grandfather, when I lived in France (…) I remember receiving a letter from back home, (…), and when I opened it, there were violets inside sent by my grandfather. It was really lovely. And I've always remembered it".

These practices reflect the intimate connection between the community and their environment, where plants are seen as integral to their lifeways ($n = 20$). This is well exemplified in the following narrative: "There was a couple who bought a weekend house, and the woman got lost in Costabona amid the fog. The man went to find (the informant), and they spoke on the phone (…). Based on her responses, he asked her if she had passed through a place with iron mining remnants on the ground, and if there were yellow broom bushes around her. With this information, he located her, and together with the husband, they went to find her. (…) When he finally called for her, they were only 50 meters away." The informant knew the valley and remembered that those particular species of Pyrenean broom bushes (*Cytisus oromediterraneus* Rivas Mart., T. E. Díaz, Fern. Prieto, Loidi & Penas) grew around that specific area. This deep understanding of the valley and its diversity allowed them to find the woman safely amidst the fog. "Thanks to this plant, I found this woman" (Narrative#36).

Thirty-two narratives also depict close interactions between individuals and the natural environment and their knowledge of the local flora. The people in these stories engage with plants on a personal level, such as gathering wildflowers, identifying edible plants, or using specific plants for various purposes. Narrative#1 illustrates how people in the community were familiar with the properties of arrel d'alcana tintoria (arrel de peu de colom) (roots of *Alkanna tinctoria* Tausch) used for painting lips. Narrative#9 tells the story of a person who mistakenly consumed a poisonous plant, the common monkshood (tora blava, *Aconitum* x *cammarum* L. instead of a safe one, the striped hemlock (coscoll, *Molopospermum peleponnesiacum* L. W. D. J. Koch), highlighting the importance of plant identification for survival.

4.1.3 | Individual memories, representation, and valuation of plants

The 40 memories from our informants reveal strong connections to plants and associated events, mostly related to plants' uses ($n = 37$). Fifteen memories related with family traditions involving gardening, herbal remedies, or specific plant uses. Fourteen memories are rooted in childhood experiences, evoking feelings of nostalgia (such as Mem#12 and Mem#13), and the development of interviewees' relationships and uses of plants over time.

Our informants recall specific plant names and healing characteristics ($n = 6$) (like in Mem#7, Emem#39) demonstrating a deep fascination for the ethnomedicinal properties of plants. Some of the memories are tied to multi-sensorial inputs ($n = 4$), for instance, through the smell of "an almond tree in bloom," (Mem#2) or the taste of "wild strawberries" (Emem#29). Finally, three memories involved personal growth and transformative experiences linked to plants. They are tied to the passing of loved ones (as seen in Emem#32) to impactful moments that often mix spirituality with specific outcomes (as seen in Emem#35), and some others are directly spiritual and represent healing and bonding familiar moments where plants had a strong presence (Emem#34) "My mother injured her vocal cords at Christmas. She couldn't speak. I promised that if she spoke again, I would buy the Christmas flowers for the church. (…) And 2 days before, she started speaking again. And it's a memory I have of having bought all those flowers and filling the altar with red flowers." These memories serve as emotional triggers, the plants linked to these life events are forever woven into the person's emotions and memories.

When asked about their appreciation for plants, respondents highlighted the special place plants hold in their hearts, with 17 emphasizing their beauty and aesthetics and 14 emphasizing their edible and medicinal properties. Plants, with their vibrant colors, alluring flowers, and pleasant scents, bring joy and happiness. For example, in Appr#2, the respondent expressed that being surrounded by plants evokes feelings of happiness, emphasizing the connection built through the process of caring for them: "Taking care of them may require effort due to their slow growth, but when they bear fruits, you have a precious plant right there. The connection is very direct." Fifteen of our informants, when asked "what plants are," saw them as life-giving entities ($n = 15$), contributing to the vitality of ecosystems, and maintaining key ecological functions and processes (see, for instance, Descript#71). People establish unique and personal connections with plants, often tied to their experiences. For instance, five informants told us about plants "they felt connected to," due to their association with family and childhood, as shown here (Bond#7) "(…) There was a pruner (*Prunus domestica* L.), peach tree near where I worked, and when it rained, I liked to take shelter under it; it has good leaves to stop the water." Finally, four informants reported when asked about "what do [they] appreciate the most about plants?," as creating a sense of peace and companionship among the plants, fostering a deeper bond with the natural world. For instance (Appr#15), "Their life cycle is similar to humans, especially before. We did certain things in spring and others in autumn… We were more connected with our environment. The human being has wanted to come before nature. And nature is very wise. We don't know how to recognize that something is green, and we want to make it blue. And that's impossible". In a particular case, one of our informants responded: (Appr#30) "Probably adaptability, resilience. When there's a flood, they are all on the ground, but the next day they stand up again or like with the harvest. I think it's a message we should learn from."

5 | DISCUSSION

First, as the aim of our study was to unveil the intangible relations with plants for better assessing plant awareness disparity, our results

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

from the adapted version of the PAD-I are only indicative of our studied population awareness based on the selected eight statements. These are not individual PAD-I scores and cannot be compared with scores gathered in other settings. Yet, the responses to our selected statements and the rich documentation of intangible relationships with plants underscore the complexity of human–plant relationships, extending beyond conventional attitudes as encapsulated in Likert scales. Our exploration of the intricate human–plant connections in the Alt Ter valley has yielded valuable insights, which we discuss across three main dimensions: the multidimensional nature of human–plant relationships; novel methodological approaches to assess these relations; and the importance of intangible connections to address PAD.

5.1 | Embracing intangible relations with plants in the study of PAD

Our study reveals rich oral traditions, familiar habits, and personal bonds with plants, contributing to a broader understanding of human–plant relations in rural areas of the Global North (Ikeke, 2022). Informants' narratives reveal the numerous relational values held by plants, and people's detailed understanding of their contributions to human well-being (Brondizio et al., 2019; Díaz-Reviriego et al., 2016). Emotional well-being and aesthetics, key relational values derived from our interviews, illustrate the essential role of plants in supporting mental and emotional health (Brady, 2003; Pritchard et al., 2019; Richardson et al., 2021). Our work aligns with the relational turn in conservation science, emphasizing the need for relational thinking as a powerful way to illuminate human–plant relations in all their richness and complexity (Eyster et al., 2023; Pascual et al., 2023). Cultural significance of plants shapes identity and biocultural heritage as they are intricately linked to cultural practices, storytelling, and traditional knowledge (Chettri & Sharma, 2022; Verschuuren et al., 2021). Exploring the local literature of oral traditions can illuminate the differences and similarities of these intangible relations across generations. Ethnobotanical knowledge, passed down through generations, encodes critical insights on different plant species, contributing to effective biodiversity conservation strategies (Hua et al., 2021; McElwee et al., 2020). Safeguarding these cultural connections is thus crucial for maintaining biocultural diversity and fully understanding plants' contributions to human and ecological well-being (Castro, 2021; Quave & Pieroni, 2015; Ulian et al., 2020).

5.2 | Methodological approaches for assessing PAD

This study introduces a comprehensive methodological tool for assessing PAD, encompassing social, psychological, and emotional contexts in place-based human–plant relationships. If complemented with questions on more tangible aspects, such as individuals' knowledge of plants (e.g., plants' local names, uses of plants) and individuals' practices related to plants (such as cooking, gathering), this protocol might allow for a more holistic understanding of human–plant relationships. In contrast to standard PAD protocols (Parsley, 2020), our approach delves deeper into the social-ecological contexts influencing plant awareness through its qualitative technique. We therefore recommend further research to include qualitative questions on the intangible and tangible relations with plants, alongside standardized approach such as the PAD-I. If not all the statements from Parsley et al. (2022) are used, it is essential to balance positive and negative statements and to test the overall robustness of the statements selection, what was, in our case, beyond the scope of our study. Merging all these approaches enables a deeper comprehension of human–plant relationships and contributes to a better understanding human connectedness to nature (Zylstra et al., 2014). Because PAD is concomitant to other processes such as traditional knowledge loss, it is important to ensure that future efforts to address it take a biocultural approach. To enhance understanding, exploring the cultural, social, and familiar contexts of the studied populations is crucial when assessing human awareness toward plants. The proposed method may serve as a foundation for further research in diverse contexts, provided it is locally adapted. Indeed, even though this study involved aged local ethnobotanical experts, the designed questions might be adapted to a randomly selected sample, including individuals from different life stages and with varying ethnobotanical knowledge. Using a standardized protocol that can be locally adapted might allow for the comparison of PAD and human–plant relationships across social groups, level of exposure to plants, and cultures. In our specific study, challenges posed by age, education, and linguistic differences required a carefully designed research approach. If well adapted to local conditions, we believe this protocol could be helpful and replicable elsewhere, stressing the importance of acknowledging place-based specificities. The method's success stems from our interdisciplinary approach and implementation strategies, involving researchers from diverse fields. Interviews, lasting 1–2 h, allowed space for participants to discuss intimate issues. Essential psychological principles were applied to establish a positive rapport, employing empathetic listening techniques to connect with participants beyond personal biases. Effective listening, including techniques like clarifying, reflecting, and providing feedback, facilitated uninterrupted self-expression and sharing of emotional aspects.

5.3 | Fostering plant awareness

Finally, our findings underscore the urgent need to recognize human–plant connections, prompting reflection on strategies to address plant awareness disparity. Encouraging plant awareness will entail a transformative and sustained shift across sectors in how plants and their multiple contributions to humans in rural areas are affirmed and valued. Intangible relations emerge as a potential pathway to combat this phenomenon, fostering deeper connections among people and their plant worlds. Addressing PAD requires a contextual definition of these intangible relationships. The Alt Ter valley exemplifies human–plant

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

relations intricately interwoven into the community's cultural fabric, based on emotional bonds and intergenerational transmission. When merged with prior experiences and cultural context, learning becomes a much more enriching endeavor (Wandersee et al., 2006). Therefore, this study lays the groundwork for designing educational programs, community initiatives, and policy frameworks amplifying the recognition of plants as essential for human survival and well-being (Achurra, 2022). Integrating individuals' emotional, familiar, and cultural connections with plants proves powerful in engaging diverse audiences, transcending age, background, and formal education (Jose et al., 2019). Such insights might nourish the nexus between people and plants by weaving the middle spaces between science and creative imagination, local and scientific knowledge, and emotions and perceptions. Transdisciplinary approaches that combine artistic, experiential, and empirical methods hold potential for fostering environmental education by evoking emotions, broadening visions of the future, and promoting reflectivity. These approaches can transform how we relate to the plant world (Bentz & O'Brien, 2019). By tapping into plants' emotional and cultural resonance, we can nurture a heightened sense of appreciation, empathy, and stewardship for the natural world (Bright & Eames, 2021).

AUTHOR CONTRIBUTIONS

All the authors participated in the design of the research. Joaquim Querol, Ariadna Casadevall, and Alba Garet collected the data. Joaquim Querol and Sandrine Gallois analyzed the data and all the authors (Joaquim Querol, Álvaro Fernandez-Llamazares, Teresa Garnatje, Ariadna Casadevall, Alba Garet, and Sandrine Gallois) participated in the writing of the manuscript.

ACKNOWLEDGEMENTS

Our deepest gratitude goes to all the guardians of human–plant relation, specifically to the women and men who welcomed us and dared to share glimpses of their worlds. We thank Xavier Guitart i Cano, Mayor of Camprodon, who facilitated us with the first contact in the area. We also thank Prof Joan Vallès for his help throughout the project, as well as Victoria Reyes-García, Cristina Roquet Ruiz, and Michela Osnato. This study received support from the Beatriu de Pinós Programme and the Ministry of Research and Universities of the Government of Catalonia (Agencia de Gestio d'Ajuts Universitaris i de Recerca, BP2020-00216) and the Laboratory for the Analysis of Social-Ecological Systems in a Globalized world (LASEG), Universitat Autònoma de Barcelona and Generalitat de Catalunya (2021-SGR-00182). Á.F.-L. was funded by a Ramón y Cajal research grant from the Spanish Ministry of Science and Innovation (RYC2021-034198-I). This research received funding from ICTA-UAB's "María de Maeztu" Programme for Units of Excellence of the Spanish Ministry of Science and Innovation (CEX2019-000940-M).

DATA AVAILABILITY STATEMENT

All the qualitative data collected for this study are included in the Supporting information, and the quantitative data are available from the author upon reasonable request.

ETHICS STATEMENT

This research adhered to the Code of Ethics of the International Society of Ethnobiology (International Society of Ethnobiology, 2006). Free, prior, and informed consent was obtained from all individuals participating in this study. Anonymity, confidentiality, and data protection were ensured throughout the project. A specific permit to conduct interviews in the area was obtained from the Mayor of Camprodon (signed on of March 31, 2023, prior to any data collection). Our research design complies with the guidelines of the Research Ethics Committee of the Universitat Autònoma de Barcelona (UAB). Participants' personal data were kept confidential in accordance with applicable Spanish and EU laws: Spanish Organic Law 3/December 5, 2018 on the protection of personal data and guarantee of digital rights, and Regulation (EU) 2016/679 of the European Parliament and of the Council of April 27, 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

CONFLICT OF INTEREST STATEMENT

The authors declared no conflict of interest.

ORCID

Álvaro Fernandez-Llamazares https://orcid.org/0000-0002-7813-0222
Teresa Garnatje https://orcid.org/0000-0001-6295-6217
Sandrine Gallois https://orcid.org/0000-0002-4354-7685

REFERENCES

Achurra, A. (2022). Plant blindness: A focus on its biological basis. *Frontiers in Education*, *7*, 963448. https://doi.org/10.3389/feduc.2022.963448

Agelet, A., Bonet, M. À., & Vallès, J. (2000). Homegardens and their role as source of medicinal plants in mountain regions of Catalonia (Iberian Peninsula). *Economic Botany*, *54*(3), 295–309. https://www.jstor.org/stable/4256323

Agelet, A., & Vallès, J. (2003). Studies on pharmaceutical ethnobotany in the region of Pallars (Pyrenees, Catalonia, Iberian Peninsula). Part III. Medicinal uses of non-vascular plants. *Journal of Ethnopharmacology*, *84*(2–3), 229–234. https://doi.org/10.1016/s0378-8741(02)00320-3

Amprazis, A., & Papadopoulou, P. (2020). Plant blindness: A faddish research interest or a substantive impediment to achieve sustainable development goals? *Environmental Education Research*, *26*(8), 1065–1087. https://doi.org/10.1080/13504622.2020.1768225

Bentz, J., O'Brien, K. (2019). Art for change: Transformative learning and youth empowerment in a changing climate. *Elementa Science of the Anthropocene*, *7*, 52.

Blue, S., Hargiss, C. L., Norland, J., Dekeyser, E. S., & Comeau, P. (2023). Plant blindness represents the loss of generational knowledge and cultural identity. *Natural Sciences Education*, *52*(1), e20106. https://doi.org/10.1002/nse2.20106

Brady, E. (2003). *Aesthetics of the natural environment*. Edinburgh University Press eBooks. https://doi.org/10.1515/9781474465380

Brick, C., Nielsen, K. S., & Hofmann, W. (2023). Opportunities for emotion research on biodiversity. *Emotion Review*, *15*(4), 263–266. https://doi.org/10.1177/17540739231193755

Bright, R., & Eames, C. (2021). From apathy through anxiety to action: Emotions as motivators for youth climate strike leaders. *Australian*

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Journal of Environmental Education, *38*(1), 13–25. https://doi.org/10.1017/aee.2021.22

Brondizio, E., Díaz, S.M., Settele, J., Ngo, H., Gueze, M., Aumeeruddy-Thomas, Y., Bai, X., Geschke, A., Molnár, Z., Niamir, A., & Pascual, U. (2019). Chapter 1: Assessing a planet in transformation: Rationale and approach of the IPBES Global Assessment on Biodiversity and Ecosystem Services; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. https://doi.org/10.5281/zenodo.5517203

Calvet-Mir, L., Calvet-Mir, M., Molina, J. L., & Reyes-García, V. (2012). Seed exchange as an agrobiodiversity conservation mechanism. A case study in Vall Fosca, Catalan Pyrenees, Iberian Peninsula. *Ecology and Society*, *17*(1), 29. https://www.jstor.org/stable/26269010

Calvet-Mir, L., Riu-Bosoms, C., González-Puente, M., Ruiz-Mallén, I., Reyes-García, V., & Molina, J. L. (2015). The transmission of home garden knowledge: Safeguarding biocultural diversity and enhancing social–ecological resilience. *Society & Natural Resources*, *29*(5), 556–571. https://doi.org/10.1080/08941920.2015.1094711

Castro, P. (2021). A dynamic view of local knowledge and epistemic bonds to place. In C. M. Raymond, L. C. Manzo, D. R. Williams, A. Di Masso, & T. von Wirth (Eds.), *Changing senses of place: Navigating global challenges* (pp. 259–270). Cambridge University Press eBooks. https://doi.org/10.1017/9781108769471.023

Chettri, N., & Sharma, E. (2022). Contribution of traditional ecological knowledge on biodiversity conservation—A retrospective from the Hindu Kush Himalaya. In S. C. Rai & P. K. Mishra (Eds.), *Traditional ecological knowledge resource Management in Asia* (pp. 261–271). Springer International Publishing. https://doi.org/10.1007/978-3-031-16840-6_15

CSS-EBLA. (2019). Intangible Cultural Heritage, A screening of funding opportunities in the EU. ISBN 9788899745073

Daniel, J., Russo, A., & Burford, B. (2023). How might we utilise the concept of botanic gardens' in urban contexts to challenge plant blindness? *Biodiversity and Conservation*, *32*(7), 2345–2364. https://doi.org/10.1007/s10531-023-02607-w

Díaz-Reviriego, I., Fernández-Llamazares, Á., Salpeteur, M., Howard, P. L., & Reyes-García, V. (2016). Gendered medicinal plant knowledge contributions to adaptive capacity and health sovereignty in Amazonia. *AMBIO: a Journal of the Human Environment*, *45*(S3), 263–275. https://doi.org/10.1007/s13280-016-0826-1

Eyster, H. N., Satterfield, T., & Chan, K. M. A. (2023). Empirical examples demonstrate how relational thinking might enrich science and practice. *People and Nature*, *5*(2), 455–469. https://doi.org/10.1002/pan3.10453

Fančovičová, J., & Prokop, P. (2011). Plants have a chance: Outdoor educational programmes alter students' knowledge and attitudes towards plants. *Environmental Education Research*, *17*(4), 537–551. https://doi.org/10.1080/13504622.2010.54587

Fernández-Llamazares, Á., & Cabeza, M. (2017). Rediscovering the potential of Indigenous storytelling for conservation practice. *Conservation Letters*, *11*(3), e12398. https://doi.org/10.1111/conl.12398

Garnatje, T., Calvet-Mir, L., Parada, M., Rigat, M., Vallès, J., & Reyes-García, V. (2011). Els horts familiars del Pirineu català: Aproximacions etnobotàniques i etnoecològiques. *Mètode*, *72*, 73–76. http://hdl.handle.net/10261/83587

Gelabert, P., Rodrigues, M., Vidal-Macua, J. J., Ameztegui, A., & Vega-García, C. (2022). Spatially explicit modeling of the probability of land abandonment in the Spanish Pyrenees. *Landscape and Urban Planning*, *226*, 104487. https://doi.org/10.1016/j.landurbplan.2022.104487

Gras, A., Garnatje, T., Bonet, M., Carrió, E., Mayans, M., Parada, M., Rigat, M., & Vallès, J. (2016). Beyond food and medicine, but necessary for life, too. Other folk plant uses in several territories of Catalonia and the Balearic Islands. *Journal of Ethnobiology and Ethnomedicine*, *12*, 23. https://doi.org/10.1186/s13002-016-0097-8

Gras, A., Parada, M., Vallès, J., & Garnatje, T. (2020). Catalan ethnoflora: A meta-analytic approach to life forms and geographic territories. *Journal of Ethnobiology and Ethnomedicine*, *16*, 1–10. https://doi.org/10.1186/s13002-020-00424-x

Gras, A., Serrasolses, G., Vallès, J., & Garnatje, T. (2019). Traditional knowledge in semi-rural close to industrial areas: Ethnobotanical studies in western Gironès (Catalonia, Iberian Peninsula). *Journal of Ethnobiology and Ethnomedicine*, *15*(1), 19. https://doi.org/10.1186/s13002-019-0295-2

Herrero, B., & Cardaño, Y. M. (2015). Ethnobotany in the folk songs of Castilla y León (Spain). *Botanical Sciences*, *93*(2), 249–260. https://doi.org/10.17129/botsci.88

Hua, S., Yang, J., & Xue, D. (2021). Applications of Wa traditional culture in biodiversity conservation. *Shengwu Duoyangxing*, *29*(8), 1120–1127. https://doi.org/10.17520/biods.2020480

IDESCAT. (2022). Anuario estadístico de Cataluña. Pluviometría. Precipitación mensual y anual. Comarcas y Aran. https://www.idescat.cat/indicadors/?id=aec&n=15195&lang=es

Ikeke, M. O. (2022). In search of environmental ethics: A hermeneutics of the concept of spirit in African Indigenous philosophy. *Oracle of Wisdom Journal of Philosophy and Public Affairs (OWIJOPPA)*, *6*(1), 1–14.

International Society of Ethnobiology. (2006). International Society of Ethnobiology Code of Ethics (with 2008 additions). Consulted 20/05/2024. http://ethnobiology.net/code-of-ethics/

Ivanova, T., Ganeva-Raicheva, V., Bosseva, Y., & Dimitrova, D. (2021). Singing the nature—Ethnobotanical knowledge in Bulgarian folk songs. *Botanical Sciences*, *99*(2), 321–341. https://doi.org/10.17129/botsci.2672

Jacobs, M. H., & Vaske, J. J. (2019). Human–wildlife interactions: Turning conflict into coexistence. In B. Frank, J. A. Glikman, & S. Marchini (Eds.), *Understanding emotions as opportunities for and barriers to coexistence with wildlife* (pp. 65–84). Cambridge University Press. https://doi.org/10.1017/9781108235730.007

Jose, S., Wu, C., & Kamoun, S. (2019). Overcoming plant blindness in science, education, and society. *Plants, People, Planet*, *1*(3), 169–172. https://doi.org/10.1002/ppp3.51

Kimmerer, R. (2013). Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants. Milkweed editions.

Krosnick, S. E., Baker, J. C., & Moore, K. R. (2018). The pet plant project: Treating plant blindness by making plants personal. *The American Biology Teacher*, *80*(5), 339–345. https://doi.org/10.1525/abt.2018.80.5.339

Margulies, J. D., Bullough, L.-A., Hinsley, A., Ingram, D. J., Cowell, C., Goettsch, B., Klitgård, B. B., Lavorgna, A., Sinovas, P., & Phelps, J. (2019). Illegal wildlife trade and the persistence of "plant blindness". *Plants, People, Planet*, *1*, 173–182. https://doi.org/10.1002/ppp3.10053

McDonough MacKenzie, C., Kuebbing, S., Barak, R. S., Bletz, M., Dudney, J., McGill, B. M., & Tonietto, R. K. (2019). We do not want to "cure plant blindness" we want to grow plant love. *Plants, People, Planet*, *1*(3), 139–141. https://doi.org/10.1002/ppp3.10062

McElwee, P., Fernández-Llamazares, Á., Aumeeruddy-Thomas, Y., Babai, D., Bates, P., Galvin, K. A., Guèze, M., Liu, J., Molnár, Z., Ngo, H. T., Reyes-García, V., Chowdhury, R. R., Samakov, A., Shrestha, U. B., Díaz, S., & Brondizio, E. S. (2020). Working with Indigenous and local knowledge (ILK) in large-scale ecological assessments: Reviewing the experience of the IPBES global assessment. *Journal of Applied Ecology*, *57*(9), 1666–1676. https://doi.org/10.1111/1365-2664.13705

Mckertich, P., & Shilpa, V. (2016). "It happens quietly": Plant poetry and the botanification of the imagination. *Journal of Literature and Science*, *9*(2), 36–49. https://doi.org/10.12929/jls.09.2.03

Palomino, M., Taylor, T., Göker, A., Isaacs, J., & Warber, S. (2016). The online dissemination of nature–health concepts: Lessons from sentiment analysis of social media relating to "nature-deficit disorder".

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

International Journal of Environmental Research and Public Health, *13*, 142. https://doi.org/10.3390/ijerph13010142

Parsley, K. (2020). Plant awareness disparity: A case for renaming plant blindness. *Plants, People, Planet*, *2*(6), 598–601. https://doi.org/10.1002/ppp3.10153

Parsley, K. M., Daigle, B. J., & Sabel, J. L. (2022). Initial development and validation of the plant Awareness Disparity Index. *CBE- Life Sciences Education*, *21*(4), ar64. https://doi.org/10.1187/cbe.20-12-0275

Pascual, U., Balvanera, P., Anderson, C. B., Chaplin-Kramer, R., Christie, M., González-Jiménez, D., Martin, A., Raymond, C. M., Termansen, M., Vatn, A., Athayde, S., Baptiste, B., Barton, D. N., Jacobs, S., Kelemen, E., Kumar, R., Lazos, E., Mwampamba, T. H., Nakangu, B., … Zent, E. (2023). Diverse values of nature for sustainability. *Nature*, *620*, 813–823. https://doi.org/10.1038/s41586-023-06406-9

Pedrera, O., Ortega, U., Ruiz-González, A., Díez, J. R., & Barrutia, O. (2023). Branches of plant blindness and their relationship with biodiversity conceptualisation among secondary students. *Journal of Biological Education*, *57*, 566–591. https://doi.org/10.1080/00219266.2021.1933133

Pritchard, A., Richardson, M., Sheffield, D., & McEwan, K. (2019). The relationship between nature connectedness and eudaimonic well-being: A meta-analysis. *Journal of Happiness Studies*, *21*(3), 1145–1167. https://doi.org/10.1007/s10902-019-00118-6

Quave, C., & Pieroni, A. (2015). A reservoir of ethnobotanical knowledge informs resilient food security and health strategies in the Balkans. *Nature Plants*, *1*, 14021. https://doi.org/10.1038/nplants.2014.21

Reyes-García, V., Huanca, T., Vadez, V., Leonard, W. R., & Wilkie, D. (2006). Cultural, practical, and economic value of wild plants: A quantitative study in the Bolivian Amazon. *Economic Botany*, *60*(1), 62–74. https://doi.org/10.1663/0013-0001(2006)60[62:CPAEVO]2.0.CO;2

Richardson, M., Passmore, H., Lumber, R., Thomas, R., & Hunt, A. (2021). Moments, not minutes: The nature-wellbeing relationship. *International Journal of Wellbeing*, *11*(1), 8–33. https://doi.org/10.5502/ijw.v11i1.1267

Rigat, M., Bonet, M. À. M. I., Garcia, S., Garnatje, T., & Vallès, J. (2007). Studies on pharmaceutical ethnobotany in the high river Ter valley (Pyrenees, Catalonia, Iberian Peninsula). *Journal of Ethnopharmacology*, *113*(2), 267–277. https://doi.org/10.1016/j.jep.2007.06.004

Rigat, M., Bonet, M. À. M. I., Garcia, S., Garnatje, T., & Vallès, J. (2009). Ethnobotany of food plants in the high River Ter Valley (Pyrenees, Catalonia, Iberian Peninsula): Non-crop food vascular plants and crop food plants with medicinal properties. *Ecology of Food and Nutrition*, *48*(4), 303–326. https://doi.org/10.1080/03670240903022320

Rigat, M., Garnatje, T., & Vallès, J. (2011). Plant biodiversity in Pyrenean homegardens (Catalonia, Iberian peninsula): Current state of a mountain agroecosystem. *Acta Botanica Gallica*, *158*, 525–551. https://doi.org/10.1080/12538078.2011.10516293

Rigat, M., Vallès, J., Iglésias, J., & Garnatje, T. (2013). Traditional and alternative natural therapeutic products used in the treatment of respiratory tract infectious diseases in the eastern Catalan Pyrenees (Iberian Peninsula). *Journal of Ethnopharmacology*, *148*(2), 411–422. https://doi.org/10.1016/j.jep.2013.04.022

Sanders, D. (2019). Standing in the shadows of plants. *Plants, People, Planet*, *1*(3), 130–138. https://doi.org/10.1002/ppp3.10059

Stagg, B. C., & Dillon, J. (2022). Plant awareness is linked to plant relevance: A review of educational and ethnobiological literature (1998–2020). *Plants, People, Planet*, *4*(6), 579–592. https://doi.org/10.1002/ppp3.10323

Stagg, B. C., Hetherington, L., & Dillon, J. (2024). Towards a model of plant awareness in education: A literature review and framework proposal. *International Journal of Science Education*, *46*, 1–21. https://doi.org/10.1080/09500693.2024.2342575

Teixidor-Toneu, I., M'Sou, S., Salamat, H., Baskad, H. A., Illigh, F. A., Atyah, T., Mouhdach, H., Rankou, H., Babahmad, R. A., McGuinness, M. B., Martin, G. J., & D'Ambrosio, U. (2022). Which plants matter? A comparison of academic and community assessments of plant value and conservation status in the Moroccan High Atlas. *Ambio*, *51*(3), 799–810. https://doi.org/10.1007/s13280-021-01584-0

Thomas, H., Ougham, H. J., & Sanders, D. (2021). Plant blindness and sustainability. *International Journal of Sustainability in Higher Education*, *23*(1), 41–57. https://doi.org/10.1108/ijshe-09-2020-0335

Ulian, T., Diazgranados, M., Pironon, S., Padulosi, S., Liu, U., Davies, L. A., Howes, M. R., Borrell, J. S., Ondo, I., Pérez-Escobar, O. A., Sharrock, S., Ryan, P., Hunter, D., Lee, M. A., Barstow, C., Łuczaj, Ł., Pieroni, A., Cámara-Leret, R., Noorani, A., & Mattana, E. (2020). Unlocking plant resources to support food security and promote sustainable agriculture. *Plants, People, Planet*, *2*(5), 421–445. https://doi.org/10.1002/ppp3.10145

Verschuuren, B., Mallarach, J., Bernbaum, E., Spoon, J., Brown, S., Borde, R., Brown, J., & Calamia, M. A. (2021). Cultural and spiritual significance of nature: guidance for protected and conserved area governance and management. https://doi.org/10.2305/iucn.ch.2021.pag.32.en

Wandersee, J. H., Clary, R. M., & Guzman, S. M. (2006). A writing template, for probing students' botanical sense of place. *American Biology Teacher*, *68*, 419–422. https://doi.org/10.2307/4452030

Zylstra, M. J., Knight, A. T., Esler, K. J., & Le Grange, L. L. (2014). Connectedness as a core conservation concern: An interdisciplinary review of theory and a call for practice. *Springer Science Reviews*, *2*, 119–143. https://doi.org/10.1007/s40362-014-0021-3

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Querol i Mercadé, J., Fernandez-Llamazares, Á., Garnatje, T., Casadevall, A., Garet, A., & Gallois, S. (2025). Beyond plant awareness disparity: Exploring intangible relationships with plants in the Catalan Pyrenees. *Plants, People, Planet*, *7*(3), 828–837. https://doi.org/10.1002/ppp3.10593

25722611, 2025, 3, Downloaded from https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10593 by Spanish Cochrane National Provision (Ministerio de Sanidad), Wiley Online Library on [16/04/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License