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We need to appreciate common synanthropic plants before they become rare: Case study in Latgale (Latvia)

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ABSTRACT

Local ecological knowledge holds great potential in contributing to sustainable resource management and conservation activities. For this reason, the authors choose to analyse an ethnobotanical dataset from the Baltic Sea region by exploring the relationship between plants and humans on the basis of three main categories: habitat characteristics, distribution in the wild and plant sensitivity to human impact beyond physical distance. The study provides empirical evidence of widespread usage of so-called common species which are widely distributed in the territory and benefit from human activity. When considering the data via the intensity of use, based on detailed use-reports (DUR), the main category is shown to be apophytes (1001 DUR), followed by anthropophytes (426), hemeradiophores (255) and hemerophobes (54). The authors highlight the co-dependency of plants and humans in the medicinal and wild food domains and stress the need for integrated management strategies where local community knowledge plays a part.

Keywords: Common Species; Conservation; Ethnobotany; Synanthropic Plants.

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SIGNIFICANCE STATEMENT

The authors seek to understand the relationship between plant use and plant sensitivity to human impact beyond physical distance. To do so, the authors specifically choose to analyse an ethnobotanical dataset from the Baltic Sea region and divide the named plants into various categories based on human – plant relationships. The authors note the great importance of synanthropic plants in both the human diet and medicinal applications. We highlight the existing work and continued need to integrate local ecological knowledge into conservation actions in order to safeguard biocultural diversity.

INTRODUCTION

Ecological change and the decline of plant genetic resources are among the factors behind the loss of knowledge regarding traditional plant use (Hanazaki et al. 2013). Not only does the disappearance of wild taxa affect the practice of active use but it might also cause certain damage to cultural heritage as traditional knowledge plays a part in defining cultural identity (Bharucha and Pretty 2010). While discussing change in traditional ecological knowledge, environmental degradation has been an important factor from the perspective of academic discussion (Tang and Gavin 2016; Aswani et al. 2018). The Millennium Ecosystem Assessment (2005) lists several natural and human-induced factors which cause changes in the ecosystem, including the ongoing land use and habitat transformation. However, many habitats, e.g. hedgerows, grasslands, and road verges, have evolved through traditional agricultural practices (Bignal and McCracken 1996; Halada et al. 2011) and depend on the continuation of human activities to maintain their species composition, structure and function. Despite not being natural, semi-natural habitats are known for the high biodiversity they host and the services they provide (Fantinato et al. 2018). Moreover, scholars stress the historical development of ecosystems in which prehistoric societies played a great part in their creation (Albuquerque et al. 2018). In this respect, conservation strategies should not exclude people but rather greatly enhance the coexistence of nature and humans (Carter et al. 2012) or their symbiotic relationship (Ksenzhek and Volkov 1998). The importance of the diversity of all forms of life brings us closer to the general concept of biocultural diversity (Maffi and Dilts 2014) and the co-dependency of plants and humans (The Shenzhen Declaration 2017; Raven 2018). Biocultural diversity utilizes the diversity of nature (Maffi and Dilts 2014). However, few studies have explored human dependence on common species which "shape much of the world around us" (Gaston 2008). Until now, limited studies have emphasized the importance of common species; however, existing studies suggest that dominant or common species "in natural communities play a key role in conferring short-term resistance to reductions in ecosystem function, as rare and uncommon species are lost" (see Smith and Knapp 2003, p. 515). However, common species "have been the subject of rather little explicit attention, either from ecologists or from conservation biologists" (Gaston 2008, p. 73). While discussing plant conservation strategies, attention is only rarely given to widely distributed plant taxa (see Vila-Ruiz et al. (2014) on residential yards). Other scholars have also noted that little value is placed on marginal lands (Marouf et al. 2015). Gaston (2011) adds that "although common species are those with which we are inevitably most familiar, the state of being common is itself rare" (. . .) "common species lie at the very heart of the biodiversity crisis" (p. 354-359). This in turn leads us to the overall question of biodiversity and consequently to human well-being (see FAO 2019). With regard to the above, we would like to provide a closer look at the concept of common species through the lens of ethnobotany, and thus the core aspect of this study.

As noted by Gaston (2010), common species are as important as rare ones, due to their importance in supporting ecosystem services. A growing number of studies have emphasized the importance of common species among various ecosystems (Winfree et al. 2015; Frimpong 2018), including the importance of weeds (Stepp and Mowerman 2001; Zimdahl 2018) and neglected and underutilized species in supporting human needs (Hunter et al. 2019). The academic arena includes numerous discussions related to various nature conservation approaches (see Mulder and Coppolillo 2005) such as the concept of looking beyond borders of protected areas (Mora and Sale 2011; Western et al. 2015; Heywood 2019).

The link between traditional knowledge and resource management, as well as theoretical studies on plant availability and their use, e.g. optimal foraging theory, is not new phenomenon and has been developed by many scholars (e.g. Schultes 1994; Cunningham 2001; Bussman 2002, Albuquerque 2008; Albuquerque et al. 2015; Shrestha and Medley 2017), although recent studies have stressed the need to better integrate ethnobotanical results in practice (Albuquerque et al. 2019), particularly while prioritizing plant lists for conservation activities (Heneidy et al. 2017). In respect to plant taxa and their management, less than three out of 100 useful wild species worldwide are sufficiently protected through in-situ or ex-situ conservation actions (Khoury et al. 2019); in Latvia approximately 235 vascular plant species are included in the list of specially protected species with additional taxa listed as specially protected with exploitation limits (Cabinet of Ministers No 396 2000). Khoury et al. (2019) also includes ethnobotanical knowledge while defining useful wild plants.

Based on the above, our aim is to gain a glimpse into the relationship between plant use and plant sensitivity to human impact and the ecological characteristics of taxa through the lens of an ethnobotanical study from the Baltic Sea region. The objectives of the study are twofold. Firstly, to assess the proportion of plants used among local communities on the basis of three categories: distribution, habitat, and plant sensitivity to human impact. Secondly, to draw attention to the need to notice and protect common synanthropic plants needing human attention, as these provide security food and a medicinal reservoir. We propose as a hypothesis that people prefer to use plants that are more anthropophilic, e.g. plants which need or benefit from human influence.

Latgale region (Latvia) was chosen as a case study and our research goes beyond the classical ethnobotanical analysis. The region has already been studied with regard to food (Prūse et al. 2020 under revision) and medicinal plant applications from an ethnobotanical perspective (Simanova et al. 2020) which provides a list of ethnobotanically used plants. We categorize the used taxa and discuss the results of our search for the dominant characteristics of the ethnobotanical dataset, while proposing how ethnobotanical knowledge of the region might support nature conservation strategies on a local scale.

MATERIAL AND METHODS

The study region (Figure 1) is rich in lakes and the territory is primarily covered by available agriculture land (43%) and forests (41%) (DNAP 2012). Historical notes from the work conducted by Lehmann (1985) provide information about the Latgale region (including the study area) indicating the presence of 819 vascular plant species (Suško and Evarts-Bunders 2010). Depending on the source, the number of vascular plants for the whole of Latvia varies between 1800 and 1937 species (Tabaka et al. 1988; Gavrilova and Šulcs 1999; Priedītis 2014; Nikodemus et al. 2018). Parts of the study sites are within Rāznas National Park (Dagdas novada pašvaldība 2018).

The fieldwork took place in Dagda municipality (Latgale region) in July 2017, during which the data were collected using semi-structured interviews following pseudo-random and snowball methods. Seventy-three interviewees, with an average age of 63 years, provided responses to questions regarding wild plant species used as medicine and food. Both past and current practices of plant use were recorded. The Code of Ethics of the International Society of Ethnobiology (ISE 2006) was followed, and prior informed oral consent was obtained from all interviewees. Voucher specimens were collected with the interviewees and deposited at the Estonian University of Life Sciences herbarium (TAA), bearing numbers LGA001-120 and herbarium numbers TAA0146373-495. The dried plant samples are deposited at the Herbarium of DAIS at Ca' Foscari University of Venice (UVV), bearing numbers UVVDLGA001-71. For a full description of the data collection methodology and description of interviewees, see Simanova et al. (2020).

Categorization

The study analyses ethnobotanically significant plants on the basis of three different categorization approaches in order to understand the importance of useful plants in relation to humans and within the ecosystem. The first approach evaluates the distribution range of species in the ecosystem, the second discusses the habitats in which these plants can be found, while the third addresses plant sensitivity to human impact.

Distribution range

Following the vascular plant catalogue of Latvia by Gavrilova and Šulcs (2005), for each wild and cultivated taxon the distribution range across the country e.g. common or rare in the wild, and its naturalization status, e.g. escaped plants which commonly naturalize, were recorded. Additionally, an encyclopaedia on Latvian plant taxa was used for deriving information for 7 plant taxa as the data were missing from the reference source (Priedītis 2014), as well as for adding conservation status (Priedītis n.d.), if any, with regard to species listed in the Latvian Red Book (Andrušaitis 2003). For 20 plant taxa no distribution range was defined in the given source, as 18 of these taxa were cultivated species and 2 were purchased in a shop (Additional file 1).

Habitat

The occurrence of plant taxa was listed between several habitats on the basis of the information provided in the encyclopaedia of Latvian flora (Priedītis 2014). For comparative purposes, the various habitats of occurrence were combined into larger categories. In this respect, one or more of 10 habitat groups were assigned to each taxa: 1) along roadsides and railways; 2) in nutrient poor habitats including gravel, loam, sand, dolomite, and dunes; 3) in human-influenced environments which are directly modified by humans including nutrient-rich habitats, at buildings, gardens; 4) on fallow lands; 5) in pastures; 6) in various forest habitats including pine forests and in shrubs; 7) across various habitats including open, dry and other; 8) in various meadows (excluding wet habitats) including forest edges and hillslopes; 9) in wasty places; and 10) in wet and swampy habitats, bogs and wet forests. For most of the taxa, their habitats were not restricted to only one type. Thirty-three taxa (mostly cultivated) were either not included or had no information on their occurrence in the online Latvian flora encyclopaedia. In such cases the habitat of occurrence was left blank. The limitation associated with the above division of habitats is two-fold: this information does not necessarily reveal where people

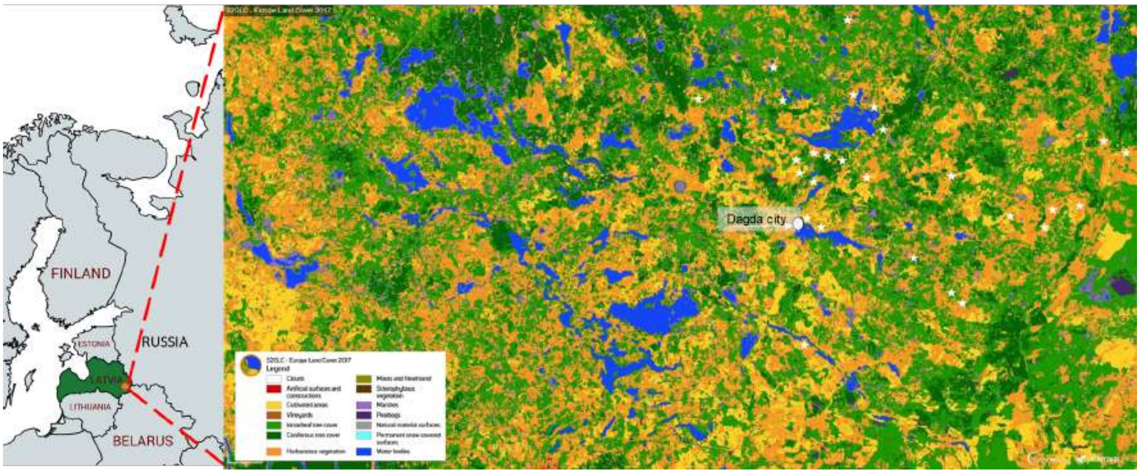

Figure 1. Map of the study area including land cover representation (⋆ - 27 study villages & populated areas).

collect plants and the description is quite vague as it is not directed to the study region specifically but rather the whole of Latvia. Additionally, this categorization does not include any emic viewpoints and thus is largely based on an outside or so-called etic perspective.

Sensitivity to human impact

Many ethnobotanical studies limit plant classifications to folk botanical classification (Poncet et al. 2015), habitat (Beltrán-Rodríguez et al. 2014) or ecosystem division (Ouédraogo et al. 2014), while only two recent studies on Estonian ethnobotany have addressed also categorizations of sensitivity to humans, although it was only applied to historical data on the use of medicinal plants (Sõukand and Kalle 2011; Sõukand and Kalle 2012).

We followed the forementioned works and applied Kukk's (1999) approach in order to describe plant and human relationships based on dependency rather than the plant's physical distance from humans. Sensitivity to human impact is assessed on the basis of the positive or negative effect of human activities on the plant. More specifically, for some plant taxa, human-modified environments are the only means to survive. Kukk (1999) names four categories of plants based on their sensitivity to human impact:
(1) anthropophytes (dependent on human activity, the group also includes cultivated plants),
(2) apophytes (need human interaction),
(3) hemeradiophores (indifferent to human activity, can grow in both human-disturbed and untouched habitats), and
(4) hemerophobes (avoid human disturbance).

In Latvia, similar terminology regarding apophytes and anthropophytes is used by Laiviņš (1989) reflecting, as with Kukk (1999), the status of their presence in the flora (native vs. alien). However, the Laiviņš (1989) study lacks the hemeradiophore and hemerophobe categories, and therefore we use Kukk's (1999) categorization which is based on Estonian flora. Nonetheless, the short geographical distance and shared climate between the two countries (Rimkus et al. 2018) allows for assuming that the similarity of the applicable categories is very high. Kukk's (1999) categorization is based on his own observations and the work of Enari (1944) and Rebassoo (1962) (see Kukk 1999).

We further considered the sensitivity of human impact on the proportion of taxa that was actually used; as, for example, we cannot speak about birch (*Betula* spp.) being a hemeradiophore, but would rather need to allocate it to the apophyte group, since it needs to attain a certain age or thickness in order to be ready for tapping sap and this is mainly possible when the tree is looked after, to a greater or lesser extent, by the users. The same applies to *Ribes nigrum* L., *Quercus robur* L., *Tilia cordata* Mill. and *Acer platanoides* L., all of which grow in human-induced landscapes (for the full list see Additional file 1).

Following such reasoning, we assigned all taxa to one of the four categories of sensitivity to human impact.

Analysis

Using the list of plants derived from the ethnobotanical field study, we compiled an Excel spreadsheet (Additional file 1) in which every used taxon was associated with all habitat categories reported in the literature sources. As no single source used for classification was exhaustive, or even the list of plants univocally interpretable, we had to perform several adjustments.

- On occasions in which the interviewee described an application only on a class or family level and/or it was not possible to identify the plant, the plants were excluded from the analysis, i.e. Poaceae and Polypodiopsida.

- In some cases, where the identification was only made at the genus level and no herbarium specimen was available, the common taxa was selected from the Latvian flora data base (Priedītis 2014), e.g. for *Betula* spp. the common species *Betula pendula* Roth was chosen. In cases in which numerous herbarium specimens were available with different species of the same genus, the most common species was included in the data analysis based on the available information on its occurrence in the wild provided in the plant encyclopaedia of Priedītis (2014). In a few instances, two species were named where the distribution was different, e.g. *Mentha* x *piperita* L. (rarely runs wild), *Mentha longifolia* (L.) L. (runs wild) (Priedītis 2014). In such cases, the most human-preferring taxon, e.g. apophytes, was included in the analysis.

- Eighteen taxa were not named in Kukk's (1999) classification and therefore the category was assigned by the current authors. Sixteen of these taxa were cultivated plants and thus classified as anthropophytes. *Corylus avellana* L. and *Viburnum opulus* L. were assigned to the apophyte category. Both taxa are found in the wild and are also planted near human settlements either for ornamental or nutritional supplementation purposes (Priedītis 2014, Evarte-Budere et al. 2014, Dabas dati 2020). In cases of uncertainty, interviewee comments were analysed.

- In cases in which the distribution of taxa was not provided by Gavrilova and Šulcs (2005), the Latvian plant encyclopaedia of Priedītis (2014) was used to complete the missing information. However, for most of the 20 cultivated taxa this data was not provided in either of the two sources and thus left blank.

Detailed use-reports (DUR) were used for the calculations as they are the best means of assessing the intensity and diversity of use for the named taxa. Both past and present uses were included in the analysis; however, we also compared past and current uses in order to establish whether changes over time have occurred.

For the analysis, there were a total number of 139 taxa deriving from 55 plant families. This included 116 taxa from 50 plant families for medicinal uses, and 73 taxa from 38 families for food uses. The total number of DUR analysed, including both medicinal and food uses, was 1736. The number of uses for medicinal application was 841 DUR, while that for food was 895 DUR. For food taxa, only wild plant taxa were considered with a few exceptions: the cultivated plant had a special manner of preparation, it was not cultivated for food purposes, or the plant part used was not regularly used as food. For medicinal plant taxa, potted or house plants were also included in the analysis. This might introduce a slight bias while comparing anthropophyte categories between medicinal and food uses.

In order to test the study objectives, Pearson's correlation coefficient (R version 3.5.3.) was calculated between the four categories of sensitivity to human impact and DURs. The categories of sensitivity to human impact were converted into a numerical scale (NS) (anthropophytes – 4; apophytes – 3, hemeradiophores – 2; hemerophobes – 1).

RESULTS

Habitats

The main taxa used by interviewees, namely *Betula pendula, B. pubescens* Ehrh., and *Vaccinium myrtillus* L. (> 100 DUR), grew in habitats which are rarely considered important in terms of conservation. More precisely, based on the categorization of Priedītis (2014), out of 139 taxa from the ethnobotanical data of the Dagda region, thirty-three taxa grew along roadsides/railways, thirty-nine taxa grew in wasty places and thirty-seven grew in human-induced, nutrient-rich habitats (see Figure 2, Table 1, Additional file 1). More than half of the taxa cited by interviewees grew in different co-shared habitats. For example, *Achillea millefolium* L. grows in gravel and sand pits, on roadsides and in various dry wasty places; and *Rumex thyrsiflorus* Fingerh can be found in dry meadows, on fallow lands, on the slopes of riverbanks and in wasty places (Priedītis 2014).

More than half of the taxa are common or fairly common in occurrence in Latvian flora (Additional file 1). Only two taxa are listed in the Latvian Red Book (Andrušaitis 2003) within the third category (rare species which are not becoming extinct but might become extinct due to a limited number of individuals or limited areal distribution): *Allium schoenoprasum* L. and *Allium ursinum* L. *Allium ursinumis* L. is also included in the specially protected plant list issued by the Cabinet of Ministers No 396 (2000).

Distribution range

The ethnobotanical data reveals the high dependency of local communities on common or fairly common taxa across Latvian flora (Figure 3).

Table 1. Occurrence in the environment of plants of Latvian flora cited by interviewees from communities in Dagda municipality, based on the Priedītis (2014) encyclopaedia.

Habitat	Number of taxa
along roadsides and railways	37
in nutrient poor habitats including gravel, loam, sand, dolomite, and dunes	16
in human-influenced environments including nutrient-rich habitats	38
on fallow lands	14
in pastures	4
in various forest habitats including pine forests and in shrubs	42
across various habitats including open, dry and other	8
in various meadows (excluding wet habitats) including forest edges and hillslopes	38
in wasty places	39
in wet and swampy habitats, bogs and wet forests	37

Figure 2. Typical roadsides in the study area of Dagda municipality, Latvia. Credit: BP & RS.

Plant sensitivity to human impact

The main plant category among all taxa is anthropophytes, which is followed by apophytes (Figures 4 and 5).

While comparing the division between applications, anthropophyte taxa are more represented among medicinal uses whereas apophytes are fairly common among both food and medicine uses. A possible explanation for this difference may be linked to the constantly changing need for various medicinal taxa, and thus it is easier for people to operate within the better-known environment. Most of the anthropophytes are cultivated taxa, of which 12 are associated with food use and 34 with medicinal use. Only one shared taxon, *Armoracia rusticana* P.Gaertn., B.Mey. & Scherb, appears as cultivated within the apophyte category (Additional file 1).

The situation is different when considering the data via the intensity of use, based on detailed use-reports (DUR), where the main category is shown to be apophytes (1001 DUR), followed by anthropophytes (426), hemeradiophores (255) and hemerophobes (54) (Figure 6). The number of taxa for apophytes is lower in comparison to that of anthropophytes, but the diversity of use is higher. An interviewee (woman born in 1965) reported a past use of Potentilla erecta L. as a medicinal remedy which can no longer be found by the interviewee. This and similar narratives inspired us to analyse past uses separately. Considering the taxa only named as a past use (13 taxa), most fall under the apophyte and anthropophyte categories and only three out of 13 taxa fall under the hemeradiophore group: *Oxalis corniculata* L., *Melampyrum nemorosum* L. and *Helichrysum arenarium* (L.) Moench.

It is important to note that most of the taxa reported by interviewees as either disappeared or not growing nearby were apophytes (e.g. *Valeriana officinalis* L., *Potentilla erecta*). An interviewee born in 1976 mentioned that *Carum carvi* L. has died out, sharing their memory that "when my mother gathered *Carum carvi* it was widespread in the meadows".

Among the apophyte group, *Fragaria vesca* L. (Figure 7) stands out with the highest DUR for food (74 DUR) and *Betula* spp. (59 DUR)) for medicinal application.

The taxon with the highest DUR among the anthropophyte group for medicinal application is *Matricaria chamomilla* L. (41 DUR), whereas for food it is *Mentha* sp. (*Mentha* × *piperita* (14 DUR)). To note, anthropophyte taxa also include escaped plants which commonly naturalize. For hemeradiophores, the main

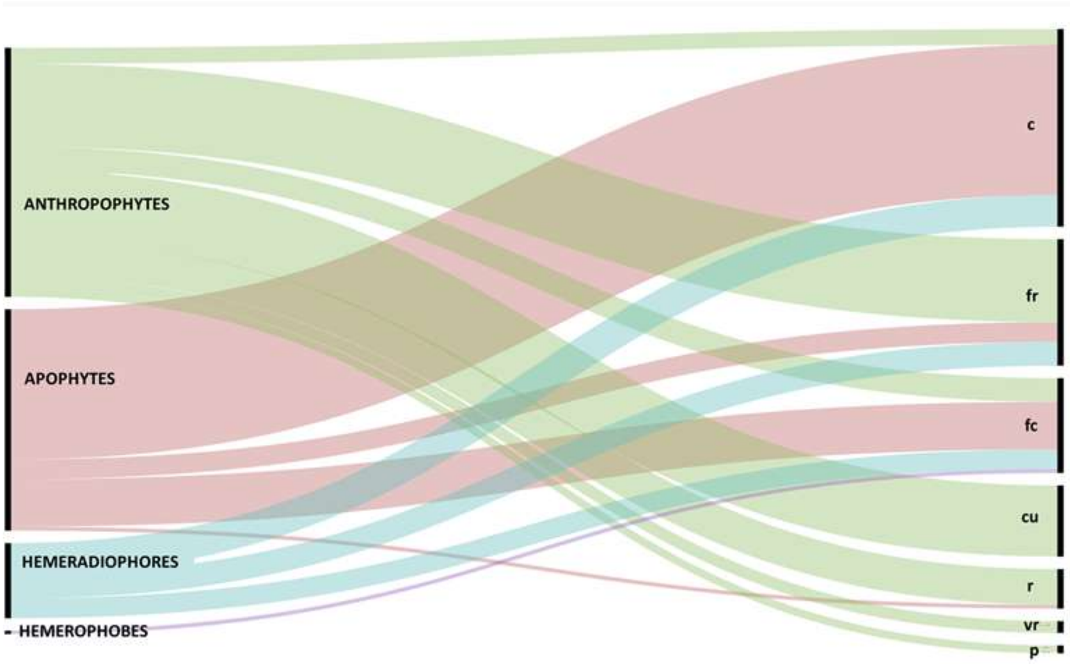

Figure 3. Occurrence of plant taxa named by interviewees that are found in the wild based on Gavrilova and Šulcs (2005) apportioned by the number of taxa in each of the four categories of sensitivity to human impact ('cu' – cultivated; 'p' - purchased; 'c' – common; 'fc' – fairly common; 'fr' – fairly rare; 'r' – rare; 'vr' – very rare).

taxon based on DUR was *Vaccinium myrtillus* for both food (83 DUR) and medicinal application (22 DUR). The only taxon within the hemerophobe group for both food and medicinal application is *Vaccinium oxycoccos* L. (Figure 8). This might be explained by the nature of hemerophobe taxa, which are found far from human-influenced environments and thus difficult to reach.

For calculation, the total number of DUR was summed for each category of sensitivity to human impact (1 $NS_{hemerophobes}$ – 54 DUR; 2 $NS_{hemeradiophores}$ – 255 DUR; 3 $NS_{apophytes}$ – 1001 DUR; 4 $NS_{anthropophytes}$ – 426 DUR). Based on the analysis of Pearson's correlation coefficient the correlation is positive but not significant ($R = 0.59$).

DISCUSSION

A Latgalian man born in 1937 noted that "what grows around needs to be used", which explicitly describes our main results. Our analysis indicates that both medicinal and food plant uses in Latgale region (Latvia) highly depend on apophyte and anthropohyte taxa, which goes hand in hand with the idea of 'co-dependency' as emphasised by Raven (2018). 'Co-dependency' as introduced by Raven presents the following two-way relationship: "We all need plants, depending on them absolutely for our very existence, but in the Anthropocene, plants also need us for their survival" (p. 12). This, in turn, is quite alarming as there is a lack of management strategies particularly for apophyte taxa since most of these taxa are widely distributed and hold no special status, except for *Allium schoenoprasum* which is listed in the Latvian Red Book (Andrušaitis 2003). However, taxa that benefit from human activities not only hold high importance for biologically valuable grasslands (e.g. indicator species *Polygala vulgaris* L., *Briza media* L.), umbrella species (*Valeriana officinalis*) (Rūsiņa et al. 2005; Baroniņa 2016; Auniņš et al. 2013) and various applications as food and medicine, but they also have a tight connection with cultural elements. Widely used apophyte taxa such as *Fragaria vesca*, *Rubus idaeus* L., *Rumex* spp., and *Carum carvi* are named in Latvian Folk Song collections (listed under the UNESCO programme) dating back to 1880 as well as in Latvian beliefs, e.g. collection of Pēteris Šmits 1940 – 1941 (Sile et al. 2019). For example, *Urtica* spp., which exhibits a high number of DUR in the apophyte category, has been an important plant across the Latvian territory even before the introduction of Christianity (Suomela et al. 2018). The Latvian collection of Folk Songs likens the ability of plants to sting to difficulty in human life (Dainu Skapis n.d.). The collection of Latvian beliefs indicates various applications of nettles including as a hair

Figure 4. Synanthropic taxa including *Leucanthemum vulgare* (Vaill.) Lam. and *Carum carvi* L. at the side of an interviewee's house. Credit: IM.

treatment, to alleviate headache and in the household to combat fleas (Sile et al. 2019; AiLab n.d.). In addition, *Carum carvi* has a very deep history as a food plant dating back to medieval towns in the 14th century (Brown et al. 2017), and is noted as one of the plants symbolizing Latgalian identity (Svilāns et al. 2012). These are only few examples providing a snap shot of the importance that apophyte species hold for both habitats and human use. Unfortunately, Halada et al. (2011) has already noted that numerous European habitat types which depend on or benefit from low-intensity human activity, in this case agricultural management throughout Europe, experience rather worse conservation status compared to non-agricultural habitats. According to MEPRD (2014), the traditional management of grasslands (e.g. grazing, mowing) in Latvia has been significantly reduced, and this in turn influences plant diversity.

Our results are in line with the findings of Signorini et al. (2009) who also noted the dependency of local communities on very common species. In addition, Signorini et al. (2009) used an emic approach while discussing the distribution of taxa. Although most of the apophytes named in our study are widely distributed in the country this does not guarantee that the resource is inexhaustible and attainable by lay people. However, several apophyte taxa were reported by the interviewees as disappeared or not found nearby. This is particularly alarming in terms of food security for local communities as well as biodi-

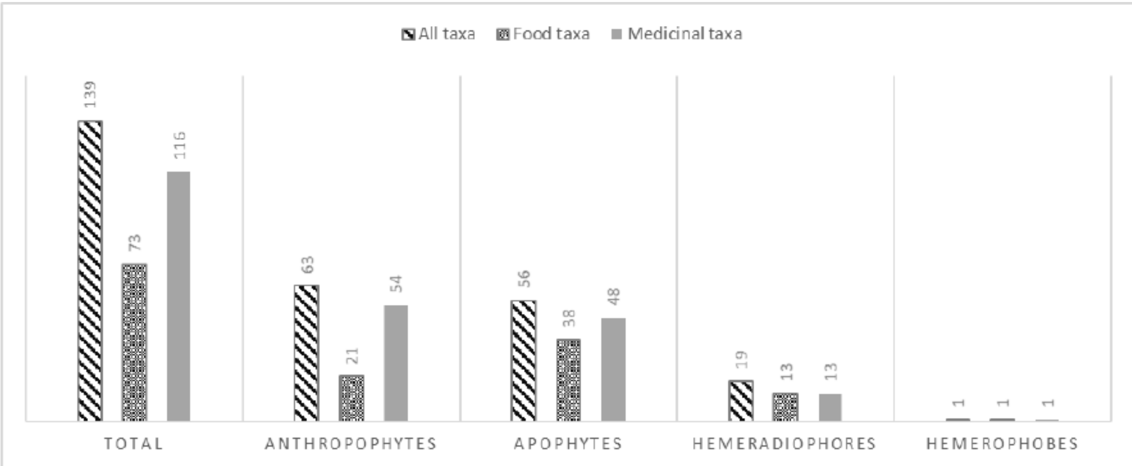

Figure 5. Division of the number of taxa named by interviewees for each category of sensitivity to human impact.

versity at large (see Gaston 2011). The perception of common might be dangerous, especially in situations where profit from wild collection is involved (see, for example, Sheldon et al. 1997). Recent studies have noted that "society increasingly focuses on managing nature for the services it provides people rather than for the existence of particular species" (Dee et al. 2017). Following this approach, our results suggest that common species support the needs of local communities by providing provisioning ecosystem services.

The high dependency on common or fairly common taxa causes us to contest the safety of their use. Questions concerning herbicides, infrastructure, rural-to-urban migration and land-grabbing have yet to be understood regarding the availability of so-called common taxa for collecting in Latvia. These and additional questions have been addressed by Marouf et al. (2015) while discussing the declining practice of wild plant foraging in Lebanon. As noted by Gaston (2010), common species lie at the centre of numerous pressures associated with biodiversity loss.

Similar results have been provided by other studies emphasising the use of nearby taxa (Sõukand and Kalle 2011) or disturbed habitats (Signorini et al. 2009; Voeks 2018) for medicinal use. To add, the difference between the division of synanthropic categories among medicinal and food uses may be linked to the constantly changing need for various medicinal taxa, and thus it is easier for people to operate within the better-known environment. However, the diversity of uses is greater for apophytes, even though there are fewer taxa in comparison to anthropophytes. This demonstrates that the specific, main repertoire of taxa is heavily exploited, a phenomenon also recorded in neighbouring Belarus, where only a few wild taxa had diverse uses in several domains (Sõukand et al. 2017).

While looking at past used taxa, we would have expected to observe more past uses linked with hemeradiophores, as indicated in the case study of Estonia (see Sõukand and Kalle 2011). However, this turned out not to be the case and a few hemeradiophores were mentioned only as a past use, most likely because the past for our interviewees is not so distant as the past in the above-mentioned article, and by the time our interviewees were born the shift towards more anthropophylic taxa had already occurred. Here we would like to add the point stressed by Albuquerque et al. (2015): "one must consider that the relationship of resource use to resource availability is a dynamic one and can lead to the decreased use of certain species as the environmental supply decreases" (p. 134). Thus, we stress the need to introduce a case-by-case approach by looking at the number or diversity of uses while discussing plant sensitivity to human activities. The study by Kala (2010) provides a case where use value and additional parameters (e.g. mode of harvest, rarity, endemism) are taken into account in order to prioritize conservation activities. Through this, we would like to stress the importance of the emic, or inside, viewpoint when discussing the importance of human-plant relationships. Ethnobotanical methods can help in this regard by providing qualitative data from the plant users themselves. Furthermore, people may provide both temporal (past vs current) and spatial dimensions with a particular focus on the local context. While the co-production of knowledge might be challenging on some level, it is highly prized by numerous scholars (Raven 2018; Norström et al. 2020; Rodrigues 2020). To add, Albuquerque et al. (2019a) study emphasises the positive benefit of integrating people's knowledge and needs in conservation activities. The OECD (2019) report notes that Latvia exhibits limited progress in regard to Aichi Biodiver-

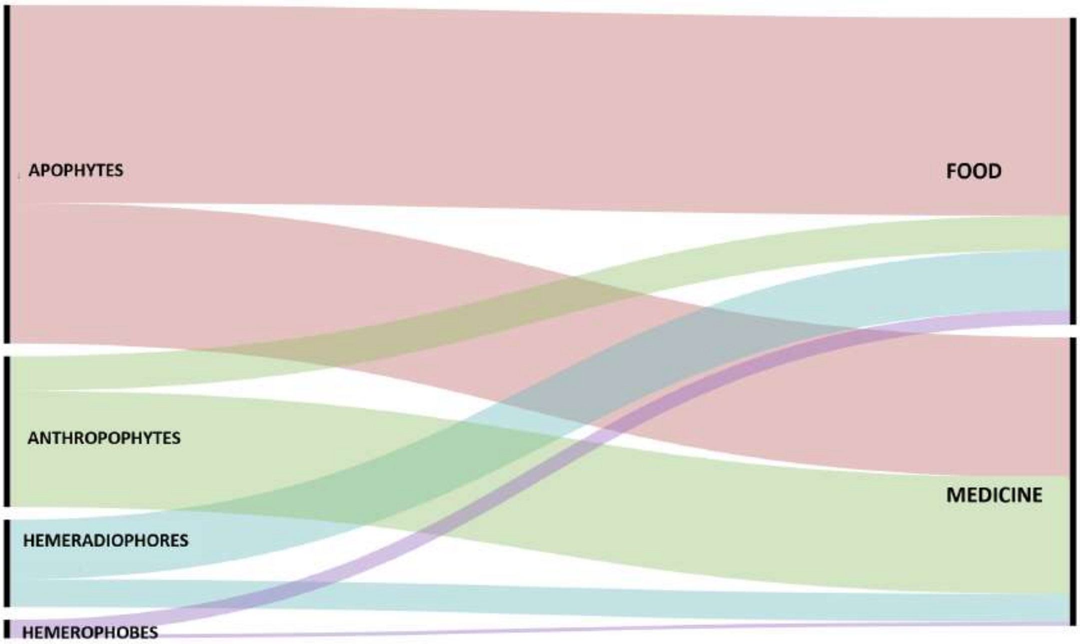

Figure 6. Division of DUR from the ethnobotanical dataset of the study area among medicinal and food uses for each of the four categories of sensitivity to human impact.

Figure 7. Berries (*Vaccinium myrtillus* & *Fragaria vesca*) served by the interviewee. Credit: BP.

sity targets (CBD 2010) including the one linked to traditional knowledge across indigenous peoples and local communities. In this respect, ethnobotany may provide a valuable source of data regarding the customs of biological resource use of local communities (e.g. Prance 2007; Quave and Pieroni 2015). In support of this, the Constitution of the Republic of Latvia (1922) set the task for the State to safeguard the surrounding environment with the following declaration: "the State shall protect the right of everyone to live in a benevolent environment by providing information about environmental conditions and by promoting the preservation and improvement of the environment". We follow the rule of thumb given by Howard (1997) which emphasises the general idea of people's behaviour towards environment protection as you protect what you value and care for (in Nisbet and Zelenski 2013).

CONCLUSIONS

Our study provides empirical evidence regarding local community dependency on common synanthropic taxa. Even though the study is case based and restricted to only one geographic area, we stress the importance of the findings regarding the relevance of ethnobotanical data while discussing local nature resource management strategies. The study

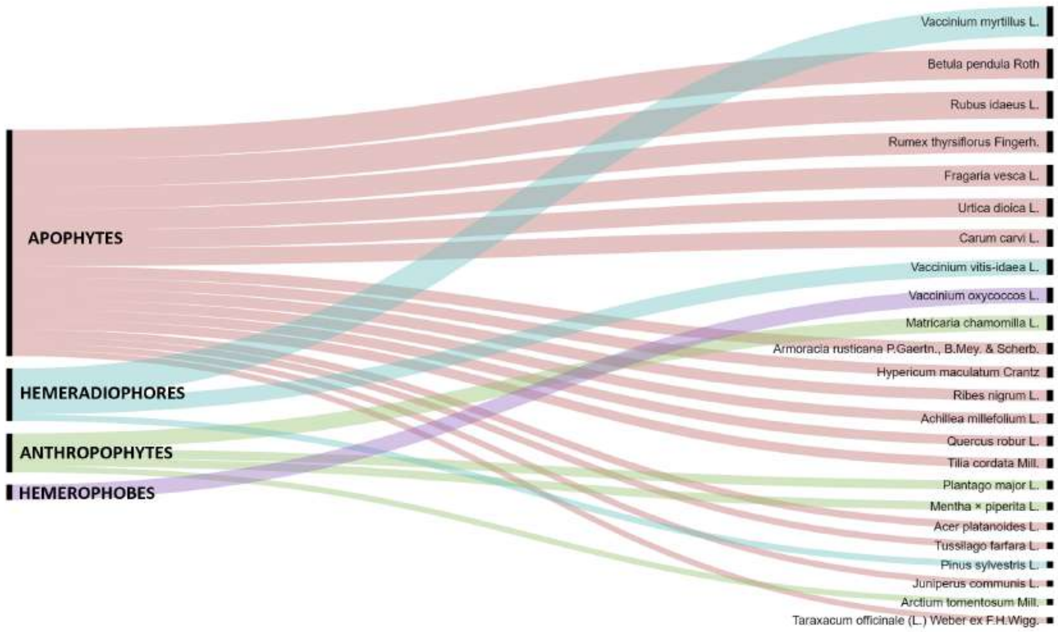

Figure 8. Division of the four categories of sensitivity to human impact based on DUR > 20 among all taxa as provided by interviewees.

indicated high human dependency on taxa which, in turn, depend on human activity and are widely distributed across the country, which therefore calls attention to the current management strategies for these taxa. The study also provides grounds for further research on investigating possible management actions to safeguard common species before they become rare. Additionally, we would like to emphasize the importance of involving local communities, through various means including ethnobotanical studies, while discussing possible management strategies considering common species.

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DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

CONTRIBUTION STATEMENT

Conceived of the presented idea: BP, RK, RS
Carried out the experiment: BP, RS, RK, AS, IM
Carried out the data analysis: BP, RS
Wrote the first draft of the manuscript: BP, RS, RK, GB
Review and final write of the manuscript: BP, RS, RK, AS, IM, GB
Supervision: RS, RK

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Additional Files

Add File 1. Abbreviations: '-' –lack of information in the source used; 'W' – wild; 'LRB' – Latvian Red Book; 'C' – cultivated; 'P' - purchased; 'c' – common; 'fc' – fairly common; 'fr' – fairly rare; 'r' – rare; 'vr' – very rare; 1 – along roadsides/railways; 2 – gravel, loam, sand, dolomite, dunes, nutrient poor habitats; 3 – human-influenced environments, nutrient-rich habitats; 4 – on fallow lands; 5 – in pastures; 6 – in various forest habitats including pine forests, in shrubs; 7 – across various habitats, open, dry, other; 8 – in various meadows (excluding wet habitats), forest edges, hillslopes; 9 – wasty places; 10 - wet and swampy habitats, bogs, wet forests. $ – taxa considered as hemeradiophores by Kukk (1999), but which for calculations we considered apophytes due to their actual use as cultivars or semi-wild status, as their use requires extended human attention; *adopted from Priedītis (2014); blank – no information in the reference sources.

Latin name	**Status** (Gavrilova and Šulcs 2005)	**Occurrence in the wild** (Gavrilova and Šulcs 2005; Priedītis, 2014)	Cultivated or wild (authors' notes)	**Habitats** (Priedītis 2014)	**Category of sensitivity to human impact** (Kukk 1999)	**Food - DUR**	**Medicine - DUR**	**Total DUR**
Acer platanoides L., Sapindaceae		c	W	6, 3	hemeradiophores$	23	3	26
Achillea millefolium L., Asteraceae		c	W	9, 8, 3, 2, 1	apophytes	7	29	36
Acorus calamus L., Acoraceae		fc	W	10	anthropophytes	3	8	11
Aegopodium podagraria L., Apiaceae		c	W	7	apophytes	3		3
Aesculus hippocastanum L., Sapindaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land	fr	W		anthropophytes	1	9	10
Alchemilla vulgaris auct., Rosaceae		fc	W	7	apophytes	4	10	14
Allium cepa L., Amaryllidaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C		anthropophytes		10	10

Allium sativum L., Amaryllidaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C		anthropophytes		15	15
Allium schoenoprasum L., Amaryllidaceae		r	W (LRB)	10, 3, 2	apophytes	1		1
Allium ursinum L., Amaryllidaceae		fr	W (LRB)	6	hemeradiophores	2		2
Alnus glutinosa (L.) Gaertn., Betulaceae		fc	W	10,6	hemeradiophores	7		7
Alnus incana (L.) Moench, Betulaceae		c	W	10, 6, 3	apophytes	9	1	10
Aloe arborescens Mill., Xanthorrhoeaceae			C		anthropophytes		10	10
Anethum graveolens L., Apiaceae	escaped cultivated plants which infrequently naturalize	fr	C	3	anthropophytes		4	4
Arctium tomentosum Mill., Asteraceae		c	W	9, 8, 6, 1	anthropophytes		21	21
Arctostaphylos uva-ursi (L.) Spreng., Ericaceae		fr	W	8,6	hemeradiophores		4	4
Armoracia rusticana P.Gaertn., B.Mey. & Scherb., Brassicaceae	escaped plants which commonly naturalize	fc	C/W		apophytes	33	6	39
Aronia melanocarpa (Michx.) Elliott, Rosaceae	escaped cultivated plants which infrequently naturalize	r	C		anthropophytes		7	7
Artemisia absinthium L., Asteraceae	completely naturalized escaped cultivated species	fr	W	9, 4, 1	apophytes	3	8	11
Artemisia vulgaris L., Asteraceae		c	W	7,3	apophytes		3	3
Atriplex patula L., Amaranthaceae		fc	W	9, 3, 1	anthropophytes	2	2	4

Avena sativa L., Poaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land	r*	C	3	anthropophytes		2	2
Berberis vulgaris L., Berberidaceae		fr	W	10, 6, 5	apophytes	3		3
Bergenia crassifolia (L.) Fritsch, Saxifragaceae			C	9, 3, 1	anthropophytes	1		1
Beta vulgaris L., Amaranthaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C		anthropophytes	5	1	6
Betula pendula Roth, Betula pubescens Ehrh., Betulaceae		c	W	6,3	hemeradiophores[$]	45	59	104
Bidens tripartita L., Asteraceae		c	W	10	apophytes		7	7
Borago officinalis L., Boraginaceae	escaped cultivated plants which infrequently naturalize	r	C	9, 3, 1	anthropophytes	4		4
Brassica oleracea var. *capitata* f. alba DC., Brassicaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C		anthropophytes		12	12
Briza media L., Poaceae		c	W	8, 4, 6	apophytes		1	1
Calendula officinalis L., Asteraceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land	fr*	C	9, 3, 1	anthropophytes		14	14
Callisia fragrans (Lindl.) Woodson, Commelinaceae			C		anthropophytes		1	1
Capsicum annuum L., Solanaceae	escaped cultivated plants which infrequently naturalize	vr	C		anthropophytes		1	1
Carum carvi L., Apiaceae		c	W	8, 6, 1	apophytes	49	12	61

Chelidonium majus L., Papaveraceae		c	W	9, 6, 3	anthropophytes		7	7
Chenopodium album L., Amaranthaceae		c	W	3	apophytes	2		2
Cichorium intybus L., Asteraceae		fr	W	10, 9, 8, 2, 1	anthropophytes	4		4
Cirsium heterophyllum (L.) Hill, Asteraceae		fc	W	8,6	apophytes		1	1
Citrus limon (L.) Osbeck, Rutaceae			P		anthropophytes		5	5
Corylus avellana L., Betulaceae		c	W	10, 8, 6	apophytes	11	1	12
Crassula ovata (Mill.) Druce, Crassulaceae			C		anthropophytes		4	4
Crataegus rhipidophylla Gand., Rosaceae		fr	W	10, 8, 6	hemeradiophores	2	3	5
Cucumis sativus L., Cucurbitaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C		anthropophytes		1	1
Cyanus segetum Hill, Asteraceae		c	W	9, 3, 1	anthropophytes		5	5
Daucus carota L. subsp. *sativus* (Hoffm.) Arcang., Apiaceae		fr	W	10, 8, 2	anthropophytes		3	3
Elaeagnus rhamnoides (L.) A.Nelson, Elaeagnaceae	escaped plants which commonly naturalize	fr	C	9, 2, 1	anthropophytes		1	1
Epilobium angustifolium L., Onagraceae		c	W	9, 8, 3, 1	apophytes	4	10	14
Equisetum arvense L., Equisetaceae		c	W	8, 4, 1	apophytes	1	2	3
Erigeron acris L., Asteraceae		c	W	9, 8, 4	apophytes		3	3
Ficus carica L., Moraceae			C		anthropophytes		1	1
Filipendula ulmaria (L.) Maxim., Rosaceae		c*	W	7	hemeradiophores		8	8
Fragaria vesca L., Rosaceae		c	W	8, 6, 4	apophytes	74		74
Frangula alnus Mill., Rhamnaceae		c	W	10, 8, 6	hemeradiophores	1		1

Helianthus tuberosus L., Asteraceae	escaped plants which commonly naturalize	fr	C	9,1	anthropophytes		1	1
Helichrysum arenarium (L.) Moench, Asteraceae		fr	W	8,6	hemeradiophores		1	1
Heracleum sosnowskyi Manden., Apiaceae	completely naturalized escaped cultivated species	fc	W		anthropophytes		1	1
Heracleum sphondylium subsp. *sibiricum* (L.) Simonk., Apiaceae		fc	W	9, 8, 6	apophytes	1		1
Humulus lupulus L., Cannabaceae		fc	W	10	hemeradiophores	2	3	5
Hypericum maculatum Crantz, Hypericaceae		fc	W		apophytes	22	17	39
Juniperus communis L., Cupressaceae		fc	W	6, 5, 2	apophytes	14	8	22
Leonurus cardiaca L., Lamiaceae		vr	C	9, 3, 1	anthropophytes		7	7
Leucanthemum vulgare (Vaill.) Lam., Asteraceae		c	W	8, 5, 4, 3	apophytes		2	2
Levisticum officinale W.D.J.Koch, Apiaceae	escaped cultivated plants which infrequently naturalize	fr	C		anthropophytes		1	1
Linum usitatissimum L., Linaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land		C	9,1	anthropophytes		4	4
Malus domestica Borkh., Rosaceae	completely naturalized escaped cultivated species	fr	W/C		anthropophytes	10		10
Matricaria chamomilla L., Asteraceae	escaped plants which commonly naturalize	fr	C	9,3	anthropophytes	13	41	54

Matricaria discoidea DC., Asteraceae	adventitious species in the Latvian flora – ephemerophytes and neophytes (archeopytes are viewed as indigenous species)	fr	W	1	anthropophytes		1	1
Melampyrum nemorosum L., Orobanchaceae		fr	W	8,6	hemeradiophores	1		1
Melissa officinalis L., Lamiaceae	escaped cultivated plants which infrequently naturalize	r	W		anthropophytes		1	1
Mentha × piperita L., *Mentha longifolia* (L.) L., Lamiaceae	escaped plants which commonly naturalize	fr	C/W	9,3	anthropophytes	14	15	29
Nepeta cataria L., Lamiaceae	escaped plants which commonly naturalize	fr	C/W	9,1	anthropophytes		4	4
Origanum vulgare L., Origanum vulgare		fc	W	8,1	apophytes	4	2	6
Oxalis acetosella L., Oxalidaceae		c	W	6	hemeradiophores	10		10
Oxalis corniculata L., Oxalidaceae	adventitious species in the Latvian flora – ephemerophytes and neophytes (archeopytes are viewed as indigenous species)	vr	W	9,3	anthropophytes	1		1
Paeonia lactiflora Pall., Paeoniaceae			C		anthropophytes		6	6
Papaver somniferum L., Papaveraceae	escaped cultivated plants which infrequently naturalize	r	C	9, 3, 1	anthropophytes		1	1
Pelargonium graveolens L'Hér, Geraniaceae			C		anthropophytes		20	20
Petasites spurius (Retz.) Rchb., Asteraceae		fc	W		hemeradiophores		1	1
Phaseolus vulgaris L., Leguminosae			C	1	anthropophytes		2	2

Philadelphus coronarius L., Hydrangeaceae			C		anthropophytes	2	1	3
Phleum pratense L., Poaceae		c	W	8, 5, 6, 3	apophytes	1		1
Picea abies (L.) H.Karst., Pinaceae		c	W	6	hemeradiophores		5	5
Pilosella officinarum Vaill., Asteraceae		c*	W	8,2	apophytes		1	1
Pinus sylvestris L., Pinaceae		c	W	2	hemeradiophores	2	21	23
Piper nigrum L., Piperaceae			P		anthropophytes		2	2
Plantago major L., Plantaginaceae		c	W	10,3	anthropophytes	1	31	32
Polygala vulgaris L., Polygalaceae		fc	W	9, 8, 6, 4	apophytes		1	1
Polygonum arenastrum Boreau., Polygonaceae		c	W	9, 4, 3, 2	apophytes		1	1
Polygonum aviculare L., Polygonaceae		c	W	9, 4, 3, 2	apophytes		1	1
Populus balsamifera L., Salicaceae	escaped cultivated plants which infrequently naturalize	fr	W	10, 8, 2, 1	anthropophytes	1	8	9
Populus tremula L., Salicaceae		c	W	6	apophytes		1	1
Potentilla anserina L., Rosaceae		c	W	10, 9, 8	apophytes		3	3
Potentilla erecta (L.) Raeusch., Rosaceae		c	W	10, 7, 6	apophytes		3	3
Primula elatior (L.) Hill, Primulacea	escaped plants which commonly naturalize	r	W		anthropophytes	3	3	6
Primula veris L., Primulaceae		c	W	10, 8, 6	apophytes	3	15	18
Prunella vulgaris L., Lamiaceae		c	W	9, 8, 6, 4	apophytes		9	9
Prunus avium L., Rosaceae	escaped plants which commonly naturalize	fr	C	8	anthropophytes	1		1
Prunus cerasus L., Rosaceae	escaped plants which commonly naturalize	fr	C		anthropophytes	12		12
Prunus domestica L., Rosaceae	escaped cultivated plants which infrequently naturalize	r	C		anthropophytes		1	1

Prunus padus L., Rosaceae		c	W		hemeradiophores		1	1
Quercus robur L., Fagaceae		c	W	10, 6, 3	hemeradiophores$	7	28	35
Ribes nigrum L., Grossulariaceae		fc	C	10,6	hemeradiophores$	29	10	39
Ribes rubrum L., Grossulariaceae	completely naturalized escaped cultivated species	fr	C	10, 9, 6, 3	anthropophytes	2		2
Rosa glauca Pourr., Rosaceae	escaped plants which commonly naturalize	fr	W	3,1	anthropophytes	9	5	14
Rubus chamaemorus L., Rosaceae		fr	W	10	hemeradiophores	3		3
Rubus idaeus L., Rosaceae		c	W	10, 6, 3, 1	apophytes	69	28	97
Rubus nessensis Hall, Rosaceae		fr	W	10, 8, 1	apophytes	3	1	4
Rumex longifolius DC., Polygonaceae		fr	W	10, 9, 8, 1	apophytes		1	1
Rumex thyrsiflorus Fingerh., Polygonaceae		fc	W	10, 9, 8, 4	apophytes	73	3	76
Salix viminalis L., Salicaceae		c	W	10,2	apophytes	1	2	3
Salvia officinalis L., Lamiaceae			C		anthropophytes	1		1
Saponaria officinalis L., Caryophyllaceae	completely naturalized escaped cultivated species	fc	W	10, 9, 8, 1	anthropophytes		1	1
Sedum roseum (L.) Scop., Crassulaceae			C		anthropophytes		2	2
Sinapis alba L., Brassicaceae	adventitious species in the Latvian flora – ephemerophytes and neophytes (archeopytes are viewed as indigenous species); escaped cultivated plants which infrequently naturalize	r	P	9,1	anthropophytes		1	1

Solanum tuberosum L., Solanaceae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land	fr*	C	9,1	anthropophytes		8	8
Sorbus aucuparia L., Rosaceae		c	W	6	apophytes	6	4	10
Stellaria media (L.) Vill., Caryophyllaceae		c	W	3	apophytes	4	4	8
Symphytum asperum Lepech., Boraginaceae	escaped plants which commonly naturalize	fr	C	10, 9, 1	anthropophytes		1	1
Symphytum officinale L., Boraginaceae		fc	W	10, 9, 1	apophytes		1	1
Syringa vulgaris L., Oleaceae	escaped cultivated plants which infrequently naturalize	fr	C	3	anthropophytes		5	5
Syzygium aromaticum (L.) Merr. & L.M.Perry, Myrtaceae			C		anthropophytes		1	1
Tanacetum vulgare L., Asteraceae		c	W	10, 8, 1	apophytes		9	9
Taraxacum officinale (L.) Weber ex F.H.Wigg., Asteraceae		c	W	7	apophytes	15	6	21
Thymus serpyllum L., Lamiaceae		fc	W	8, 6, 2	hemeradiophores	3	2	5
Tilia cordata Mill., Malvaceae		c	W	6,3	hemeradiophores$	13	21	34
Trifolium repens L., Leguminosae		c	W	9, 8, 6, 4, 1	apophytes	2		2
Trifolium medium L., Leguminosae		fc	W	7	anthropophytes	7	7	14
Tripleurospermum inodorum (L.) Sch.Bip., Asteraceae		c	W	9, 3, 1	apophytes		1	1
Tussilago farfara L., Asteraceae		c	W	10, 9, 8, 3, 2, 1	apophytes	5	19	24
Urtica dioica L., Urticaceae		c	W	9, 8, 6, 3, 1	apophytes	30	35	65
Vaccinium myrtillus L., Ericaceae		c	W	10,6	hemeradiophores	83	22	105
Vaccinium oxycoccos L., Ericaceae		fc	W	10	hemerophobes	43	11	54

Vaccinium uliginosum L., Ericaceae		fc	W	10,6	hemeradiophores	11	1	12
Vaccinium vitis-idaea L., Ericaceae		c	W	10, 6, 3	hemeradiophores	47	9	56
Valeriana officinalis L., Caprifoliaceae		c*	W	10,6	apophytes	2	16	18
Verbascum thapsus L., Scrophulariaceae		fr	W	4, 7, 2, 1	apophytes	1	1	2
Viburnum opulus L., Adoxaceae		fc	C/W	10,6	apophyte	4	10	14
Vicia faba L., Leguminosae	cultivated plants sometimes found in disturbed areas, along railways and on abandoned land	r*	C		anthropophytes		1	1
Viola tricolor L., Violaceae		fc	W	8, 4, 2	anthropophytes		2	2
					Total	**895**	**841**	**1736**