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COMMUNITY PERCEPTIONS AND USES OF PLANTS IN THE TRADITIONAL GARDENS OF GRECI COMMUNE (MACIN MOUNTAINS)

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Abstract: Traditional home gardens depend on the people who look after them, yet what these people think, use and know is rarely measured. We combined an online questionnaire answered by 200 residents with a floristic inventory of ten gardens in Greci commune (Tulcea County, Măcin Mountains National Park). The gardens held 84 taxa from 44 families, mostly cultivated (82%). Ornamental taxa accounted for 60% of the recorded taxa, while 97.5% of respondents identified food production as their garden's main purpose. Knowledge is passed on mainly in the family (98%), and 87.5% of the respondents use plants medicinally, most often sage, parsley, and St John's wort. Only five of the twelve most mentioned medicinal plants were recorded in the inventoried gardens. People see climate change (86.5%) as the main driver of changes in plant diversity and water shortage (58.5%) as the main difficulty. Those with richer gardens more often felt that diversity had increased ($\chi^2 = 16.6$, $p = 0.011$). Most respondents (77.5%) remove spontaneous plants by hand, while some also tolerate their presence. The findings highlight the importance of traditional home gardens in Greci for the transmission of plant knowledge, alongside challenges tied to climate change and water shortage.

Keywords: traditional home gardens, community-based survey, ethnobotany, local perceptions, plant uses, knowledge transmission, Măcin Mountains

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Introduction

Throughout history, home gardens have served as essential reservoirs for biodiversity conservation and as channels for the transmission of ethnobotanical knowledge (Bidak et al. 2015). Traditional gardens are fundamental components of both rural and urban landscapes, playing a vital role in maintaining biodiversity, safeguarding the cultural heritage associated with horticultural practices, and cultivating plant species specific to each region (Korpelainen 2023). These agroecological systems serve as dynamic frameworks where the preservation of local plant diversity is intertwined with sustainable resource management, ecological stability, and the cultivation of strong community connections (Galluzzi et al. 2010). Due to their multifunctional nature, home gardens can be regarded as complex ecosystems, cultivated through generations and gently molded by human care and tradition, which nurture local food security and strengthen the enduring bond between people, their land, and the cultural heritage embedded in traditional agricultural practices (Calvet-Mir et al. 2016, Korpelainen 2023). Furthermore, through their multifunctionality, these gardens integrate ecological, aesthetic, and spiritual dimensions within a single managed space, serving simultaneously as sources of subsistence – offering food, medicine, and materials – and as cultural symbols that express continuity, adaptability, and tradition (Caballero-Serrano et al. 2019).

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Traditional gardens represent more than agronomic spaces; they embody the interwoven ecological, cultural, and spiritual relationship between people and nature (Caballero-Serrano et al. 2019), functioning as living archives of ancestral symbolism in which cultivated plants – beyond their practical and ecological functions – carry meanings tied to protective and ritual roles rooted in ancient beliefs, thus preserving through oral tradition a spiritual and cultural heritage that sustains a holistic perception of the rural landscape where biodiversity and cultural symbolism coexist in a dynamic equilibrium shaped by time and tradition (Papp et al. 2013).

Furthermore, traditional gardens have a significant role in the conservation of medicinal plant species characteristic of specific regions, thereby supporting both floral diversity and the continuity of ethnobotanical knowledge (Mustafa et al. 2012). The cultivation of these species in home gardens can reduce pressure on wild populations and contribute to their sustainable use (Ssenku et al. 2022). Such practices also preserve traditional knowledge associated with the therapeutic use of plants, reinforcing the cultural heritage linked to ethnobotanical traditions (Šarić-Kundalić et al. 2010).

In rural Romania, the use of plants is deeply rooted in local traditions and orally transmitted knowledge, reflecting a close relationship between people and their environment, with ethnobotanical studies highlighting species belonging to genera such as *Achillea*, *Hypericum*, *Matricaria*, and *Pinus*, which are widely used in folk medicine and local economies (Kathe et al. 2003, Dihoru & Boruz 2016). Traditional gardens thus serve not only as centers of agrobiodiversity and self-sufficiency, but also as spaces where ecological, cultural, and spiritual values converge – preserving ancient practices and symbolic uses of plants like *Salix alba* L., *Artemisia absinthium* L. and *Ocimum basilicum* L., which maintain protective and ritual functions in Romanian folk traditions (Micu 2014, Răchisan 2018, Chiselev 2019). Studies conducted in various regions, such as Moșna in Sibiu County, reveal that traditional gardens occupy nearly a quarter of household land, hosting species of alimentary, medicinal, and ornamental value – including long-cultivated local varieties preserved in-situ for over a century (Antofie et al. 2024). Statistical data indicate that Romania ranks among the leading European Union countries in the extent of land cultivated with tomatoes, cabbage, peppers, and onions, highlighting the central role of these crops in both the national diet and the structure of the traditional agricultural landscape (Sterie et al. 2023). Beyond their productive role, Romanian traditional gardens express a deep aesthetic and cultural dimension (Papp et al. 2013, Antofie et al. 2024). Ornamental plants such as *Zinnia elegans* var. *purpurascens* DC. and *Callistephus chinensis* (L.) Nees are cultivated not only for their decorative value, but also as symbols of care, identity, and local pride (Antofie et al. 2024).

Traditional home gardens are shaped by the people who tend them, so their knowledge, practices and perceptions of what they grow are central to understanding these spaces (Calvet-Mir et al. 2016, Caballero-Serrano et al. 2019). What residents choose to cultivate, how they manage their plants and the value they attach to them reflect both the biological diversity of the garden and the cultural heritage transmitted across generations (Papp et al. 2013, Korpelainen 2023). Capturing these perceptions, however, is difficult without involving the gardeners themselves, because they are the ones who know what is grown, why and how. Participatory and citizen-science approaches, in which residents contribute information through online questionnaires shared in social networks, make it possible to collect such data from many households quickly, although

the people who answer choose themselves (Galluzzi et al. 2010). A floristic inventory of the same gardens complements this community knowledge, since it records the species actually present and their uses, so that what residents say their gardens are for can be compared with their documented composition – a comparison that neither approach could provide on its own.

In this study, we examined how the residents of Greci commune perceive, use and transmit knowledge about the plants of their traditional home gardens, and how their gardening practices and preferences are reflected in the actual floristic composition of these gardens. Using a community-based questionnaire survey complemented by a floristic inventory of ten gardens, we set out to document the perceptions, uses and practices of the residents; record the floristic composition and the categories of plant use in the inventoried gardens; and relate the residents' practices and perceptions to the documented inventory, in order to assess the multifunctional role of these gardens as reservoirs of biodiversity and bearers of local cultural heritage.

Material and methods

Study area. Greci is a commune in Tulcea County, in south-eastern Romania, adjacent to the western boundary of the Măcin Mountains National Park (PNMM) (Fig. 1). The park covers 11,151.82 ha (PMPNMM 2016), belongs to the Natura 2000 network and is the only protected area in Europe where Pontic-Sarmatic steppe, sub-Mediterranean forests and Balkan forests grow side by side (Anthony & Moldovan 2008).

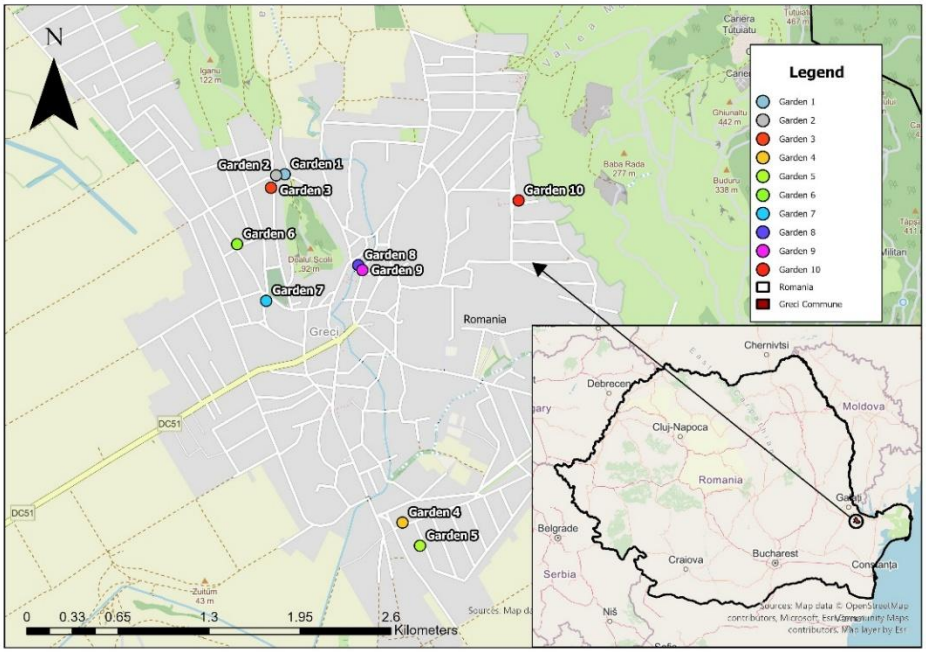


Fig. 1. Location of the ten traditional gardens surveyed in Greci commune (Tulcea County). Map created by the authors using ArcGIS Pro (Esri); base imagery: Google Earth (image © 2025 Maxar Technologies).

The Măcin Mountains are the oldest in Romania, formed during the Hercynian orogeny (Török et al. 2006), and also among the lowest: the highest peak, Țuțuiatu, is only 467 m (Posea2006). In the last ten years the mean annual temperature in the park has ranged between 12.6 and 13.9 °C, and the annual precipitation has been around 490 mm, with a clear downward trend (Meteoblue2025). Greci appears on a statistical map from 1790, and from 1882 families of Italian stonecutters settled here to work in the granite quarries (Dragulin 2011, Cizer 2012). Because the commune borders this protected area, residents' awareness of living next to the national park was one of the aspects examined in this study, which makes the setting directly relevant to our aims.

Questionnaire survey. We followed a community-based approach: we designed the questionnaire, and the residents contributed information about their own gardens and practices. The standardized questionnaire, with 18 questions, was created in Google Forms and posted in a private Facebook group of Greci residents; the 200 responses came in between 12 and 14 May 2025. The introductory text explained what the study was about, said that taking part was voluntary and anonymous and that no personal data were collected, and asked for one answer per household. We asked how long people had been gardening, what their garden is for, how many species and which groups of plants they grow, where they learned about plants and whether they share this knowledge, whether they use plants medicinally, how they think plant diversity has changed in the last 10 years and why, what they do about spontaneous plants, how they keep seeds, whether they bring wild plants into the garden, what their main difficulties are, whether traditional gardens matter for local culture and whether they know that they live near a protected area. Most questions were closed (single or multiple choice), and several allowed an open "other" answer.

Floristic inventory. We randomly selected ten households in Greci (Fig. 1), to get a varied sample and to avoid choosing gardens subjectively. We visited the gardens twice, in August–September 2024 and in May–June 2025, so that species that mature at different times of the year would not be missed. In each garden we photographed every taxon, cultivated or spontaneous and tolerated by the owners. To identify the taxa, we used *Plante vasculare din România* (Sârbu et al. 2013), *Flora României* (Săvulescu 1952–1976), Plants of the World Online (POWO 2025) and the apps PlantNet and iNaturalist, and we followed POWO (2025) for scientific names. For each taxon we noted the family; how it occurs in the garden (cultivated – c, spontaneous – s, or subspontaneous – sb, referring to plants occurring outside cultivation following escape from cultivation); whether it is native or alien in the Romanian flora (Săvulescu 1952–1976, Sârbu et al. 2013, POWO 2025); and its use (food, ornamental, medicinal, fodder or growth support). We assigned uses based on how a plant occurs, because local people also find uses for spontaneous and subspontaneous plants. They are based on field observations and on the first author's own knowledge as a member of the community; the details on medicinal and ritual uses come from older relatives of the first author. Taxa with several uses were counted in each category.

Data processing and analysis. We cleaned and analysed the questionnaire data in R 4.5.2. Multiple-choice answers were turned into yes/no variables, and free-text answers were merged when they clearly meant the same thing (for example, "mentă" and "izmă" for *Mentha* spp.; "dry soil" and "heat" were counted as water stress, and "lack of time" as physical effort). Respondents named plants with local names, which we matched

tentatively to taxa: sage (*Salvia officinalis*), parsley (*Petroselinum crispum*), St John's wort (*Hypericum perforatum*), mint (*Mentha* spp.), rosemary (*Salvia rosmarinus*), wormwood (*Artemisia absinthium*), greater celandine (*Chelidonium majus*), marigold (*Calendula officinalis*), lemon balm (*Melissa officinalis*), lavender (*Lavandula* spp.), thyme (*Thymus* spp.) and basil (*Ocimum basilicum*). We also calculated two simple indices for each respondent: a multifunctionality index (the number of declared garden purposes among food, medicinal, ornamental and commercial; range 0–4) and a conservation-awareness index (0–3 points: gardens seen as important for local culture, awareness of living near a protected area, and tolerance of spontaneous plants, i.e. letting them grow or using them). We report frequencies and percentages for all questions, used Pearson's chi-square tests (with Cramér's V as effect size) for associations between categorical variables and Spearman's rank correlation for ordered classes, and took $p < 0.05$ as the threshold. The tests are exploratory and were not corrected for multiple testing. For the inventory, we used descriptive statistics, with percentages calculated from the 84 taxa (taxa with several uses are counted in each category).

Results and discussion

Respondents, gardens and functions. Most respondents (65.5%) had been gardening for more than 20 years, 38.5% grew more than 20 species, and another 32.5% between 11 and 20 (Table 1). When asked what their garden is for, nearly everyone said food production (97.5%); 40.5% said ornamental purposes, 14.5% medicinal purposes, and only 4% selling or commercialization (Fig. 2a). So, the gardens are mainly subsistence-oriented, with a widespread but secondary aesthetic role, which fits the picture of home gardens as multifunctional socio-ecological systems (Galluzzi et al. 2010). The groups of plants people reported follow the same pattern: food plants (95.5%), ornamentals (61.5%), aromatic plants (57.5%) and medicinal plants (38%) (Fig. 2b). In other words, even gardens that people describe through food production hold plants with several practical and cultural roles. Almost everyone (98.5%) uses garden plants in cooking; 71% use them for teas or medicinal infusions, 49% for decoration, and 7.5% in cosmetics (Fig. 2c).

Perceived functions and documented composition of the gardens. The inventory of the ten gardens recorded 84 taxa from 44 families (Tables 2 and 3). Asteraceae (11 taxa, 13%), Rosaceae (10 taxa, 12%) and Apiaceae (4 taxa, 5%) were the best represented, followed by Solanaceae, Cucurbitaceae, Poaceae, Lamiaceae and Fabaceae, with three taxa each (4%) (Fig. 3a). Other studies found a similar picture: Asteraceae and Rosaceae are also the most frequent families in the domestic gardens of Sheffield (Smith et al. 2006) and in the gardens of the Lauris area in southern France (Marco et al. 2008), and in Ezerets (Bulgaria), a region quite similar to Greci in position, climate and history, the top families were Asteraceae, Rosaceae, Lamiaceae and Apiaceae (Nagodă et al. 2024). Most taxa were cultivated (69; 82%), 12 (14%) were spontaneous and three (4%) were subspontaneous (*Ailanthus altissima* (Mill.) Swingle, *Juglans regia* L. and *Morus alba* L.). Alien taxa (60; 71%) outnumbered native ones (24; 29%), a pattern also found in the domestic gardens of Amman, Jordan, where 84% of the taxa were alien (Al-Kofahi et al. 2024). Some of the native taxa are also deliberately cultivated as ornamentals, for example the climber *Humulus lupulus* L., grown on fences and arbours. Alien

ornamentals can become invasive if they escape from cultivation (Jones et al. 2024), so encouraging people to grow native plants would be a good idea.

Table 1. Results of the single-choice questions of the survey (n = 200 respondents).

Question	Response	n	%
Years of garden cultivation	> 20	131	65.5
	10–20	26	13.0
	5–10	22	11.0
	< 5	21	10.5
Number of species cultivated	> 20	77	38.5
	11–20	65	32.5
	6–10	42	21.0
	1–5	16	8.0
Medicinal use of plants	Yes	175	87.5
	No	25	12.5
Perceived change in diversity (last 10 years)	Increased	107	53.5
	Decreased	59	29.5
	Unchanged	34	17.0
Sharing knowledge with younger people	Frequently	101	50.5
	Occasionally	97	48.5
	No	2	1.0
Seed strategy	Buy new seeds each year	106	53.0
	Traditional saving	92	46.0
	Both	2	1.0
Transplanting wild plants into the garden	No	104	52.0
	Yes	51	25.5
	Occasionally	45	22.5
Main challenge of gardening	Water stress	117	58.5
	Physical effort / time	71	35.5
	Access to seeds	8	4.0
	Pests / diseases	3	1.5
	Other	1	0.5
Gardens important for local culture	Yes	193	96.5
	Do not know	6	3.0
	No	1	0.5
Aware of living near a protected area	Yes	186	93.0
	Not sure	9	4.5
	No	5	2.5

Multiple-choice results are shown in Figs 2–7.

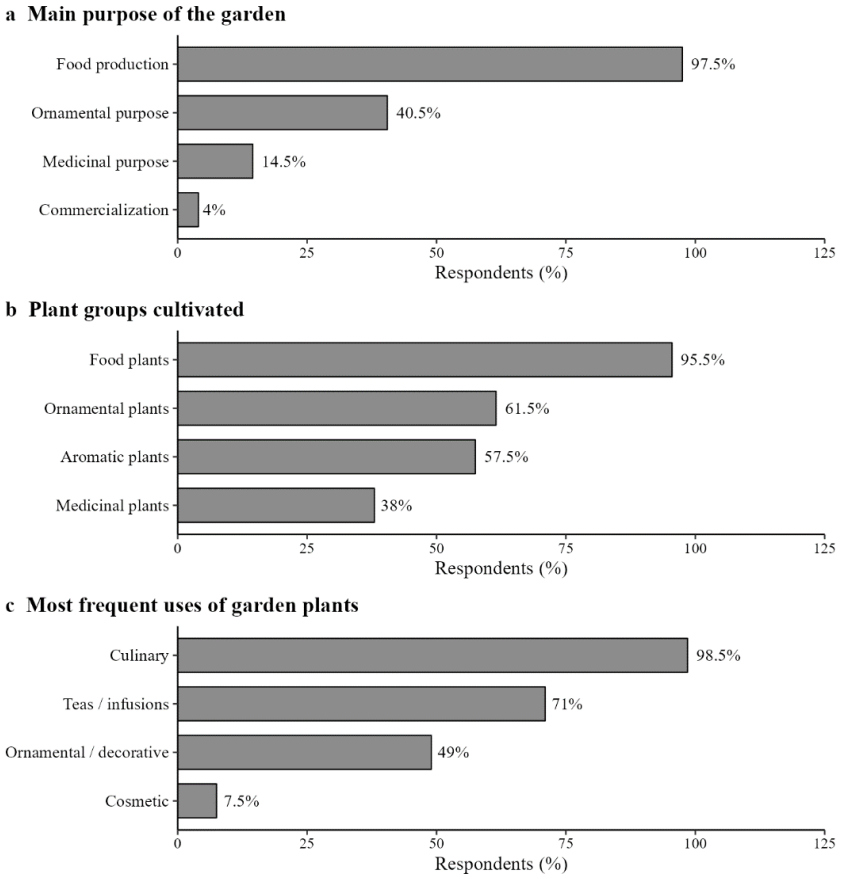


Fig. 2. Purposes of the gardens (a), plant groups cultivated (b) and most frequent uses of garden plants (c) reported by the respondents (n = 200; multiple answers allowed).

What the gardens contain does not mirror what people say they are for (Fig. 3b). Ornamental use was the most frequent in the inventory (50 taxa; 59.5%), followed by food (29 taxa; 34.5%), fodder (10; 11.9%), medicinal (6; 7.1%), and growth support (1; 1.2%), whereas 97.5% of the respondents named food production as the main purpose of their garden and only 40.5% the ornamental one. A high share of ornamental taxa is common in gardens around the world (Kendal et al. 2012) and was also found in Ezerets, where 68.25% of the taxa were ornamental (Nagodă et al. 2024). In Greci, flowers and shrubs clearly shape the look of the gardens (Fig. 4). Interestingly, this is hardly how the residents describe their gardens: 97.5% of the respondents named food production as the main purpose and only 40.5% the ornamental one. We think there are several reasons for the mismatch. First, the questionnaire asks about the importance of a function, whereas the inventory counts species: a handful of food crops grown on large plots can cover the household's needs, while ornamentals come in many species, need less constant care, and

are not seen as "useful", since they do not answer a subsistence need (we did not measure how much area each category covers). Second, giving each taxon only a few use categories hides multifunctional plants; parsley, for example, is a food plant in the inventory, yet 60% of the respondents named it as a medicinal plant. Third, the smaller share of food taxa might point to a slow shift of the garden from a source of food to a place for relaxation, which our data hint at but cannot prove. Among the food plants there are crops that have been grown for a long time in Romania, such as tomato (*Solanum lycopersicum* L.), onion (*Allium cepa* L.) and maize (*Zea mays* L.), which were introduced gradually between the 9th and the 19th centuries (Simoni 2017).

Table 2. Composition of the floristic inventory of the ten home gardens in Greci commune (84 taxa).

Feature	Category	No. of taxa	%
Occurrence	Cultivated	69	82.1
	Spontaneous	12	14.3
	Subspontaneous	3	3.6
Origin	Alien	60	71.4
	Native	24	28.6
Documented use[a]	Ornamental	50	59.5
	Food	29	34.5
	Fodder	10	11.9
	Medicinal	6	7.1
	Growth support	1	1.2

[a] Percentages of the 84 taxa; 12 taxa have more than one use and are counted in each category.

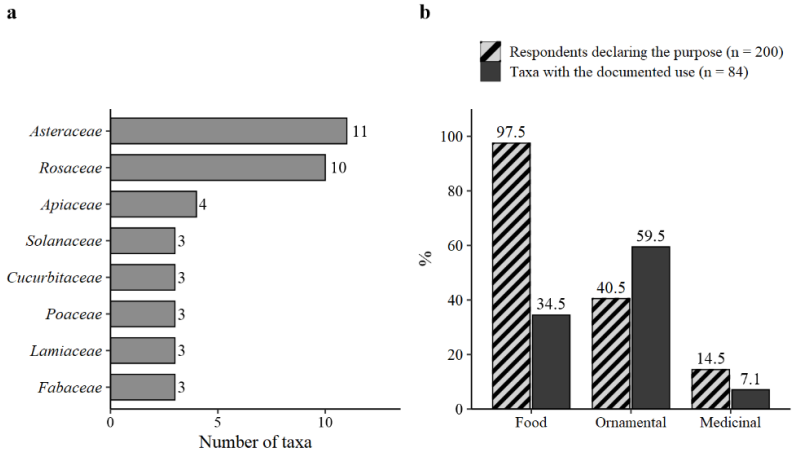


Fig. 3. (a) Families represented by at least three taxa in the inventory (the other 36 families have one or two taxa each); (b) purposes declared by the respondents (n = 200) compared with the uses documented in the inventory (percentage of the 84 taxa; taxa with several uses are counted in each category).

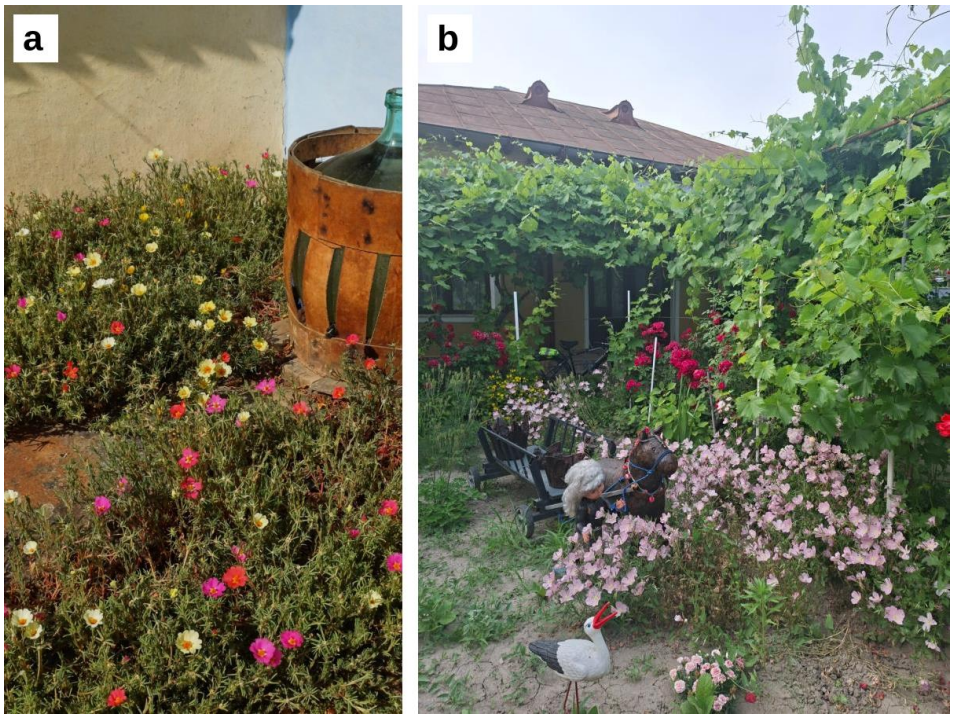


Fig. 4. Ornamental aspects of the traditional gardens in Greci: (a) decorative detail with *Portulaca grandiflora* Hook.; (b) decorative corner dominated by *Oenothera speciosa* Nutt., *Rosa* sp. and *Vitis vinifera* L. Photos: Luciana Andrei.

Medicinal plants and modes of use. Medicinal use was reported by 87.5% of the respondents (Table 1). The plants named most often were sage (135 respondents; 67.5%), parsley (120; 60%) and St John's wort (118; 59%), far ahead of mint (15; 7.5%) and a long tail of plants named by one to four people, such as rosemary, wormwood, greater celandine, marigold, lemon balm, lavender, thyme and basil (Fig. 5a). Only five of the twelve most named plants (sage, parsley, rosemary, greater celandine and marigold) were found in the ten gardens we inventoried; St John's wort, mint, wormwood, lemon balm, lavender, thyme and basil were not. This fits with what we saw on the ground: many medicinal plants are collected outside the household gardens, from woods, hills and uncultivated fields, or are bought, although the questionnaire did not ask where plants come from. *Hypericum* is among the genera most widely used in Romanian folk medicine and in the local economy (Kathe et al. 2003, Dihoru & Boruz2016). Regarding garden plants generally, 71% of respondents reported using them for teas or infusions and 7.5% for cosmetic preparations (Fig. 2c).

In the inventory only six taxa (7.1%) were classed as medicinal: *Armoracia rusticana* G.Gaertn., B.Mey. & Scherb., *Calendula officinalis* L., *Chelidonium majus* L., *Plantago media* L., *Salvia officinalis* L. and *Symphytum officinale* L. Their uses come from older relatives of the first author and are firmly rooted in Romanian folk medicine: marigold (*C. officinalis*) as infusions or tinctures put on wounds, burns and skin lesions;

greater celandine (*C. majus*) as fresh stems cut open, with the latex applied on warts and other skin problems; plantain (*P. media*) leaves externally against swelling and joint pain and internally as a cough syrup; sage (*S. officinalis*) as infusions for skin problems; and comfrey (*S. officinale*) as fresh compresses, poultices, root decoctions and ointments against rheumatism, swollen legs and to help fractures heal. We did not test any of these uses clinically, so they show local knowledge only. Romanian phytotherapy goes back to Dacian times, and several plants used then, including *C. majus* and *S. officinale*, are still in use (Segneanu et al. 2019). Some plants also have a spiritual or ritual role: comfrey (*Symphytum officinale*) is regarded as protective, like wormwood (*A. absinthium*), and keeps evil spirits away, and lovage (*Levisticum officinale*) is believed to work in the same way (Răchisan2018). We found few such taxa, but they belong to a heritage that fades as the older generation passes away.

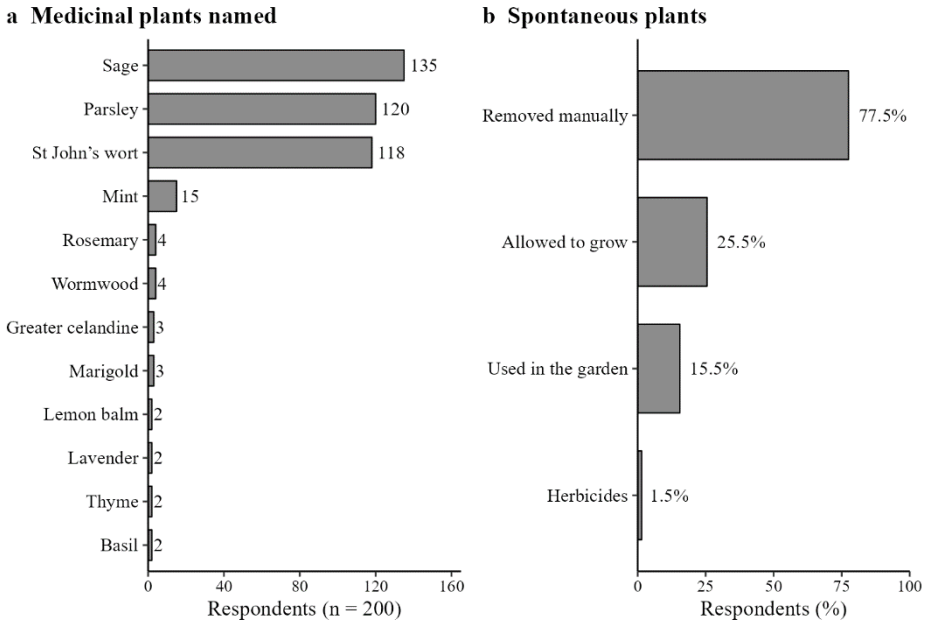


Fig. 5. (a) Medicinal plants named by the respondents (n = 200; multiple answers; vernacular names assigned to taxa as described in Material and methods); (b) management of spontaneous plants (percentage of respondents; multiple answers).

Transmission of knowledge and seed saving. Knowledge is passed on in the family: 98% of the respondents learned how to grow plants from their parents or relatives, 24.5% from neighbours or the community, 24.5% from books or the internet and 8% from other sources (Fig. 6a). This is vertical transmission (Calvet-Mir et al. 2016), now accompanied by newer routes, since books and the internet are as common as the neighbours. Half of the respondents (50.5%) often share their plant knowledge with younger family or community members and 48.5% do so occasionally (Fig. 6b). Seed

saving shows the same mix of old and new: 53% buy new seeds every year, 46% save seeds the traditional way (drying and storing them at home) and 1% do both (Fig. 6c). The fact that almost half of the households still keep their own seeds is a valuable way of keeping local genetic material alive. As for wild plants, 52% of the respondents never bring them into their garden, 25.5% do and 22.5% do it occasionally (Fig. 6d), so part of the community values the biodiversity around it and makes use of it.

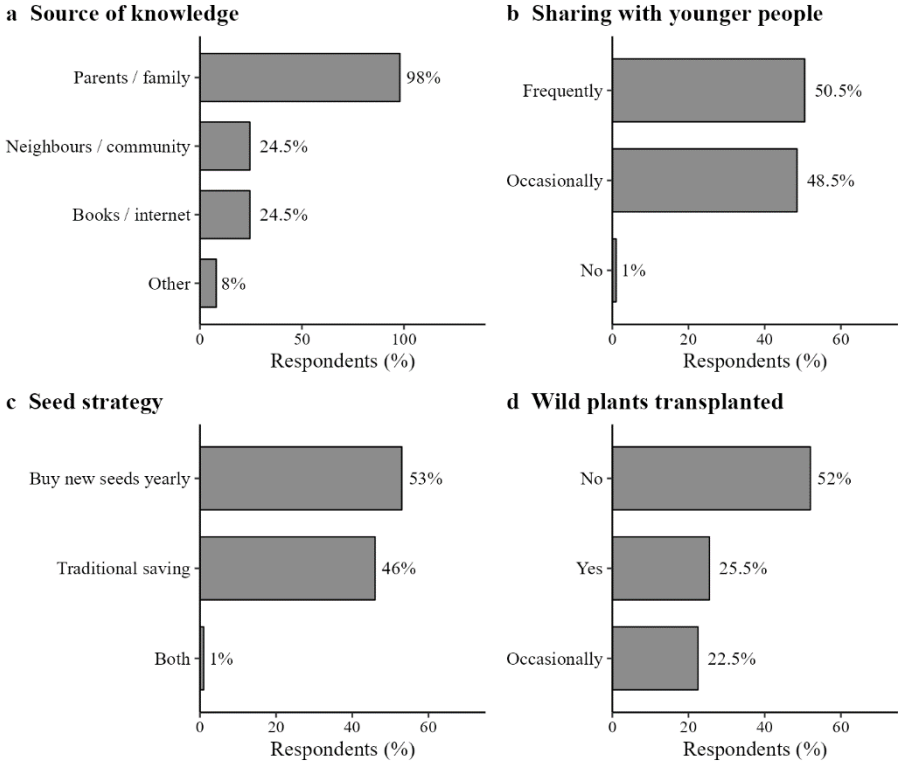


Fig. 6. Transmission of knowledge and practices (n = 200): (a) sources of gardening knowledge (multiple answers); (b) sharing of plant knowledge with younger family or community members; (c) strategy for obtaining seeds; (d) transplanting of wild plants into the garden.

Perceived change, drivers and challenges. People felt that the diversity of what they grow had changed over the last 10 years: 53.5% saw an increase, 29.5% a decrease and 17% no change (Table 1). The answer depended on how rich the garden was (χ^2 = 16.62, df = 6, p = 0.011, Cramér's V = 0.20; Table 4): an increase was reported by 67.5% of the respondents growing more than 20 species, but by only 18.8% of those growing 1–5 species, half of whom (50%) reported a decrease (Fig. 7a). Gardeners with many species may simply be more active in adding and keeping plants, or more attentive to changes. Older gardens had more species (Spearman's $\rho = 0.30$, $p < 0.0001$), and richer gardens had higher multifunctionality ($\rho = 0.27$, $p = 0.0001$), but not higher conservation awareness ($\rho = 0.08$, $p = 0.24$). On the other hand, garden age was not related to medicinal

use, knowledge sharing or multifunctionality, and the number of species was not related to the seed strategy (Table 4); these practices seem to be shared across the community rather than tied to a particular group of gardeners.

Climate change was by far the most cited driver of changes in diversity (86.5%), followed by access to seeds (37.5%), social change (12.5%) and local traditions (10%) (Fig. 7b). Water stress was the main difficulty of gardening (58.5%), followed by physical effort and lack of time (35.5%) (Fig. 7c). So the perceived threats are not only about losing traditions; they are also very down to earth – drought, seeds and workload – which agrees with the decreasing precipitation recorded in the Măcin area (Meteoblue2025).

Table 4. Statistical tests on the questionnaire data (n = 200).

Test	Statistic	df	p	Effect size
Garden age × medicinal use	$\chi^2 = 2.05$	3	0.562	V = 0.10
Garden age × knowledge sharing	$\chi^2 = 8.31$	6	0.216	V = 0.14
Garden age × multifunctionality level	$\chi^2 = 4.70$	9	0.859	V = 0.09
Protected-area awareness × cultural importance	$\chi^2 = 2.32$	4	0.677	V = 0.08
Number of species × perceived change	$\chi^2 = 16.62$	6	0.011	V = 0.20
Number of species × seed strategy	$\chi^2 = 10.23$	6	0.115	V = 0.16
Garden age – number of species	$\rho = 0.30$	–	< 0.0001	–
Number of species – multifunctionality index	$\rho = 0.27$	–	0.0001	–
Number of species – conservation-awareness index	$\rho = 0.08$	–	0.237	–

Pearson's chi-square (χ^2) with Cramér's V; Spearman's rank correlation (ρ). Expected counts were below 5 in some cells for several χ^2 tests.

Spontaneous plants and the garden–wild boundary. Most respondents remove spontaneous plants by hand (77.5%), but 25.5% let some of them grow as long as they do not bother the crops, 15.5% use them in the garden and only 1.5% use herbicides (Fig. 5b). Gardens thus look like semi-permeable mosaics, where planting is deliberate, but a small spontaneous component is tolerated. The inventory agrees: we recorded 12 spontaneous taxa, ten of them used as fodder for farm animals (for example *Amaranthus palmeri* S.Watson, *Portulaca oleracea* L. and *Setaria viridis* (L.) P.Beauv.), which explains why the owners put up with them. Something similar was reported from home gardens in Eastern Tyrol, where spontaneous plants are tolerated because people find uses for them, although the use is not necessarily constant (Vogl-Lukasser et al. 2010). One thing to keep in mind: in the questionnaire, the option about using spontaneous plants mentioned only food and medicinal uses, not fodder, so it probably underestimates how much they are tolerated.

One local use surprised us. The invasive alien *A. altissima* grows subspontaneously in the gardens, and people use the woody stems of young individuals as stakes for tomatoes and other crops (Fig. 8). This use did not fit any standard category, so we recorded it as "growth support". The species is known for allelopathic properties that inhibit the growth of other plants, is studied as a possible natural herbicide, and is planted in forest and shelter belts and for ornament (Enescu et al. 2016). This creative use shows how local people adapt to the plants available to them, and how an invasive species can acquire a function in a particular context; it is not, however, a recommendation for managing the species.

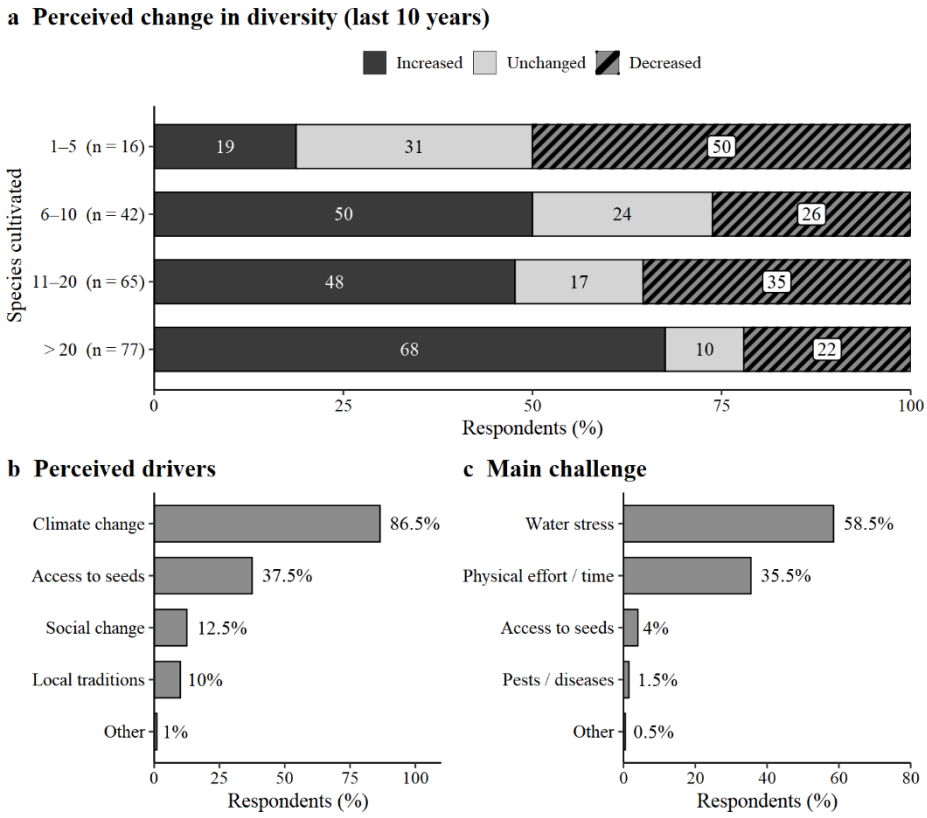


Fig. 7. (a) Perceived change in the diversity of cultivated plants during the last 10 years, by number of species cultivated (numbers inside bars are percentages of the respondents in each class); (b) perceived drivers of changes in diversity (multiple answers); (c) main challenge of gardening.

Cultural value, protected-area awareness and limits of the approach. Awareness of the cultural value of gardens was very high: 96.5% of the respondents think that traditional gardens are important for preserving local culture (0.5% disagreed and 3% did not know), and 93% know that they live near a protected area (4.5% were not sure and 2.5% were not aware) (Table 1). The two attitudes were not statistically related ($\chi^2 = 2.32$, df = 4, p = 0.68; Table 4), meaning that awareness of the protected area is widespread across respondents rather than limited to one subgroup.

Our approach has limits, and it is fair to say so. The questionnaire circulated for three days in a social-media group, so the sample is self-selected, we do not know the size of the group or the response rate, we collected no demographic data (age, sex), and the answers are self-reported and cannot be checked. Some conditional questions were answered by everyone (for example, 25 respondents who said they do not use plants medicinally still ticked plants from the medicinal list), and all percentages refer to the 200

respondents. In several chi-square tests, some expected counts were below five, so the results should be read with caution; for the significant association, a permutation test gave the same result ($p = 0.011$). Local plant names were matched to taxa tentatively, and the ten inventoried gardens are only a small sample of the gardens in the commune. Even so, the community-based approach let us document perceptions and practices that an inventory alone would miss, and showed a gap between the perceived and the documented functions of the gardens. We also recorded taxa at species level and did not document local varieties or cultivars, which would add further detail on the agrobiodiversity of these gardens.



Fig. 8. Ailanthus altissima in the gardens of Greci: (a) tree; (b) foliage; (c) tomato plants supported by stems of young *A. altissima* individuals. Photos: Luciana Andrei.

Conclusions

Our survey of 200 residents, combined with the floristic inventory of ten gardens, shows that the traditional gardens of Greci are multifunctional spaces. The inventory recorded 84 taxa from 44 families – dominated by the Asteraceae, Rosaceae and Apiaceae – most of them cultivated and alien, with ornamental taxa making up the largest share (60% of the 84 taxa). The residents, however, see their gardens above all as subsistence spaces (97.5% named food production), so bringing the two methods together revealed a clear gap between the perceived and the documented functions of the gardens – a gap that only the combination of questionnaire and inventory could expose. Knowledge is passed on mostly within the family (98%) and is widely shared with younger people, medicinal use of plants is common (87.5%) and almost half of the households still save seeds the traditional way; yet only five of the twelve most named medicinal plants were found in the inventoried gardens, which suggests that many are gathered from the wild or bought. People see climate change and water shortage as the main pressures, and richer gardens go together with a perceived increase in diversity. Gardens tolerate spontaneous plants only to a limited extent, and local inventiveness is shown by the use of the invasive *Ailanthus altissima* as growth support. Nearly all respondents consider these gardens

important for local culture. Because our sample is self-selected, the results are indicative; repeating the survey with demographic data and a larger number of inventoried gardens, including their local varieties, would help monitor these gardens under climate change, and encouraging native species could lower the risk of invasions by alien ornamentals.

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Table 3. Floristic inventory of the ten traditional home gardens in Greci commune. Occurrence: c = cultivated, s = spontaneous, sb = subspontaneous; origin: N = native, A = alien to the Romanian flora; use: F = food, O = ornamental, M = medicinal, Fo = fodder, S = growth support.

No.	Taxon	Family	Occ.	Orig.	Use
1	*Abies alba* Mill.	Pinaceae	c	N	O
2	*Ailanthus altissima* (Mill.) Swingle	Simaroubaceae	sb	A	S
3	*Allium cepa* L.	Amaryllidaceae	c	A	F
4	*Amaranthus palmeri* S.Watson	Amaranthaceae	s	A	Fo
5	*Anethum graveolens* L.	Apiaceae	c	A	F
6	*Antirrhinum majus* L.	Plantaginaceae	c	A	O
7	*Armoracia rusticana* G.Gaertn., B.Mey. & Scherb.	Brassicaceae	c	A	F, M
8	*Beta vulgaris* L.	Amaranthaceae	c	A	F
9	*Calendula officinalis* L.	Asteraceae	c	A	O, M
10	*Campsis radicans* (L.) Bureau	Bignoniaceae	c	A	O
11	*Canna indica* L.	Cannaceae	c	A	O
12	*Capsicum annuum* L.	Solanaceae	c	A	F
13	*Carduus nutans* L.	Asteraceae	s	N	Fo
14	*Chelidonium majus* L.	Papaveraceae	s	N	O, M
15	*Chrysanthemum* sp.	Asteraceae	c	A	O
16	*Cosmos sulphureus* Cav.	Asteraceae	c	A	O
17	*Cucumis melo* L.	Cucurbitaceae	c	A	F
18	*Cucurbita maxima* Duchesne	Cucurbitaceae	c	A	F
19	*Cucurbita pepo* L.	Cucurbitaceae	c	A	F
20	*Cydonia oblonga* Mill.	Rosaceae	c	A	F
21	*Dahlia* sp.	Asteraceae	c	A	O
22	*Daucus carota* L.	Apiaceae	c	N	F
23	*Dianthus caryophyllus* L.	Caryophyllaceae	c	A	O
24	*Digitaria ciliaris* (Retz.) Koeler	Poaceae	s	A	Fo
25	*Echinacea purpurea* (L.) Moench	Asteraceae	c	A	O
26	*Erigeron annuus* (L.) Desf.	Asteraceae	s	A	O
27	*Eschscholzia californica* Cham.	Papaveraceae	c	A	O
28	*Euonymus japonicus* Thunb.	Celastraceae	c	A	O
29	*Euphorbia marginata* Pursh	Euphorbiaceae	c	A	O
30	*Ficus carica* L.	Moraceae	c	A	F
31	*Fragaria vesca* L.	Rosaceae	c	N	F
32	*Gaillardia aristata* Pursh	Asteraceae	c	A	O
33	*Galium aparine* L.	Rubiaceae	s	N	Fo
34	*Gladiolus imbricatus* L.	Iridaceae	c	N	O
35	*Hedera helix* L.	Araliaceae	c	N	O
36	*Hemerocallis fulva* L.	Asphodelaceae	c	A	O
37	*Hosta* sp.	Asparagaceae	c	A	O
38	*Humulus lupulus* L.	Cannabaceae	c	N	O
39	*Hylotelephium telephium* (L.) H.Ohba	Crassulaceae	c	N	O
40	*Iris* × *germanica* L.	Iridaceae	c	A	O
41	*Juglans regia* L.	Juglandaceae	sb	A	F, O
42	*Lactuca sativa* L.	Asteraceae	c	A	F
43	*Lamium amplexicaule* L.	Lamiaceae	s	N	Fo
44	*Levisticum officinale* W.D.J.Koch	Apiaceae	c	A	F
45	*Lilium candidum* L.	Liliaceae	c	A	O
46	*Lonicera japonica* Thunb.	Caprifoliaceae	c	A	O
47	*Malus domestica* (Suckow) Borkh.	Rosaceae	c	A	F

No.	Taxon	Family	Occ.	Orig.	Use
48	*Medicago sativa* L.	Fabaceae	c	A	O
49	*Morus alba* L.	Moraceae	sb	A	O, F
50	*Nandina domestica* Thunb.	Berberidaceae	c	A	O
51	*Oenothera speciosa* Nutt.	Onagraceae	c	A	O
52	*Oxalis corniculata* L.	Oxalidaceae	s	A	O, Fo
53	*Paeonia* sp.	Paeoniaceae	c	N	O
54	*Paulownia* sp.	Paulowniaceae	c	A	O
55	*Petroselinum crispum* (Mill.) Fuss	Apiaceae	c	A	F
56	*Petunia axillaris* (Lam.) Britton, Sterns & Poggenb.	Solanaceae	c	A	O
57	*Phaseolus vulgaris* L.	Fabaceae	c	A	F
58	*Philadelphus coronarius* L.	Hydrangeaceae	c	A	O
59	*Phlox paniculata* L.	Polemoniaceae	c	A	O
60	*Picea pungens* Engelm.	Pinaceae	c	A	O
61	*Plantago media* L.	Plantaginaceae	c	N	M
62	*Platycladus orientalis* (L.) Franco	Cupressaceae	c	A	O
63	*Portulaca grandiflora* Hook.	Portulacaceae	c	A	O
64	*Portulaca oleracea* L.	Portulacaceae	s	N	Fo
65	*Prunus amygdalus* Batsch	Rosaceae	c	A	F, O
66	*Prunus avium* (L.) L.	Rosaceae	c	N	F
67	*Prunus domestica* L.	Rosaceae	c	A	F
68	*Prunus laurocerasus* L.	Rosaceae	c	N	O, F
69	*Pyrus communis* L.	Rosaceae	c	N	F
70	*Rosa* sp.	Rosaceae	c	N	O
71	*Rubus idaeus* L.	Rosaceae	c	N	F
72	*Rumex conglomeratus* Murray	Polygonaceae	s	N	Fo
73	*Salvia officinalis* L.	Lamiaceae	c	A	M, O
74	*Salvia rosmarinus* Spenn.	Lamiaceae	c	A	O, F
75	*Setaria viridis* (L.) P.Beauv.	Poaceae	s	N	Fo
76	*Solanum lycopersicum* L.	Solanaceae	c	A	F
77	*Symphyotrichum dumosum* (L.) G.L.Nesom	Asteraceae	c	A	O
78	*Symphytum officinale* subsp. *uliginosum* (A.Kern.) Nyman	Boraginaceae	c	N	M, O
79	*Trifolium pratense* L.	Fabaceae	s	N	O, Fo
80	*Viola* × *wittrockiana* Gams	Violaceae	c	A	O
81	*Vitis vinifera* L.	Vitaceae	c	N	F
82	*Yucca filamentosa* L.	Asparagaceae	c	A	O
83	*Zea mays* L.	Poaceae	c	A	F
84	*Zinnia elegans* Jacq.	Asteraceae	c	A	O