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PERSPECTIVE

Food for flower-visiting insects: Appreciating common native wild flowering plants

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Abstract

1. Native wild flowering plants provide important season-round nectar and pollen resources for flower-visiting insects, but many are unappreciated or even disliked by members of the public; for example ivy (*Hedera* spp.), dandelion (*Taraxacum officinale* agg.) and bramble (*Rubus fruticosus* agg.).
2. This antipathy has received little research attention despite a pressing need for a societal shift towards greater awareness of such plants and recognition of their ecological value.
3. Engendering greater awareness and appreciation of common wild-growing plants could greatly improve floral resource availability for flower-visiting insects, enhance biodiversity and simultaneously benefit human physical and mental well-being.
4. However, there are multiple challenges to changing public attitudes. Knowledge of common wild flowering plants among members of the public is limited and this phenomenon is symptomatic of a diminishing human connection to nature. While many species of wild flowering plants may be overlooked due to a lack of awareness or knowledge, it is evident that some 'weeds' are actively unpopular.
5. Reframing societal perceptions towards ecological value could be achieved in several ways including through formal education, messaging by the media, businesses and environmental organisations, and by encouraging public participation in urban land management.

KEYWORDS
bramble, conservation, dandelion, ivy, landscape management, pollinators, pro-environmental behaviour, weeds, wildflowers, wildlife gardening

1 | INTRODUCTION

Floral resources are necessary for a wide range of insects that feed on nectar and pollen in their adult life stage, and bees whose larvae are also fed on these resources. Adult pollinators (we use the term loosely to include all flower-visiting insects) visit a wide range of flowers, including flowering crops (Garratt et al., 2014) and ornamental garden plants (Garbuzov & Ratnieks, 2014a). However, a large proportion of the floral resources utilised by pollinators is provided by wild-growing native species of herbaceous wildflowers, shrubs and trees (e.g. Balfour et al., 2018; Wood et al., 2017), hereafter collectively termed 'wild flowering plants'.

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Large-scale land use changes during the late 19th century and 20th century have reduced the abundance of wild flowering plants in the UK (Ollerton et al., 2014; Robinson & Sutherland, 2002). For example, in the period from 1930 to 1999, 69 of 97 wild flowering bumblebee forage plants suffered a reduction across Great Britain (Carvell et al., 2006). Likewise, it has been estimated that 97% of wildflower-rich hay meadows in England and Wales were lost between 1930 and 1984 (Fuller, 1987). These losses have been repeatedly linked to pollinator declines, as flower availability directly affects their survivorship, growth, distribution and reproduction (e.g. Balfour et al., 2018; Carvell et al., 2006; Roulston & Goodell, 2011).

However, despite this and evidence of growing societal concern for bees and other pollinators (Hall & Martins, 2020; Wignall et al., 2019), the ecological value of many native common wild flowering plants for flower-visiting insects is often overlooked, with many species being unnoticed, undervalued or even disliked. However, this mass-blooming goes largely unnoticed by members of the public. It is also noteworthy that 8 of the top 10 plant species (ranked by insect visitor richness; Table 1) in the Database of Pollinator Interactions (Balfour et al., 2022) are considered weeds (Long, 1910). However, many of these species exhibit prodigious seed production and vigorous growth habits and can rapidly colonise disturbed habitats and outcompete rare species (Balfour & Ratnieks, 2022). Hence, their net ecological contribution is not always positive and decisions about their tolerance or removal can be complex even from a conservation perspective.

Improving public awareness of the ecological and conservation value of common wild flowering plants could help to meet a pressing need for increased floral resource availability (Defra, 2014; Roulston & Goodell, 2011) through greater tolerance and encouragement of these species, many of which are routinely removed from domestic and public greenspace (Baldock, 2020; Larson et al., 2014; Figure 1). Often only simple management changes, such as reducing mowing frequency, are needed to allow insect-attractive wild flowering plants to thrive in these areas (Baldock et al., 2019; Baldock, 2020; Coupey et al., 2015; Noordijk et al., 2009). However, despite this potential, the extent of and underlying reasons behind societal underappreciation of common wild flowering plant species, and possible ways in which to address this, has received little research attention. Furthermore, the current public efforts to support pollinators tend to lack scientific underpinning. For example, lists of garden plants recommended for pollinators are generally not based on empirical data (Garbuzov & Ratnieks, 2014b). Products, such as bee hotels and seed balls, which are widely available in shops and online stores are more often than not both financially costly and ineffective (Alton & Ratnieks, 2020).

In this article, we discuss three 'underappreciated' native British wild flowering plants, namely ivy (*Hedera* spp.), dandelion (*Taraxacum officinale* agg.) and bramble (*Rubus fruticosus* agg.). These are chosen

TABLE 1 List of plant species in the Database of Pollinator Interactions (Balfour et al., 2022) with the greatest number of observed (Obs) and estimated (Est; Chao Estimator) flower-visitor species. Also shown is the diversity index of their respective flower visitors (H′, Shannon–Wiener). To identify those plant species with the greatest number of insect visitors, the database was filtered to include only studies which recorded all plants (i.e. transects) and all pollinators. An abundance-based species diversity estimator (Chao1 Estimator; Hsieh et al., 2016) was used to estimate the number of flower-visitor species (rounded up to nearest whole number) which would have been recorded with unlimited sampling effort.

Plant species	Obs	Est	H′
Ranunculus repens	260	517	3.29
Cirsium arvense	197	398	3.76
Heracleum sphondylium	240	387	4.89
Senecio jacobaea	152	377	4.16
Anthriscus sylvestris	113	364	4.42
Rubus fruticosus agg.	210	344	3.17
Leucanthemum vulgare	184	340	3.56
Pastinaca sativa	62	339	4.01
Prunus spinosa	42	245	2.23
Cirsium vulgare	84	240	3.15

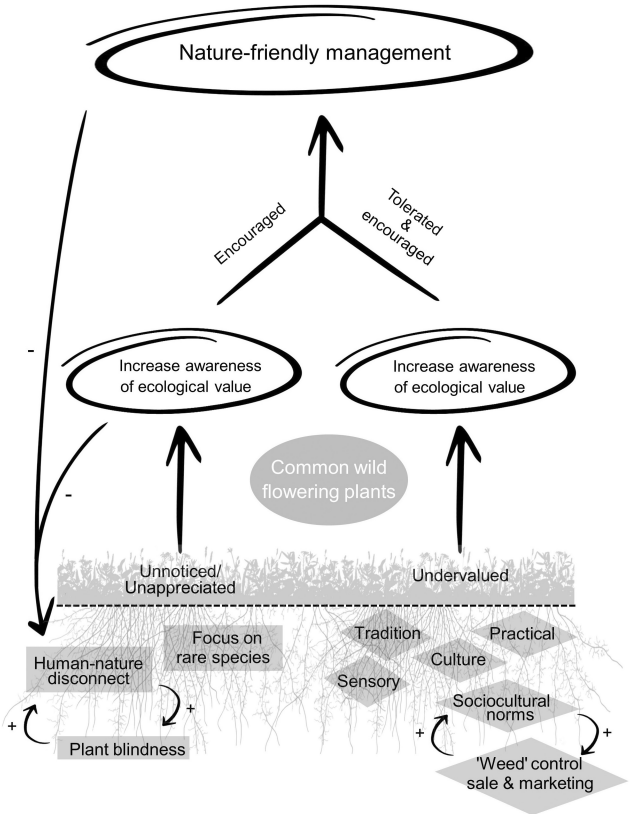

FIGURE 1 Improving nature-friendly landscape management through increasing societal awareness of underappreciated common native wild flowering plants and their ecological value. Theoretical roots of societal perceptions are shown for 'Unnoticed or not appreciated' plants at the lower left in grey rectangles, and 'Disliked' plants at the lower right in grey rhomboids, with feedback loops shown in dashed lines with the direction stated as positive (+) or negative (−). Figure loosely based on Clayton (2007) and Soga and Gaston (2016).

as illustrative examples of widespread and abundant species (recorded in >90% of UK hectads; Hill et al., 2004) of high ecological value to pollinators and other wildlife, that are often overlooked or considered undesirable (i.e. classed as weeds). We outline the wildlife value and public perceptions of each, as well as practical management options to promote them where appropriate. We then consider the challenges and opportunities for raising citizen awareness of the role of wild plants in supporting pollinators (see Figure 1). We concentrate on non-agricultural contexts throughout as agricultural landscape management is largely shaped through farming policy and practice (Balfour & Ratnieks, 2022). Our focus is primarily on the British or European context, as several of the highlighted species have become problematic invasives when introduced beyond their natural range.

2 | UNDERAPPRECIATED NATIVE WILD FLOWERING PLANTS

2.1 | Ivy

Ivy (*Hedera* spp.), an abundant climbing evergreen shrub that grows in many habitats, consists of two native British species (sometimes treated as subspecies), *H. helix* and *H. hibernica*, that blooms from September to November (Streeter et al., 2009). The flowers are inconspicuous, going largely unnoticed by members of the public, but produce pollen and large quantities of nectar. The nectar is exuded from a central disc with no corolla tube so that the rewards are accessible to both long- and short-tongued insects. Over 100 species of insects have been recorded visiting ivy flowers (Balfour et al., 2022), and this plant is a key autumn source of nectar and pollen for honeybees and hoverflies, butterflies, and the solitary ivy bee, *Colletes hederae* (Garbuzov & Ratnieks, 2014b, 2014c). Due to its local abundance at a time when there are few other species in flower, it has been suggested that ivy is a 'keystone species' for pollinators (Garbuzov & Ratnieks, 2014c). It is also an important source of food, shelter and nest sites for birds, mammals and invertebrates (Metcalfe, 2005).

However, ivy is often regarded as a pest or nuisance plant, particularly due to fears that its adventitious roots will damage trees and buildings. While there is limited evidence that ivy damages trees, it can damage buildings if left unchecked, which is of particular concern for heritage property (Small, 2019). Nevertheless, this evergreen plant can act in a bio-protective role both for buildings (Sternberg et al., 2010), increasing heating efficiency (Bolton et al., 2014). Moreover, urban vegetation can benefit biodiversity, pollution mitigation, stormwater management, public health and mental well-being (Wu, 2014). Tolerating ivy in the built environment may therefore have broad sustainability benefits as well as providing food for pollinators.

In rural environments, reducing concerns regarding ivy's damage to trees and buildings may help to increase tolerance of this species in privately managed woodland and other areas. Environmental charities can help to counter this. For example, the Woodland Trust states on its website: 'Ivy has long been accused of strangling trees, but it doesn't harm the tree at all, and even supports at least 50 species of wildlife' (Woodland Trust, 2022). However, beyond its native range its vigorous growth and tendency to dominate the field layer make it a problematic invasive (Metcalfe, 2005).

2.2 | Dandelion

Dandelions, *Taraxacum officinale* agg., produce large amounts of nectar sugar and pollen (Hicks et al., 2016) from March to October, with peak bloom in May. Although native to Eurasia they now occur in all regions of the world. In Britain, they are widespread, often locally abundant in a variety of habitats (Baldock et al., 2019) and have a long history of human use as both a food and traditional medicine (Schütz et al., 2006). Dandelions receive many insect visits relative to co-flowering species (Baldock et al., 2019) and support a wide range of pollinators, with 97 bee species, 94 fly species and 25 species of butterfly recorded visiting the flowers in Britain (Balfour et al., 2022). Dandelion pollen is a particularly rich source of energy-rich lipids (Roulston & Cane, 2000) and represents an important dietary contribution to pollinators, especially in early spring. Modelling indicates that increasing the number of dandelions on greenspaces in four UK cities could increase insect–flower network robustness at the city scale (Baldock et al., 2019).

However, dandelions are often considered to be undesirable 'weeds'. They are frequently removed from domestic garden lawns (Clayton, 2007), and urban greenspaces via herbicide use and mowing regimes. The basis of this dislike may be largely influenced by sociocultural preferences for 'tidy' lawns (Clayton, 2007; Goddard et al., 2013). Dandelions are difficult to remove since they have a long taproot, can regenerate from small fragments, and are dispersed in large numbers via airborne seeds. Negative perceptions of dandelions have been capitalised on by herbicide companies, many using photos of this flower on their packaging of lawn weed-killer products (Figure 2a). Meanwhile, imagery of neat, weed-free lawns has long been promoted by mass media (Clayton, 2007). These factors are likely to further reinforce perceptions of dandelion, and other species growing in lawns, as nuisance weeds.

More sympathetic management of *T. officinale* agg. is easily facilitated through reduced mowing. This is a cost-effective strategy to greatly increase floral resources in urban areas and transport highways. Sociocultural shifts in attitudes towards dandelion to promote its wildlife value and alter existing negative perceptions may be necessary (Larson et al., 2014). Due to growing popular interest in gardening for wildlife and more 'natural' gardening styles (Goddard et al., 2013), and growing public awareness of the threats facing pollinators (Hall & Martins, 2020; Wignall et al., 2019), it may be that attitudes towards dandelion and other lawn 'weeds' are already shifting (Fischer et al., 2020).

FIGURE 2 Available weed control products designed to kill (a) lawn weeds, 'Kills dandelions, daisies & clover' and (b) deep-rooted and woody weeds, 'Kills Nettles, Dock, Brambles, Thistles and many more'.

2.3 | Bramble

The open flowers of bramble produce large volumes of nectar and pollen (Gyan & Woodell, 1987a) and are visited by a wide range of pollinators, including species of conservation concern. It is geographically widespread and locally abundant, growing in many land-use types (Wignall et al., 2020). The flowers bloom over a long period, including summer months when per-insect resource availability can be scarce (Balfour et al., 2018). Bramble is highly abundant relative to co-flowering wild plant species and provides a major source of pollen for honeybees, hoverflies and solitary bees (Wignall et al., 2020; Wood et al., 2017).

A controversial plant that is both loved and hated, *R. fruticosus* has human cultural and foraging value due to the blackberries produced in late summer, but is a prickly, hardy plant that can quickly colonise an area (Gyan & Woodell, 1987b) and become a nuisance, especially due to its thorns. Therefore, it is often removed from urban green spaces, with the use of chemicals marketed specifically for this purpose (Phillips, 2015, Figure 2b).

Conflicts of interest also arise in conservation. Bramble is beneficial for many kinds of wildlife as well as pollinators, such as small mammals, birds and invertebrates which use bramble for shelter, nesting and forage (Metcalfe, 2005). However, it can readily outcompete other plants, including rare wildflower species, and is often invasive when introduced beyond its natural European range (Balandier et al., 2013). Encroaching bramble scrub can threaten vulnerable biodiverse habitats such as species-rich grassland (Defra, 2020). Nevertheless, it would be possible and beneficial to further increase the tolerance of bramble in areas where it is not obstructive, for example in hedgerows or along fences and walls (Baldock, 2020; Baldock et al., 2019). As with other similarly controversial plants, a shift in public awareness and opinion of bramble as an ecologically valuable species may be required for this to be feasible.

3 | CHALLENGES: CONTRIBUTING FACTORS TO COMMON WILD FLOWERING PLANT UNDERAPPRECIATION

Evidence suggests that knowledge of common wild flowering plants among members of the public is limited, or selective. A study of British A-Level students found that 86% of students could name only three or fewer common wildflowers, with 41% naming one or none (Bebbington, 2005). A 2017 poll commissioned by Plantlife UK found that only 3.5% of British participants were able to name 'red clover' correctly and 0.8% to name common 'dog-violet' (Plantlife, 2017). Interestingly, the same poll also found that 70% of respondents were able to identify bluebells, previously found to be England's 'favourite flower' in earlier polling. The extent and causes of variation in public familiarity among wild flowering plants remain unclear and would be an interesting direction for future research. However, a diminished potential to encounter plants in urbanised settings appears to underpin this phenomenon. Diminishing experiences with plants results in a cyclical process by reducing awareness and attention (Stagg & Dillon, 2022).

3.1 | Human–nature disconnect

Low societal awareness of common wild flowering plants is likely symptomatic of a diminishing human connection to nature in recent decades (Miller, 2005; Soga & Gaston, 2016). The time children

today spend engaging in outdoor experiences has decreased substantially compared to previous generations, with an increasing percentage that has never experienced activities such as birdwatching and catching insects (Soga & Gaston, 2016). Underlying factors include increasing urban living, with 55% of the global population living in urban areas in 2018, a figure predicted to increase to 68% by 2050 (UN, 2019). Reliance on digital technology for both work and entertainment also contributes to reducing interactions with nature (Miller, 2005, Soga & Gaston, 2016). Yet, there is growing evidence that exposure to natural environments is associated with mental health benefits (Pearson & Craig, 2014).

3.2 | Plant blindness

Human–nature disconnection may be reinforced by the common phenomenon of 'plant blindness' (Wandersee & Schussler, 1999), or plant awareness disparity (PAD; Parsley, 2020): an inability to notice or appreciate plants, distinguish among species or recognise their importance. PAD acts through physiological constraints in human visual perception and cultural factors including a limited educational focus on flora (Balding & Williams, 2016; Wandersee & Schussler, 1999). It is possible that where they are present, wild flowering plants become part of an uninteresting and unimportant backdrop, rather than the focus of any interest or awareness of their role within ecosystems.

3.3 | Focus on rare species

A further factor may be a societal focus on rarer plant species, since these are often the focus of conservation goals, while common flowers such as bramble, dandelion and ivy are not. For example, on its website, Plantlife (2022) currently lists 25 ongoing UK conservation projects in 7 habitats, 20 of which aim to protect wild flowering plants (5 projects focus on lichens, moss or other lower plants). Of these, 19 specifically aim to protect rare or threatened species while only one ('*Magnificent Meadows Cymru*') focuses on conserving meadow habitat with no explicit use of the words 'rare', 'threatened', 'extinction' or 'vanishing'. Humans have a psychological value bias towards rarity (Angulo & Courchamp, 2009), with real-world behavioural impacts. For example, zoo visitors show greater personal investment in rare animals species, expending more time and effort, to see these species (Angulo et al., 2009). This bias may interact with high-profile media messaging about rare or threatened species to contribute to a lack of awareness of wild flowering plant value. While the augmenting effect of rarity on the value of a species to collectors, traders and consumers (Rivalan et al., 2007) is often a focus of concern in wildlife conservation, it is interesting that this may also negatively affect common species through increasing their perceived unimportance or disposability.

4 | CHALLENGES: DISLIKE OF COMMON WILD FLOWERING PLANT

While many species of wild flowering plants may be overlooked due to a lack of awareness or knowledge, it is evident that some are actively unpopular, at least in certain contexts. What causes this dislike? Are there any factors that are common to less-liked species?

4.1 | Culture

Negative perceptions of spontaneously growing plants may arise simply because they are uninvited and represent the wild and untamed (Mabey, 2010). Domestic gardens in particular are often highly controlled spaces and psychologically represent an extension of people's homes and even human superiority over nature (Clayton, 2007), the growth of common garden wildflowers or 'weeds' can represent an unwelcome invasion. Not all 'weeds' are equal, however. For example, Clayton (2007) shows that gardeners in the United States considered wild violets to be flowers rather than weeds, and the reverse for dandelions, despite both growing without being planted. The public also tends to conflate weedy native wild flowering plants with invasive non-native species (Balfour et al., 2022).

4.2 | Aesthetic preferences

Research among >2000 residents in the Czech Republic found flowers that are blue, radially symmetrical and non-complex to be preferred while yellow flowers were considered the least attractive, with flower shape being a more powerful predictor of appeal than colour (Hůla & Flegr, 2016). There is evidence to suggest that human innate aesthetic preferences may affect flower preference. This may align with ecological valence theory (Palmer & Schloss, 2010) and habitat selection theory (Heerwagen & Orians, 1993), where the innate preferences for certain colours may be connected to signals for rewarding resources and habitats. However, this is not conclusive, and it is difficult to extricate innate perception from cultural factors (Hůla & Flegr, 2016). Dandelions are often described as 'unsightly' (Clayton, 2007), and it is possible that aesthetic preferences may partly contribute to certain species' low popularity (and the reverse). For those species considered to be unattractive, growing in the wrong place or both, characteristics adding to resilience to control measures may reinforce dislike by gardeners, including vigorous growth, efficient propagation and difficulty of removal. These properties are common to ivy, dandelion and bramble.

4.3 | Sociocultural norms

Dislike of common wild flowering plants can also be understood at a lower resolution. In many cases, plants are visually perceived as a

near-homogeneous mass of vegetation rather than as a collection of individuals of multiple species (Wandersee & Schussler, 1999). For many people, wild-growing vegetation is perceived negatively due to its irregular growth or untidiness *en masse*. Weber et al. (2014) showed that Berlin residents had mixed opinions towards wild-growing roadside vegetation, with 37% of survey participants associating this with disorder and only 15% with positive aspects of urban greening, including perceived beauty and psychological well-being. This reflects a common socio-cultural preference for a tidy landscape aesthetic showing signs of care and maintenance (Ngiam et al., 2017) which can act as a barrier to adopting wildlife-friendly management (Goddard et al., 2013). This preference for neat landscapes, often at odds with those hosting greater biodiversity (Gobster et al., 2007), has real consequences for the resources available for pollinators. In many areas, spontaneously growing flowering plants are routinely removed from public spaces. Reflecting this, a recent study of four UK cities showed that publicly managed greenspace made up a large proportion of land use area (27%–35%), but hosted low floral abundance and species richness, missing a considerable opportunity to support pollinators (Baldock et al., 2019). Neighbourhood pressure to have a tidy, manicured lawn and garden (Goddard et al., 2013) is also a clear social driver for removing wild flowering plants found that among 220 householders in Sheffield, UK, >65% mowed their lawn once a fortnight or more and only 15% said they tolerated weeds in most parts of their garden. Residents who reduce mowing or gardening activities to promote wildlife in their gardens may experience social consequences through neighbourly disapproval and even community enforcement (Goddard et al., 2013).

5 | OPPORTUNITIES: IMPROVING COMMON WILD FLOWERING PLANT APPRECIATION

The National Pollinator Strategy for England gives 'Raising awareness of what pollinators need to survive and thrive' as one of five key strategy areas. The Defra programme *Bees' Needs* (Defra, 2014) includes an appeal to gardeners, farmers and managers of urban spaces to: (i) leave patches of land to grow wild and (ii) cut grass less often, thus, indirectly promoting greater tolerance of wild flowering plants. However, we suggest that there are many ways to explicitly increase appreciation of these plants among a wide section of society, and that it is both necessary and timely to do so. Three of the many relevant channels are formal education, positive messaging by the media and organisations, and citizen science.

5.1 | Formal education

Following the large Swiss programme, 'Nature on the way to school', pupils showed a significant increase in the number of local wild plants they could identify. Furthermore, an increase in the number of wild plants children were able to identify was positively associated with an increased appreciation of these species (Lindemann-Matthies, 2005). Similarly, a Slovakian study showed that a programme focusing on practical work with plants significantly improved school children's knowledge of and attitudes towards plants (Fančovičová & Prokop, 2011). In Tennessee Tech University's 'Pet Plant Project', students enrolled on a botany course were tasked with growing a plant from seed to maturity. Following the project, 73% of students reported a greater tendency to notice plants more, 76% planned to grow plants in the future and many reported feeling a long-term connection with plants (Krosnick et al., 2018).

These and many other studies suggest that effective education and communication within educational settings, and integrating active engagement with nature within curricula, can engender a greater appreciation of common wild plants. However, humans often use heuristics, or rules of thumb, to help simplify the decision-making process. Such an approach may come at the cost of more deliberate information processing and lead to biases when used to make decisions about a plant species' ecological value. Hence, this limit to human cognition may pose complications to such programmes.

5.2 | Messaging by the media, businesses and environmentally focused organisations

Language and the use of images can shape perceptions of species and how people relate to the natural world (Monroe et al., 2009; Otieno et al., 2013). Many common wild flowering plants are described as 'weeds'. This word is frequently used for flowering plants that have not been deliberately planted or sown. However, in many cases, this is not appropriate since it does not recognise, for example, the beauty (ivy-leaved toadflax, *Cymbalaria muralis*; Figure 3) and/or usefulness (i.e. value to humans, including ecological function) of many plants that, although growing spontaneously, are not commonly considered a nuisance.

Improving the messaging regarding common wild flowering plants could help to reframe attitudes and recognition of their ecological value for pollinators and other wildlife (Otieno et al., 2013). One practical step could be to reduce the use of the word 'weed' from sources from which people receive information about plants and flower-visiting insects, as well as concurrently incorporating positive and accurate messaging relating to wildlife value. Such sources include the media, such as television and radio programmes, news and social media (Wignall et al., 2019), as well as wildlife- and gardening-focused charities, and businesses such as garden centres and hardware stores.

Further to this, perhaps a neologism could be found to describe spontaneously colonising plants that are beneficial for wildlife. This could simultaneously integrate ecological awareness into the language used to describe such plants and reduce the negative connotations associated with the word 'weed'. New defining words or phrases can both increase understanding and reduce stigma, for

FIGURE 3 Four common wild-grown plant species: (a) bramble, *Rubus fruticosus*, (b) dandelion, *Taraxacum officinale*, (c) ivy-leaved toadflax, *Cymbalaria muralis* and (d) ivy, *Helix hedera*.

example in mental illness and gender identity (Gustafsson Sendén et al., 2015).

5.3 | Government policy ('Act now, explain now')

Local and national government and their agencies can also play an instrumental role in reshaping the narrative around wild plants. In France, a nationwide ban on the use of the herbicide glyphosate in public spaces in early 2019 (Nature 2020) led to the adoption of more labour-intensive methods of weed control and a proliferation of spontaneously growing vegetation in urban areas. Positive communication by local authorities regarding the plants and their ecological role has led to widespread acceptance and greater ecological awareness among citizens (Duffaut et al., 2022). Also in France, the URBANBEES programme, which pioneers collaborative urban ecological green space management, was implemented in Lyon in 2010 with a particular focus on managing urban spaces for wild bees. Actions throughout the city included reducing mowing, cutting and pesticide use, developing hedgerows, tolerating self-seeding wild plants and planting native flowering plants. Management alterations were made in collaboration with citizens, land managers and users of the space, alongside both passive and active communication to raise awareness of how these changes promoted wild bees, including posters, information panels and pamphlets, webpages, workshops with residents, themed events and local press (Coupey et al., 2015). By involving citizens throughout its implementation, the programme successfully garnered public support for the 'less managed' landscapes, creating sustainable changes in how the city spaces are managed to include wildlife (Coupey et al., 2015). Similar work has also been undertaken by Landlife in the UK, who specialise in creative and innovative solutions to low-cost ecological urban landscaping, community engagement and wildflower seed provision (Luscombe & Scott, 2020).

These findings point to a role of effecting practical management changes alongside highly visible communication, an 'act now, explain now' approach, as a successful and efficient method of improving attitudes towards common wild flowering plants, as well as perhaps shifting attitudes more broadly towards a normative 'ecological aesthetic' (Gobster et al., 2007).

5.4 | Citizen science programmes

Citizen science schemes may also facilitate improved awareness and heightened appreciation for native plants and pollinators. An assessment of the Great Pollinator Project in New York City found that around three-quarters of participants reported planting native or pollinator-friendly plants (Toomey & Domroese, 2013). Given the current awareness of pollinators among the British public (Sharma et al., 2019), emphasising the importance of safeguarding pollinators through changing gardening practices may yield more effective leverage for changing mindsets and practices than placing initial emphasis on plants. An assessment of the Planting for Pollinators platform (embedded within the UK programme BeeWatch) found that engaging with bumblebees through the scheme shifted how people gardened. Cessation of pesticide use, leaving areas of grass unmown and encouraging wildflowers through engaging with the scheme appeared particularly important in motivating gardening changes in less knowledgeable participants (Sharma et al., 2019).

6 | CONCLUSIONS

Since mid-2018, global movements drawing attention to environmental and ecological breakdown have resulted in greater penetration of these issues into the public consciousness (Thackeray

et al., 2020), meaning that current perceptions of wildlife may currently be undergoing rapid change. Thus, it may be a particularly opportune time to take action to improve landscape management for pollinators and biodiversity more widely, including allowing common wild flowering plants to grow in areas such as public greenspace (Baldock, 2020; Garbuzov et al., 2015).

Allowing wild flowering plants, including trees, many of which can be of great value to pollinators (e.g. *Tilia cordata*; Balfour et al., 2015), to grow in areas such as public spaces would not only benefit pollinators (Baldock et al., 2019), but could also improve human–nature connection. Many common wild flowering plants can be sustainably integrated into the built environment and public greenspace simply by reducing management intensity (Baldock, 2020). The latter represents a less expensive and more sustainable option than the sowing of 'wildflower mixes' which are generally short-lived and of non-native seed stock (Balfour et al., 2015). Encouraging these plants and the wildlife they support may therefore be particularly valuable in efforts to restore direct interactions with nature for citizens in increasingly urbanised societies (Rotherham & Lambert, 2012). Nature connection and regular interaction with the natural world have multiple associated benefits for human physical and psychological well-being (Miller, 2005; Soga & Gaston, 2016). Pro-nature gardening actions that enhance visible biodiversity such as wildflowers and pollinating insects have been linked to a greater awareness of nature, which, in turn, has been associated with greater connectedness to nature (Hamlin & Richardson, 2022). Moreover, a broad education on the ecological value and characteristics of native plants would equip the public with the tools to discern which contexts these plants could be tolerated and those in which they should be removed.

The societal perception of common wild flowering plants has many theoretical roots (Figure 1) but is not currently well understood, despite its importance for pollinator conservation. Therefore, future research should aim to determine current public knowledge and perception (e.g. ecological function, appropriate management) of such plants, to understand the steps that can be taken to sustainably integrate nature- and pollinator-friendly landscapes into our everyday lives.

AUTHOR CONTRIBUTIONS

Veronica R. Wignall and Francis L. W. Ratnieks conceived the ideas; Veronica R. Wignall led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

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There are no conflicts of interest.

DATA AVAILABILITY STATEMENT

No data are associated with this paper.

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