



Mapping the advancements in floristic knowledge of Italy (2005–2025)

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Abstract

Based on the evaluation of 3,902 local floristic references published between 2005 and 2025, an update to the floristic knowledge map of Italy is presented. To measure the progress in floristic knowledge across Italy's administrative regions, the 'Index of Floristic Knowledge Advancement' (IFA) is proposed here. This index categorizes regions based on the proportion of potential improvement that has actually been achieved. Results showed an improvement in knowledge, most notably for Northern and Central Italy. Emilia-Romagna emerged as the most comprehensively documented region with the highest IFA value (0.81), followed by Lombardia (0.60), Friuli-Venezia Giulia (0.54), Trentino-Alto Adige and Veneto (0.53). In central Italy, Lazio (0.50), Sardegna (0.45) and Toscana (0.36) registered the highest scores. Over the past twenty years, 453 specific and subspecific taxa have been described from the Italian territory, the majority of which (443) are Italian endemics. *Hieracium* is the most represented genus (147 taxa). The marked progress documented is likely due to the accelerated impact of coordinated scientific projects, citizen science programs, the development of digital databases, and an increased focus on taxonomic research.

Keywords Checklist · Vascular flora · Biodiversity · Italian peninsula · Sardinia · Sicily

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Introduction

Italy has one of the most extensive traditions of floristic research worldwide. Floristic research in Italy began to flourish in the late 18th and early nineteenth centuries, continuing until the early 1900s. This activity was interrupted during the mid-century world wars, before resuming significantly between 1960 and the early 2000s (Scoppola 2012). To summarize the state of floristic knowledge in Italy, a first map was released in 1978 (Filipello 1978), then updated in 2005 (Scoppola and Blasi 2005). Nevertheless, the extensive research carried out over the past two decades has made a second update timely and needed. To this end, the Working Group for Floristics, Systematics and Evolution of the Italian Botanical Society (SBI) developed a project aimed at achieving a comprehensively updated knowledge of the Italian flora.

In an era of accelerating scientific progress, facilitated by global connectivity, advanced technologies, and large-scale data storage, fundamental disciplines such as floristics face renewed scrutiny (D'Antraccoli et al. 2022). Over the past two decades, transformations within the Italian university system have significantly redirected the focus of the botanical community. Professional priorities have increasingly shifted toward fields such as plant ecology, biotechnology, and genetics, which are perceived to offer stronger prospects for competitive funding and high-impact publications (Domina 2024). These phenomena parallel well known trends at global level (Crisci et al. 2020; Peruzzi 2025). In light of this, the Italian Botanical Society has taken a proactive role in advancing floristic, taxonomic, and systematic research. Recently, a project aimed at the critical analysis of unconfirmed, doubtful, excluded, and extinct taxa for Italy has been carried out, since these categories constitute a significant gap in national floristic knowledge (Domina et al. 2025). The floristic knowledge of a region is a foundational, long-term investment, a cumulative record built through the dedicated fieldwork of generations of researchers. While the resulting inventories are often localised in scope, their true scientific value is unlocked through synthesis. Contemporary data science and biogeographic analysis can integrate these primary datasets, transforming regional checklists into the essential evidence for research of broad ecological and evolutionary significance (Gerstner et al. 2017; Fois et al. 2023).

Moving beyond anecdotal perception, this research aims to systematically document and interpret the footprint of floristics in contemporary Italian science. We analyse the flow of floristic knowledge production in the last twenty years, examining the contribution of floristics to global biodiversity perception, its representation in peer-reviewed literature, and its integration with broader ecological or conservation studies, thereby evaluating its persistence as a core botanical discipline.

Materials and methods

This research covers the terrestrial extents of the Italian peninsula and its islands, including the sovereign territories of the Republic of San Marino and the Vatican City.

A comprehensive bibliographic survey was conducted to capture the primary literature on the Italian vascular flora published from 2005 to 2025. The resulting Bibliographic catalogue (Annex 1) is structured according to the Italian administrative regions, thereby facilitating geographic analysis. Data were supplemented with records from the Wikiplantbase platforms (Peruzzi and Bedini 2013 onwards; Bagella et al. 2015 onwards; Bedini et al.

2016; Barberis et al. 2016 onwards; Domina et al. 2016 onwards; Peruzzi et al. 2017, 2019 onwards; Adorni et al. 2020 onwards). Materials such as management documents, theses not published online, conference abstracts, popular science texts, and non-distributional nomenclatural typification or chromosome counts were excluded from the analysis. For the spatial representation of floristic knowledge, we adopted a coordinate precision within 250 m and the categorization system established by Scoppola and Blasi (2005). This system consists of 5 ordinal categories, from 1 to 5, with 1 = Almost unknown areas; 2 = Areas with a generic, barely informative knowledge; 3 = Areas with medium knowledge; 4 = Fairly well-known areas; 5 = Well-known areas. In addition, small well-known territories within areas assigned to lower knowledge classes are also identified. This approach allows for a direct, diachronic analysis of changes in floristic knowledge across the two-decade interval. The borders of the polygons in the thematic maps have been determined by tracing the geographical boundaries of the areas, such as contour lines, watercourses, and administrative boundaries. Data collection was conducted in most regions according to biogeographical areas (e.g. Domina et al. 2018). Field data collection in Valle d'Aosta continued to follow the quadrant systems established by the Central European Floristic Cartography (Gory 1982), although the cartographic representation was aligned with that used in other regions. For Trentino-Alto Adige the map was produced using the same criteria as in the previous edition (Scoppola and Blasi 2005). The number of records per quadrant reflects the level of knowledge: < 100 = almost unknown; 100–499 = generic knowledge; 500–1999 = medium knowledge; 2000–4999 = fairly well known; > 5000 records = well known. The data can be viewed through online distribution maps, i.e. for the Province of Bolzano at <https://www.florafauna.it> and for the province of Trento at https://sit.museo.civico.rovereto.g3wsuite.it/it/map/webGIS_floraTN/.

The floristic distribution map was produced using ArcGIS 10.5 (ESRI 2016). Each bibliographic reference was manually georeferenced to a polygon delimiting the spatial extent of its contributing area. The base cartography consists of vector data (e.g., administrative boundaries, coastlines) retrieved from the Italian National Geoportal (<http://www.pcn.minambiente.it>). Site names (toponyms) were derived from the 1:25,000 topographic map series of the Italian Military Geographic Institute (IGM 1940–today). All toponyms were translated in English according to the standard spellings provided by the National Geospatial-Intelligence Agency's Geographic Names Server (National Geospatial-Intelligence Agency 2025). The main changes that have occurred over the last 20 years for each administrative region are listed in the results. A comparative analysis is conducted using datasets from 1978 (Filipello 1978) and 2005 (Scoppola & Blasi 2005). To quantify advances in floristic knowledge for each Italian administrative region, we defined the 'Index of Floristic knowledge Advancement' (IFA). This index quantifies the proportion of maximum potential progress achieved, from the initial baseline year ([START YEAR]) to the ideal level-5 state in [END YEAR]. All analyses were based on regional percentage distributions rather than absolute areas, thereby ensuring comparability among regions regardless of their size. Assuming no decrease in floristic knowledge from 2005 to 2025, the IFA is a normalized index bounded between 0 and 1. IFA values are categorised as follows: 0–0.25 limited, 0.25–0.49 moderate, 0.50–0.74 high, and 0.75–1 very high. Only the essential bibliography is cited in the text. A list of taxa published over the last twenty years has also been compiled, including for each taxon: family, publication year, administrative region, indication of endemism to Italy, current taxonomic status according to Bartolucci et al. (2024), and, if considered synonym, the accepted taxon to which it is referred. All details are in the research outputs that are available as supplementary materials: Annex 1: Bibliographic catalogue; Annex 2: List of names of vascular plant taxa published; Annex 3: Detailed

floristic knowledge map; Annex 4: Formal definitions and assumptions for the calculation of IFA.

Results

General overview

A total of 3,902 references were collated and evaluated, comprising 3,423 articles and 479 books or book chapters (Annex 1). Among the articles, 2,330 (67.8%) appeared in journals edited in Italy, and 1,093 (32.2%) were published in international journals. In detail, 395 works (10.1% of the total) pertain to floras or checklists. With regard to the main subjects, the contributions were distributed as follows: 1,626 (41.7%) were strictly floristic studies, 711 (18.2%) focused on taxonomy or nomenclature, 431 (11%) on vegetation, 285 (7.3%) on plant conservation, and 454 (11.6%) on other topics (e.g., ecology, phylogeography).

The number of references analysed by administrative region (Fig. 1) revealed a pronounced geographic bias in research focus. Sardegna (916 references) and Piemonte (784) were the regions most frequently involved, jointly accounting for nearly a third of the total. A second group included Veneto, Sicilia, and Toscana. In contrast, Basilicata, Friuli-Venezia Giulia, Molise, Umbria, and Valle d'Aosta accounted for about 300 references or less each.

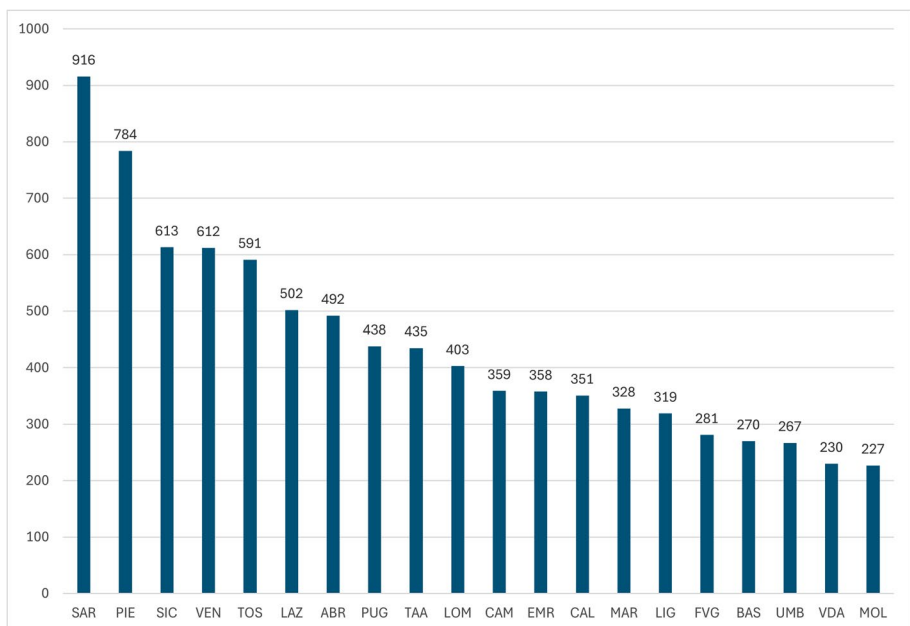


Fig. 1 The number of references recorded per each administrative region of Italy. (ABR – Abruzzo; BAS – Basilicata; CAL – Calabria; CAM – Campania; EMR – Emilia-Romagna; FVG – Friuli Venezia Giulia; LAZ – Lazio; LIG – Liguria; LOM – Lombardia; MAR – Marche; MOL – Molise; PIE – Piemonte; PUG – Puglia; SAR – Sardegna; SIC – Sicilia; TAA – Trentino-Alto Adige; TOS – Toscana; UMB – Umbria; VDA – Valle d'Aosta; VEN – Veneto)

The dataset revealed that the majority of publications (2,931) were focused on a single region, while only 95 works covered at least 18 regions. These results indicate a prevalence of geographically localised or regional studies rather than broader, multi-regional syntheses.

The Orchidaceae family scored the highest number of studies, predominantly in floristics and taxonomy, with 425 references (10.8% of the total).

Floristic exploration and taxonomic analysis of collected specimens led to the description of numerous new taxa (Annex 2). Between 2005 and 2025, a total of 579 new names were published based on material collected in Italian. Of these, 126 (ca. 22%) have subsequently been considered as synonyms of previously described taxa (Bartolucci et al. 2024). The remaining accepted taxa were 453, including 291 species and 162 subspecies. The largest part of them (443) were Italian endemics, whereas 65 were considered taxonomically doubtful (Bartolucci et al. 2024). The administrative regions that registered higher numbers of accepted or provisionally accepted newly described taxa in the considered period were: Abruzzo (74 taxa), Sicilia (69), Toscana (53), Sardegna (51), followed, by Calabria (27), Friuli Venezia Giulia and Piemonte (21), Marche (19), Puglia, and Veneto (18). The most represented genera were: *Hieracium* (147 taxa), *Ophrys* (33), *Epipactis* (29), *Taraxacum* (26), *Viola* (17), *Ranunculus* (16), *Centaurea* (12), *Genista* (11), *Pinguicula* (10), *Erysimum* (10), *Primula* and *Serapias* (9), *Allium*, *Dianthus* and *Solenopsis* (8), *Helichrysum* (7), and *Alchemilla* (6).

Overall, the most represented families for these taxa were Asteraceae (195 taxa), Orchidaceae (44), Fabaceae and Ranunculaceae (26), and Brassicaceae (21).

Analysis of floristic knowledge across Italy from 1978 to 2025 (Fig. 2, Annex 3) reveals a clear and widening north–south divide in floristic documentation. At the national scale, the IFA was 0.22 (limited) when comparing 1978 and 2005 and 0.30 (moderate) when comparing 2005 and 2025. Between 2005 and 2025, northern and central regions achieved relevant progress (Fig. 3, Fig. 4, Table 1). Emilia-Romagna was the most thoroughly documented region, with its area classified as "well-known" (Level 5) rising from 26.52% to 82.01%. Lombardia, Veneto, and Trentino-Alto Adige also showed substantial increases

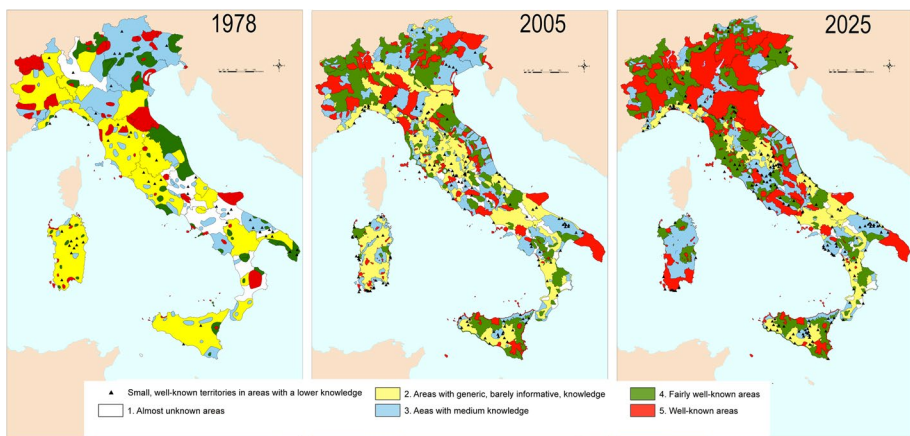


Fig. 2 Comparison of the level of floristic knowledge in Italy between 1978 (data from Filipello 1978), 2005 (data from Scoppola and Blasi 2005) and 2025 (this study)

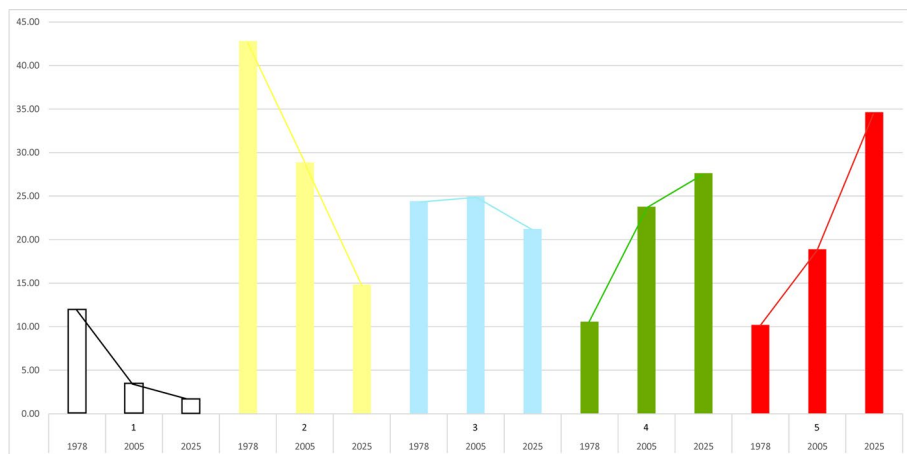


Fig. 3 Long-term evolution of floristic knowledge across Italy. The values represent the percentage of area of the whole Italian territory evaluated at three benchmark years (1978, 2005, and 2025) using a five-level classification system: **1 (white)** Virtually unknown areas; **2 (yellow)** Areas with a generic, barely informative knowledge; **3 (light blue)** Moderately known areas; **4 (green)** Fairly well-known areas; and **5 (red)** Well-known areas

in floristic knowledge, indicating strong institutional research efforts and systematic surveys.

In contrast, progress in southern regions and the islands was markedly slower. While Sardegna, which already had high knowledge values in 2005, still showed gains, regions like Calabria and Sicilia exhibited near-stagnation, with minimal advancement into the highest knowledge categories. Areas such as Basilicata, Molise, and Umbria remained largely at intermediate knowledge levels, showing little change over the two decades.

At the national level, there is an evident trend in the reduction of virtually unknown areas (Level 1) showing a consistent decline over the observed period. Conversely, the categories representing higher knowledge levels, particularly fairly well-known (Level 4) and well-known areas (Level 5), demonstrate marked increases, especially between 2005 and 2025. This progression indicates a significant national improvement in floristic exploration and data collection efforts over nearly five decades. The pronounced positive shift between 2005 and 2025 reflects the accelerated impact of coordinated scientific initiatives, citizen science programs, digital database development, and increased taxonomic research focus.

Regional detail

Abruzzo

Floristic knowledge in Abruzzo has significantly increased, primarily through focused research on protected areas. Comprehensive floras of the Gran Sasso and Monti della Laga National Park (Conti and Bartolucci 2016), Maiella National Park (Conti et al. 2019), and Abruzzo, Lazio and Molise National Park (Conti and Bartolucci 2015) have been published. The flora of the Sirente-Velino Regional Natural Park is presently under

Italy — Regional choropleth of IFA (2005→2025)

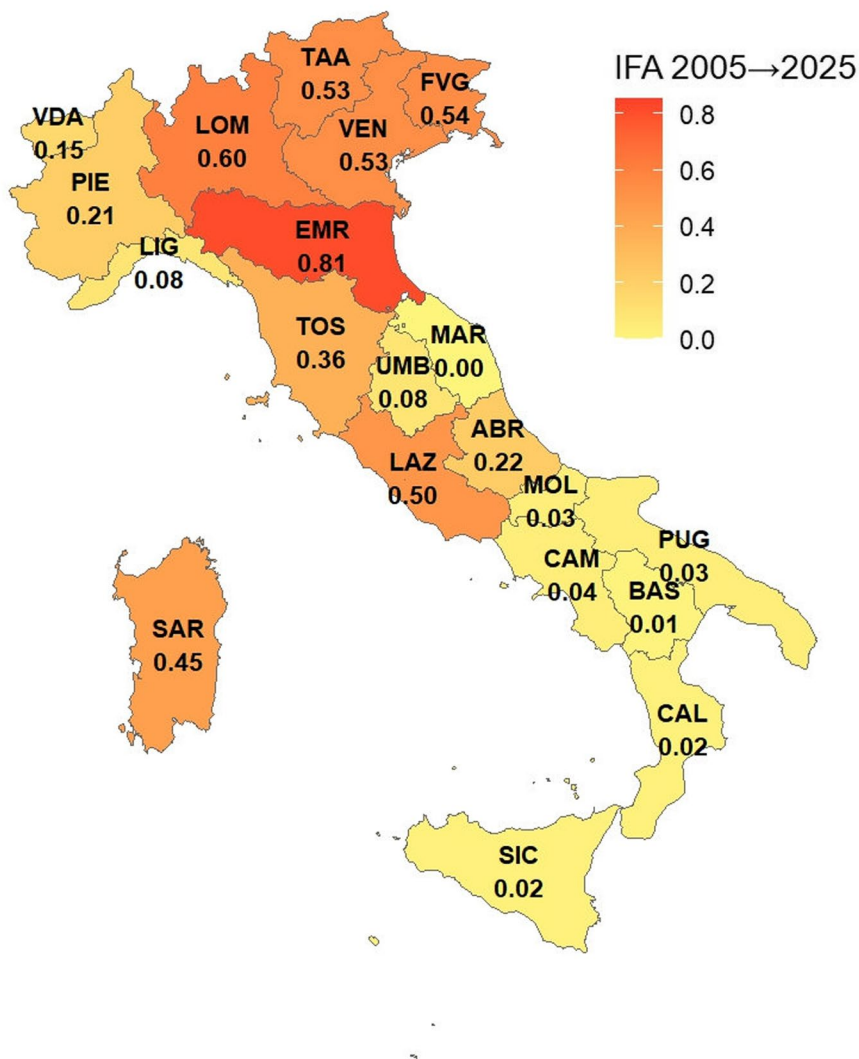


Fig. 4 Thematic map illustrating the Index of Floristic knowledge Advancement (IFA) between 2005 and 2025

publication. Additional studies address regional natural reserves including Lecceta di Torino di Sangro, Bosco di Don Venanzio, and Gole del Sagittario. Numerous other regional floristic contributions have been published, contributing to the extensive botanical knowledge of Abruzzo. Several other studies focusing on the taxonomic revisions of critical groups, led to the description of 74 taxa new to science from Abruzzo.

Table 1 The long-term evolution of floristic knowledge across the different administrative regions of Italy. The values represent the percentage of each region's area classified into one of five knowledge levels (1—Virtually unknown areas; 2—Areas with a generic, barely informative knowledge; 3—Moderately known areas; 4—Fairly well-known areas; and 5—Well-known areas), evaluated at three benchmark years (1978, 2005, and 2025)

	1			2			3			4			5		
	1978	2005	2025	1978	2005	2025	1978	2005	2025	1978	2005	2025	1978	2005	2025
Abruzzo	46.39	10.14	3.05	17.65	25.50	24.74	9.54	38.13	33.77	22.90	18.34	2.14	3.52	7.88	32.30
Basilicata	0.00	14.30	14.30	90.84	27.63	27.63	0.00	28.64	26.10	7.96	27.77	30.28	1.19	1.67	1.69
Calabria	45.15	15.44	12.19	22.55	48.90	51.23	8.93	12.15	12.03	6.78	22.89	22.96	16.59	0.63	1.58
Campania	56.46	11.15	11.10	3.50	51.54	47.95	32.84	19.28	19.47	3.23	5.21	6.39	3.97	12.83	15.09
Emilia-Romagna	0.00	0.00	0.00	37.06	26.00	0.00	38.40	25.27	11.26	1.25	22.21	6.73	23.29	26.52	82.01
Friuli Venezia Giulia	0.00	0.00	0.00	0.00	0.00	0.00	69.41	48.17	0.00	22.89	3.48	45.51	7.69	48.35	54.49
Lazio	10.69	20.12	0.00	63.40	15.34	0.00	11.97	26.64	33.31	10.03	17.18	31.25	3.91	20.72	35.44
Liguria	2.59	0.00	0.00	74.61	81.87	67.65	15.42	14.81	23.35	5.98	2.99	5.76	1.39	0.33	3.23
Lombardia	33.78	0.00	0.00	20.46	34.53	3.75	19.97	19.88	14.07	19.76	22.30	27.39	6.04	23.29	54.79
Marche	0.00	0.00	0.00	12.15	0.00	0.00	13.23	43.65	43.65	74.62	29.93	29.80	0.00	26.42	26.55
Molise	30.24	0.00	0.00	69.76	2.72	2.72	0.00	17.96	16.38	0.00	61.27	60.98	0.00	18.05	19.92
Piemonte	0.00	0.00	0.00	61.18	1.51	0.00	19.22	17.03	10.69	0.00	49.30	48.16	19.61	32.16	41.15
Puglia	31.27	7.12	1.96	14.81	22.76	28.10	23.32	28.23	28.40	16.77	6.37	6.40	13.82	35.53	35.14
Sardegna	0.00	0.00	0.00	88.34	59.60	0.00	3.86	24.06	55.78	2.94	9.86	18.11	4.85	6.49	26.11
Sicilia	0.32	0.00	0.00	81.71	30.55	29.71	12.39	14.75	14.63	4.30	37.59	37.78	1.28	17.11	17.88
Toscana	0.41	0.00	0.00	72.60	47.59	18.42	16.78	20.76	11.14	0.00	16.62	50.84	10.21	15.03	19.60
Trentino-Alto Adige	0.00	0.00	0.00	0.00	9.53	0.00	88.81	46.25	18.76	6.67	36.25	36.70	4.52	7.97	44.54
Umbria	0.00	0.00	0.00	96.56	86.63	63.46	0.00	10.71	34.85	1.71	1.45	0.46	1.73	1.21	1.23
Valle d'Aosta	0.00	0.00	0.00	0.00	2.76	2.76	0.00	15.17	15.17	0.00	73.61	56.25	100.00	8.46	25.82
Veneto	0.00	0.00	0.00	0.00	7.50	0.00	59.98	35.14	12.77	25.17	31.23	32.39	14.85	26.13	54.85
Italia	11.99	3.50	1.69	42.81	28.88	14.83	24.42	24.96	21.21	10.58	23.78	27.64	10.20	18.88	34.63

Basilicata

Floristic research in the Basilicata region has provided contributions to the knowledge of its vascular plant diversity, although the overall volume of updates remains very limited. A preliminary checklist for the Gallipoli Cognato Regional Park and the Piccole Dolomiti Lucane (Buccomino 2019) offered an initial framework for a protected area of significant landscape and naturalistic interest. Additional floristic data emerged from the field excursions organized by the SBI in 2003 in the northwestern part of the region (Conti et al. 2006) and in the central-northern sector in 2004 (Conti et al. 2007a, b). A more substantial contribution was made through the investigation of the Maddalena Mountains, straddling Basilicata and Campania, which helped to fill a knowledge gap for this sector of the southern Apennine (Rosati et al. 2017). Despite these efforts, the overall advancement in the floristic knowledge of Basilicata remains limited, with large portions of the regional territory still lacking systematic and updated floristic surveys. Over the past two decades, 15 species and subspecies have been described as new additions to the currently accepted vascular flora of Basilicata.

Calabria

Most floristic investigations have been conducted within Special Areas of Conservation belonging to the Natura 2000 network. Conversely, other studies have focused on floristically poorly known areas, located within national and regional parks or in other sites recognised as being of conservation value. These include the Presila Catanzarese (Bernardo et al. 2012), the Serre Calabre Regional Park (Crisafulli et al. 2006), the Foce del Crati (Maiorca et al. 2007), the Papisidero municipal area (Di Marco et al. 2012), and the Fiumara Bagni (Maiorca and Puntillo 2015). The recently published vascular flora of Tarsia (Peruzzi 2026) was compiled using the data for the municipality uploaded over time in the Wikipantbase #Italia online database. In total, 33 species and subspecies (including seven species of *Taraxacum* and five of *Epipactis*) were described as new to science from Calabria.

Campania

The updated map of floristic knowledge for the Campania region reveals that substantial progress has been achieved only in certain sectors. The Roccamonfina area is the only territory that can now be assigned the highest level of floristic knowledge (Croce et al. 2008). By contrast, the flora of other extensive areas, such as the Taburno–Camposauro massif (Nazzaro et al. 2007; Corazzi 2008) and the Vesole, Soprano, Sottano and Chianello mountains (Motti and Salerno 2006), deserves further investigation. The field excursions organised by the SBI improved the knowledge of the Matese massif (Santangelo et al. 2010), the Maddalena Mountains (Rosati et al. 2017), and Irpinia (Stinca et al. 2019a). Further noteworthy contributions derive from targeted surveys of small areas in the province of Caserta, the Cilento beaches, and several artificial water reservoirs (e.g., Croce 2015). Floristic updates are now available for territories that were already considered well explored in 2005 (e.g., Stinca et al. 2017, 2019b). Ongoing research on Campanian flora includes systematic studies (e.g., Orchidaceae) and management-related topics such as alien species (Del Guacchio and La Valva 2017). Several new Campanian endemics have been

described, often emerging from the revision of taxonomically complex groups, notably *Gymnospermium scipetarum* subsp. *eddae* Rosati, Farris, Fascetti & Selvi, representing the first Italian record of this western Balkan genus.

Emilia-Romagna

Emilia-Romagna stands as the Italian region with the most advanced floristic knowledge, and is the region that recorded, between 2005 and 2025, the most significant increase in terms of well-known areas. Recent years have seen significant advances in floristic documentation, leading to updated syntheses for several areas, such as the Province of Piacenza (Bracchi and Romani 2010), the surroundings of Modena (Alessandrini et al. 2010), the plane of Bologna (Alessandrini 2024). Nonetheless, some gaps still exist, notably the absence of updated general floras for the provinces of Parma and Bologna, where knowledge is otherwise fragmented across local studies. A major step towards a more systematic understanding is the forthcoming publication of a decade-long floristic mapping project started in 2016 (Montanari 2016). Encompassing the Romagna biogeographical region, this project compiles over 200,000 bibliographic and, mostly, original field records, offering a comprehensive new baseline for the area. Between 2005 and 2025, ten taxa (nine from the genus *Hieracium* and one from *Sesleria*) were described from Emilia-Romagna.

Friuli Venezia Giulia

Thanks to intensive research efforts covering urban, rural, and natural contexts across the region, floristic research in Friuli Venezia Giulia has made notable progress. A major driver of this progress is the fieldwork conducted for the new regional floristic atlas published in 2023 (Martini et al. 2023) and studies across urban, rural and natural areas of the region. Comprehensive urban floras published for the cities of Udine (Martini 2005), Pordenone (Martini and Pavan 2008), and Trieste (Martini 2010) complemented by syntheses of urban floristic patterns across Friulian cities (Martini and Filippini 2012) and a detailed study of the vascular flora of Cividale del Friuli (Boscutti et al. 2009). Significant contributions also emerged from mountain areas, including the posthumous work on the flora of Monte Jouv (Bruna 2021) and the floristic survey of Monte Matajûr (Simonetti 2005). Also wetland and aquatic habitats received considerable attention, with studies on the lower Isonzo's aquatic vegetation (Baldo et al. 2015) and comprehensive overviews of exotic aquatic plants (Tomasella 2013). An additional contribution documenting distribution patterns and increasing pressure from alien species is the alien flora of the region (Buccheri et al. 2019). Over the 20 years studied, 21 specific and infraspecific taxa currently accepted for the region have been described. Of these, 11 belong to the genus *Hieracium*.

Lazio

The knowledge of Lazio regional flora substantially increased. During the last twenty years, over 500 studies have been published, mainly focusing on floristics; moreover, numerous taxonomic studies and phytosociological investigations have been carried out. The studies on flora concern both local areas as well as the whole region. In the first case, some studies have focused on areas well-documented in 2005 (regional scale), such as Rome or Cimini Mountains. On the other hand, some local floristic studies refer to areas with previous average knowledge, such as the Castelli Romani Regional Park. Concerning the flora of the

whole region, two important works were published by Anzalone et al. (2010) and Lucchese (2017–2024). Changes in the state of knowledge regard all the sectors of the region, but the central and southern ones are more investigated nowadays (the Metropolitan City of Rome Capital and the Provinces of Frosinone and Latina), while the Province of Viterbo (north-western of Lazio) is less known and comprises large areas with medium floristic knowledge (such as the Upper Lazio); the Province of Rieti (north-eastern Lazio) is quite well known concerning the mountains, while the knowledge is low in the hilly Sabina sector. Fourteen new taxa (11 species and three subspecies) from Lazio have been described during the last 20 years.

Liguria

Since 2005, no complete floras have been published for any portion of Liguria, only partial and preliminary lists, revealing an overall limited progress in the floristic knowledge of this region. The greatest knowledge increase came from the Wikipantbase #Liguria project (Barberis et al. 2016 onwards) and the Acta Plantarum forum (Longo et al. 2021), which provided access to unpublished field records and GDOR herbarium data. This contribution is mainly based on the work of enthusiasts, retirees, or professionals rather than from true academic research. Two extensive contributions from the SBI (Peccenini et al. 2007, 2010) provided detailed inventories for the eastern Ligurian Apennine and the southern Ligurian Alps. On the other hand, scientific publications have mostly focused on specific taxonomic groups (e.g., Orchidaceae, pteridophytes) or on species of conservation interest or alien species. Key areas of floristic investigation include the coastal zones of Bordighera and Ventimiglia, the Pietra di Finale and Capo Noli sites, the urban area of Genoa and its surrounding hills, as well as the lower Val di Vara, the Magra Valley, and the surroundings of Luni and Sarzana. Only five accepted species and one accepted subspecies were described from Liguria; in all cases, these are species resulting from critical taxonomic revisions of groups whose presence in Liguria was already known.

Lombardia

Floristic knowledge in Lombardia has significantly increased. Most of the region has improved its level of floristic documentation, particularly in the provinces of Bergamo and Brescia (Martini et al. 2012), and Cremona (Bonali et al. 2006; Zanotti 2008, 2010). Similarly, the floristic knowledge of the Pavia province has reached a considerable degree of detail (Ardenghi and Polani 2016). Moreover, the advancement of floristic knowledge in Lombardia have also concerned areas of smaller extent, such as the Regional Park of Montevocchia e Valle del Curone (Villa et al. 2022), Parco Agricolo Sud Milano (Brusa and Rovelli 2010) and Groane Regional Park (Gariboldi et al. 2007) as well as urban areas like the city of Milano (Galasso et al. 2012; Toffolo et al. 2021). Fourteen specific and infraspecific accepted taxa were described for Lombardia between 2005 to 2025.

Marche

Floristic research in Marche has contributed to refining the knowledge of its vascular flora, although these updates have been relatively limited in scope, as most investigations have focused on areas with prior floristic documentation. Studies in protected areas, such as the Montagna di Torricchio (Ballelli et al. 2020) and Monti della Laga (Conti and Bartolucci

2016), have refined species distributions. Similarly, research in the Conero Regional Nature Park (Biondi et al. 2012), the Sentina Regional Nature Reserve (Conti et al. 2007a, b), and the Monti del Furlo (Gubellini and Pinzi 2019) has consolidated existing floristic knowledge rather than revealing extensive novelties. Notable exceptions, however, are the investigations in previously less-explored sectors, particularly the Piano di Colfiorito and the Piano di Popola e Cesi (Serravalle di Chienti, Province of Macerata) (Ballelli et al. 2010a), as well as the broader contribution to the Mount Pennino massif along the Umbria-Marche Apennines (Tardella et al. 2024). Nineteen new species and subspecies have been described, 17 of which belong to *Hieracium*. The majority of these new records resulted from a critical re-evaluation of misidentified specimens rather than from the discovery of new taxa in understudied areas.

Molise

Few studies have been published on the local flora of Molise. Among them, a recent update on the Abruzzo, Lazio and Molise National Park stands out, this remains the best-studied area of the region (Conti and Bartolucci 2022). Several studies, focused mainly in the Alto Molise area (in the municipalities of San Pietro Avellana, Vastogirardi, and Capracotta) and along the Molise coastline, have achieved to expand the mapped areas. In summary, the province of Isernia has been studied more extensively than that of Campobasso. The only two species putatively exclusive to the region, *Viola molisana* Ricceri & Moraldo and *Ophrys molisana* P.Delforge, have been synonymized respectively to *Viola eugeniae* Parl. and *Ophrys sphegodes* Mill., as reported in the Portal to the Flora of Italy (2026).

Piemonte

Between 2005 and 2025, floristic knowledge of Piemonte has expanded substantially thanks to coordinated efforts in data collection, database entry and critical revision of historical sources. Targeted studies have refined the regional floristic framework across several taxonomic and biogeographical components, including Orchidaceae (Isaja et al. 2017), Campanulaceae (Pistarino and D'Andrea 2015), alien invasive flora (Bouvet 2013) and endemic flora (Bertolli et al. 2024). Additional biogeographic insights derive from focused research conducted in the Graian and Cottian Alps (Pistarino et al. 2010), the Lanzo Valleys (Chiariglione 2022) and the Verbano-Cusio-Ossola district (Antonietti 2005). Further studies have focused on twelve smaller areas. Since 2005 (Selvaggi et al. 2005), the annual series “Note floristiche piemontesi” has published more than 1,350 records, including regional novelties and reports of rare/threatened or alien taxa. A collaborative mapping programme in Piedmont gathered over 790,000 georeferenced records by 2021, most from the last two decades (Selvaggi et al. 2022). Overall, floristic knowledge in Piemonte ranges from fairly well known to well known. In total, 21 accepted taxa have been described based on material collected in this region, 15 of which belong to the genus *Hieracium*.

Puglia

Puglia had limited significant changes in its floristic documentation during the analysed period. The level of knowledge remains barely informative for 28% of the territory, particularly in the province of Foggia. Published contributions primarily consisted of studies on coastal belt (e.g. Perrino and Signorile 2009; Perrino et al. 2013), or well-known areas,

such as coastal wetlands (e.g. Basset et al. 2009a, b; Beccarisi et al. 2015; Tomaselli and Sciandrello 2017), and detailed taxonomic revisions of biogeographically noteworthy taxa. In 2011, a field survey was conducted by the floristic working group in the southern sector of the Daunia Mountains (Wagensommer et al. 2014). Eighteen specific and subspecific taxa were published for Puglia during the period 2005–2025. Of these, six belong to the genus *Ophrys*.

Sardegna

There has been significant progress in the floristic knowledge of Sardegna. Although some studies have focused on areas previously investigated (e.g., Limbara and Montarbu di Seui), a large amount of new publications and floristic surveys have been conducted, helping to address existing knowledge gaps—particularly in southern Sardegna (e.g., the floras of Sulcis, Iglesiente and Sarrabus-Gerrei), but also in central (e.g., Gennargentu Massif, the upper Campidano and the Sinis Peninsula) and northern sectors (e.g., the Sassari area). An important contribution was made by the publication of *Flora dell'Isola di Sardegna* by Arrigoni (2006–2015), which represents a comprehensive synthesis of the island's vascular flora. Notably, the contribution of numerous studies focusing on distinct species, genera, or families, have encompassed the entire regional territory. Furthermore, in the last two decades, 51 new endemic taxa have been described for Sardegna.

Sicilia

Progress in floristic research in Sicilia has been limited. Most published studies have focused on areas already well-documented in 2005, with only a few exceptions. These include the municipal area of Misiliscemi and the Pantani di Anguillara in western Sicilia, the Pizzo Cane, Pizzo Trigna and Rocca di Mazzamuto reserve along the Tyrrhenian coast, the Pantalica, Valle dell'Anapo e Torrente Cava Grande reserve, and the Bosco di Santo Pietro in the southeast. A SBI excursion took place in 2012 in the Sicani mountains, central Sicilia (Domina et al. 2015); a subsequent excursion was organized in 2022 on the islands of Lipari and Panarea (Barone et al. 2023). Two catalogues covering the entire flora of Sicilia were published by Giardina et al. (2007) and Cambria and Di Gregorio (2025). Although 69 new species and subspecies have been described, most resulted from critical re-evaluation of previously known plants under different names rather than from the discovery of new taxa in under-studied areas.

Toscana

Floristic research in Tuscany has greatly advanced in the last two decades, notably with the "Flora Analitica della Toscana" (Arrigoni 2016–2021). Albeit some studies focused on areas already well-documented in 2005 (e.g., Apuan Alps, Monte Pisano, Cerbaie, Elba Island), many others explored previously under-documented zones, producing checklists for the provinces of Arezzo, Livorno, Lucca, Pisa, and Prato and for the Tuscan Maremma area (corresponding to the continental portion of the Grosseto province). Newly studied areas include thirteen pre-Apennines sites; three in Valdarno; one in the Tuscan Archipelago; and ten in central-southern Tuscany. Since 2009 (Peruzzi et al. 2010), the annual series "Contributi per una flora vascolare di Toscana" has published more than 1,200 records, including regional/provincial novelties and reports of rare/threatened or alien taxa.

Two SBI excursions were conducted in the Pisan hills (Peruzzi et al. 2011) and Mugello Romagnolo (Roma-Marzio et al. 2020). Only parts of Massa-Carrara (Lunigiana), Pistoia, Firenze, and Siena provinces still remain poorly known. Among the currently accepted taxa of the Tuscan vascular flora, 53 species and subspecies have been newly described for the region in the last twenty years, including 17 in the taxonomically critical genus *Hieracium* mostly resulting from taxonomic re-evaluations rather than discoveries in poorly explored areas.

Trentino-Alto Adige

Trentino-Alto Adige confirms its position as one of the Italian regions with the most comprehensive floristic knowledge and the highest rate of floristic records increase during the twenty-years under consideration. The number of recorded data increased from 897,000 in 2005 to 2,191,000 in 2025: mostly as a result of field collections carried out in two separate floristic mapping projects, both of which are still ongoing, one for the province of Bolzano, one for the province of Trento. Reference publications are the “Katalog der Gefäßpflanzen Südtirols” (Wilhelm et al. 2006), continuously updated in the journal *Gredleriana*, and “Flora del Trentino” (Prosser et al. 2019), updated with contributions in “Annali del Museo Civico di Rovereto” and “Italian Botanist”. There are almost 300 additional publications that focus on systematically and spatially restricted areas. In the last two decades, 12 taxa with locus classicus in Trentino-Alto Adige have been published; 10 of these appear to be endemic to the region.

Umbria

The floristic knowledge of Umbria is limited and registered little progress. A large portion of the region possesses only a general level of information. Significant improvements have been recorded in specific areas, notably the provinces of Terni, the Monte Coscerno and Monte Civitelle massifs, and the Valnerina valley, which are now classified as having an intermediate level of knowledge. A bibliographic catalogue of the flora of the Sibillini Mountains has been published, summarising all the research conducted in the area (Ballelli et al. 2010b). The flora of the Altipiani di Colfiorito, an area straddling the border with Marche, has been published (Ballelli et al. 2010a). Furthermore, Monte Pennino was surveyed during a 2021 field trip organized by the SBI, contributing with new data (Tardella et al. 2024). Only *Hieracium cochleariforme* Gottschl. has been published in the last twenty years on material collected in Umbria.

Valle d'Aosta

Special emphasis has been placed on the least explored quadrants of Valle d'Aosta. Data from agricultural environments such as hay meadows, vineyards, and apple orchards has also been recorded. Research on alien species (often overlooked in the past but expanding in the region) has been encouraged. Extensive collections of critical genera verified by specialists, such as *Hieracium*, *Pilosella*, *Alchemilla*, *Rosa*, and *Festuca*, are available. Research based on bibliographic sources, herbarium specimens, and field surveys has confirmed the presence of many historically recorded species. The “Flora vascolare della Valle d'Aosta – Repertorio commentato e stato delle conoscenze” (Bovio 2014) summarised the floristic knowledge of the region. It was followed in 2018 by the website “Vascular Flora

of the Aosta Valle" (<http://floravda.it/>) whose cartographic section has been active since 2019. To date, it displays regional distribution maps for 750 taxa using the CFCE grid, which represents over one-third of all known taxa. Compared to the 2005 map, the update expands the "well-known" areas, particularly in a large part of the Gran Paradiso National Park, the Mont Avic Regional Park, the central valley of the Aosta Valley, and a specific valley (the Vallone della Legna) in the Champorcher Valley. Five species new to science were described from Valle d'Aosta.

Veneto

Veneto is one of the Italian regions that has experienced the most significant growth in floristic knowledge. Floristic explorations were conducted across its provinces, resulting in the publication of a regional flora (Argenti et al. 2019), provincial floras, and the flora-cartographic atlas of the province of Vicenza (Scortegagna et al. 2016). This has led to a general improvement in floristic knowledge across the region, with the sole exception of the Treviso plain. Several significant georeferenced mapping projects have been underway in the Verona, Padova, and Belluno areas for a number of years, and will result in provincial-level atlases being produced in the near future. Excluding new combinations and new statuses, 14 taxa new to science have their type locality in Veneto, primarily in mountainous or hilly areas.

Città del Vaticano and Repubblica di San Marino

The microstates of Città del Vaticano and Repubblica di San Marino are both geographically enclaved within Italian territory and have historically been investigated by Italian botanists. As a result, their floristic knowledge is closely intertwined with that of the surrounding Italian regions. For the Repubblica di San Marino, an updated floristic inventory was published (Alessandrini et al. 2022), providing a comprehensive overview of its plant diversity. Regarding the Città del Vaticano State, its territory is not treated separately but is included within the broader floristic studies conducted for the city of Roma, in which it is geographically embedded. Consequently, floristic data for the Vatican are accounted for within the contributions focusing on the city of Roma (e.g. Celesti-Grapow et al. 2013), reflecting the strong biogeographical and urban continuity between these two entities.

Discussion

The 75% of published articles (2,931) study small areas included in a single region, only 2.43% cover a broad national scale. This structural weakness stems from the prevalent model of individual or small-group research, which naturally limits geographical scope. Increased collaboration is indeed essential to produce wider-scale studies (Peruzzi 2018).

An analysis of the published names reveals two distinct patterns. First, the 147 *Hieracium* names are almost exclusively the work of a single researcher, Günther Gottschlich, who collaborated with local collectors. Second, among orchids—a group heavily studied by amateurs—the rate of synonymy is strikingly high, with over 45% (37 out of 81) of described names now considered synonyms (Bartolucci et al. 2024). This contrast suggests that a synergic collaboration between professional and amateur taxonomists is key to producing more reliable and durable taxonomic hypotheses.

Even though much of the fieldwork conducted by the working group for Floristics, Systematics and Evolution of the Italian Botanical Society was concentrated in southern Italy, nevertheless these regions showed small improvements in floristic documentation. This persistent disparity highlights significant inequalities in research investment and botanical exploration across Italy. The accelerated knowledge accumulation seen in northern Italy underscores the impact of targeted scientific initiatives, carried out by various institutions, while the stagnation in the south points to a continued need for focused floristic research to achieve a nationally comprehensive understanding of the Italian plant diversity. Virtually unknown areas (Level 1) still occur in central-western Abruzzo, Campania, Puglia, Basilicata, and Calabria. In addition, large areas with generic knowledge (Level 2) are concentrated in Liguria, Umbria, southern Abruzzo, northern Campania, northern Puglia, central Basilicata, central Calabria and central Sicilia. In many cases, these areas are of limited floristic interest due to their environmental homogeneity and intensive agricultural use. In any case, the persistence of areas in the lower knowledge categories, even in 2025, highlights the need for continued targeted field studies in under-documented regions to achieve a more spatially uniform and comprehensive understanding of the Italian flora.

Similarly to the economic assessment of ecosystem services, which considers the diverse benefits provided by ecosystems, basic research fields such as floristics should be evaluated according to the contributions they offer to other disciplines. Even a small floristic contribution is not merely a local exercise but an essential component of global biodiversity knowledge, supporting taxonomic, biogeographic, evolutionary, and conservation studies (Peruzzi 2018 and literature cited therein). In addition to its scientific value, floristic knowledge is an essential source of data for protected area management bodies to comply with mandatory actions, e.g., monitoring activities under art. 11 or the Reporting under art. 17 of the Habitats Directive 92/43/EEC. There is a need for greater recognition of floristic studies from the scientific community, and from citizens and public administrators, to ensure foundational research is adequately supported (Wagensommer 2023). Floristic studies are long, laborious undertakings that provide the essential baseline data for conservation and land management; therefore, they require shared financial investment from public administrations for informed governance, private entities, and park management bodies to directly link scientific knowledge with on-the-ground protection. Without a rigorous knowledge baseline, advanced studies risk being erected on unstable grounds, fundamentally compromising the integrity, reproducibility, and long-term value of the entire scientific enterprise.

Conclusion

Floristic research in Italy suffers from a geographic imbalance, with northern regions well-documented while the southern ones remain critically understudied. Small-scale individual studies dominate, while national analyses are limited. Effective collaboration between professional and amateur taxonomists might produce more reliable results. Targeted fieldwork and greater investment are essential to build the comprehensive baseline knowledge needed for conservation and scientific progress.

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Data availability All data supporting the findings of this study are available within the paper and its Supplementary Information.

Declarations

Competing interests The authors declare no competing interests.

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References

- Adorni M, Petraglia A, Alessandrini A, Peruzzi L, Bedini G (eds) (2020 onwards) Wikipantbase #Emilia-Romagna [Database online]. <https://bot.biologia.unipi.it/wpb/emilia-romagna/index>
- Alessandrini A (2024) La Flora della pianura bolognese: prime considerazioni sulla sua consistenza e distribuzione, con precisazioni su alcune entità notevoli. *Quaderni Del Museo Civico di Storia Naturale di Ferrara* 12:39–46
- Alessandrini A, Delfini L, Ferrari P, Fiandri F, Gualmini M, Lodesani U, Santini C (2010) Flora del Modenese. Censimento Analisi Tutela. Provincia di Modena, Istituto Beni culturali Regione Emilia–Romagna Università degli studi di Modena e Reggio Emilia, pp 1–415
- Alessandrini A, Bagli L, Bruschi T, Gubellini L, Hofmann N, Montanari S, Polverelli L, Santi F, Semprini F (2022) Flora vascolare della Repubblica di San Marino (lista aggiornata e annotata). In: *Quaderno di Studi e Notizie di Storia Naturale della Romagna*, vol 54, Suppl.. Società per gli Studi Naturalistici della Romagna, pp 5–116
- Antonietti A (2005) Flora del Verbano Cusio Ossola. Provincia del Verbano Cusio Ossola, Verbania
- Anzalone B, Iberite M, Lattanzi E (2010) La Flora vascolare del Lazio. *Inform Bot Ital* 42(1):187–317
- Ardenghi NMG, Polani F (2016) La Flora della provincia di Pavia (Lombardia, Italia settentrionale). 1. L'Oltrepò Pavese. *Natura*, atti Società italiana di scienze naturali e Museo civico di storia naturale di Milano 3(2):51–79
- Argenti C, Masin R, Pellegrini B, Perazza G, Prosser F, Scortegagna S, Tasinazzo S (2019) Flora del Veneto dalle Dolomiti alla laguna veneziana, vol 1–2. Cierre Edizioni
- Arrigoni PV (2006–2015) Flora dell'Isola di Sardegna, vol 1–6. Carlo Delfino Editore, Cagliari
- Arrigoni PV (2016–2021) Flora analitica della Toscana, vol 1–8. Polistampa, Firenze
- Bagella S, Filigheddu R, Peruzzi L, Bedini G (eds) (2015 onwards) Wikipantbase #Sardegna [Database online]. <http://bot.biologia.unipi.it/wpb/sardegna>. Accessed 14 Mar 2026
- Baldo S, Tomasella M, Bertoli M, Pizzul E (2015) Flora e vegetazione acquatica nella bonifica del Basso Isontino (Friuli Venezia Giulia, Nord-Est Italia): analisi della qualità e dello stato di conservazione. *Gortania* 36(2014):5–14
- Ballelli S, Tardella FM, Orsomando E, Catorci A (2010a) The vascular flora of the “Altipiani di Colfiorito” (Umbria–Marches Apennines, Central Italy). *Webbia* 65(2):241–290. <https://doi.org/10.1080/00837792.2010.10670875>
- Ballelli S, Cesaretti S, Gatti R, Montenegro BF, Vitanzi A, Catorci A (2010b) Catalogo bibliografico della flora vascolare dei Monti Sibillini (Appennino centrale - Italia). *Braun-Blanquetia* 47:1–127
- Ballelli S, Pennesi R, Campetella G, Cervellini M, Chelli S, Cianfaglione K, Lucarini D, Piermarteri K, Tardella FM, Catorci A, Canullo R (2020) An updated checklist of the vascular flora of Montagna di

- Torricchio State Nature Reserve (Marche, Italy). *Italian Botanist* 9:87–100. <https://doi.org/10.3897/italianbotanist.9.50032>
- Barberis G, Dagnino D, Longo D, Peruzzi L, Bedini G, Peccenini S (eds) (2016 onwards) *Wikipiantbase #Liguria* [Database online]. <http://bot.biologia.unipi.it/wpb/liguria/>. Accessed 14 Mar 2026
- Barone G, Bajona E, Bartolucci F, Cancellieri L, Caruso G, Conti F, Domina G, Fascetti S, Franzoni J, Laface VLA, Pinzani L, Rosati L, Scoppola A, Stinca A, Tilia A, Crisafulli A (2023) Contribution to the floristic knowledge of Lipari and Panarea Islands (Sicilia, Italy). *Italian Botanist* 16:59–71
- Bartolucci F, Peruzzi L, Galasso G, Alessandrini A, Ardenghi NMG, Bacchetta G, Banfi E, Barberis G, Bernardo L, Bouvet D, Bovio M, Calvia G, Castello M, Cecchi L, Del Guacchio E, Domina G, Fascetti S, Gallo L, Gottschlich G, Guarino R, Gubellini L, Hofmann N, Iberite M, Jiménez-Mejías P, Longo D, Marchetti D, Martini F, Masin RR, Peccenini S, Prosser F, Roma-Marzio F, Rosati L, Santangelo A, Scoppola A, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhalm T, Conti F (2024) A second update to the checklist of the vascular flora native to Italy. *Plant Biosystems* 158(2):219–296. <https://doi.org/10.1080/11263504.2024.2320126>
- Basset A, Marchiori S, Sangiorgio F, Medagli P, Orfanidis S (2009a) The Lake Alimini Grande. Flora and Vegetation of the Italian Transitional Water System. In: Cecere E, Petrocelli A, Izzo G, Sfriso A (eds) *Flora and vegetation of ital transitional water systems. Corila and Lagunet, Venezia*, pp 189–194
- Basset A, Marchiori S, Sangiorgio F, Medagli P, Orfanidis S (2009b) The Lake of Cesine. Flora and Vegetation of the Italian Transitional Water System. In: Cecere E, Petrocelli A, Izzo G, Sfriso A (eds) *Flora and vegetation of ital transitional water systems. Corila and Lagunet, Venezia*, pp 183–188
- Beccarisi L, Marinò F, Medagli P, Zizzi T, Minonne F (2015) Inventario della flora vascolare della Riserva Naturale di Torre Guaceto (Puglia). *Thalassia Salentina* 37:11–56. <https://doi.org/10.1285/i15910725v37p11B440:F440>
- Bedini G, Pierini B, Roma-Marzio F, Caparelli KF, Bonari G, Dolci D, Gestri G, D'Antraccoli M, Peruzzi L (2016) *Wikipiantbase #Toscana*, breaking the dormancy of floristic data. *Plant Biosyst* 150(3):601–610. <https://doi.org/10.1080/11263504.2015.1057266>
- Bernardo L, Bartolucci F, Cancellieri L, Costalonga S, Galasso G, Galesi R, Gargano D, Iberite M, Iocchi M, Lattanzi E, Lavezzo P, Magrini S, Peccenini S, Sciandrello S, Scoppola A, Signorino G, Tilia A, Spampinato G (2012) Contributo alla conoscenza della Calabria: resoconto dell'escursione del Gruppo di Floristica (SBI) nel 2008 nella Presila Catanzarese. *Inform Bot Ital* 44(1):125–151
- Bertolli A (ed), Adorni M, Alessandrini A, Andreatta S, Ardenghi NMG, Argenti C, Bona E, Bovio M, Dellavedova R, Gallino B, Kleih M, Mainetti A, Martini F, Masin R, Peccenini S, Prosser F, Scortegagna S, Selvaggi A, Tomasi G, Wilhalm T (2024) *Flora endemica nel Nord Italia*. Athesia, Bolzano
- Bonali F, D'Auria G, Ferrari V, Giordana F (2006) *Atlante corologico delle piante vascolari della provincia di Cremona. Centro Ricerche Ambientali, Monografie di Pianura*
- Biondi E, Gubellini L, Pinzi M, Casavecchia S (2012) The vascular flora of Conero Regional Nature Park (Marche, Central Italy). *Flora Mediterr* 22:67–167. <https://doi.org/10.7320/FIMedit22.067>
- Boscutti F, Martini F, Simonetti W, Watschinger M (2009) Flora vascolare spontanea di Cividale del Friuli (NE Italia). *Gortania* 31:37–52
- Bouvet D (ed) (2013) *Piante esotiche invasive in Piemonte: riconoscimento, distribuzione, impatti*. Museo Regionale di Scienze Naturali di Torino, Torino
- Bovio M (2014) *Flora vascolare della Valle d'Aosta. Repertorio commentato e stato delle conoscenze*. Testolin, Sarre (AO)
- Bracchi G, Romani E (2010) Checklist aggiornata e commentata della flora vascolare della Provincia di Piacenza. Società Piacentina di Scienza Naturali e Museo Civico di Storia Naturale di Piacenza, Piacenza, pp 1–395
- Bruna A (2021) *La Flora del Monte Jouv. Opera postuma a cura di P. Siega Vignut e R. Mazzoli Chiasais*. Graphistudio, Arba (Pordenone)
- Brusa G, Rovelli P (2010) *Atlante della flora del Parco Agricolo Sud Milano. Provincia di Milano, Milano*
- Buccheri M, Boscutti F, Pellegrini E, Martini F (2019) *La flora aliena nel Friuli Venezia Giulia*. *Gortania* 40(2018):7–78
- Buccomino G (2019) Checklist preliminare della flora vascolare del Parco Regionale di Gallipoli Cognato e delle Piccole Dolomiti Lucane (Basilicata). *Delpinoa* 60–61:5–37
- Cambria S, Di Gregorio G (2025) *Flora di Sicilia e delle isole circumsiciliane*. Edizioni Danaus, Palermo
- Celesti-Grapow L, Capotorti G, Del Vico E, Lattanzi E, Tilia A, Blasi C (2013) The vascular flora of Rome. *Plant Biosystems* 147(4):1059–1087. <https://doi.org/10.1080/11263504.2013.862315>
- Chiariglione A (2022) *Flora delle valli di Lanzo. Cierre edizioni, Sommacampagna (VR)*
- Conti F, Bartolucci F (2015) *The Vascular Flora of National Park of Abruzzo, Lazio and Molise (Central Italy)*. Springer, London. <https://doi.org/10.1007/978-3-319-09701-5>

- Conti F, Bartolucci F (2016) The vascular flora of Gran Sasso and Monti della Laga National Park (Central Italy). *Phytotaxa* 256(1):1–119
- Conti F, Bartolucci F (2022) La Flora vascolare del Parco Nazionale d'Abruzzo, Lazio e Molise. Edizioni del Parco / FastEdit, Acquaviva Picena
- Conti F, Angiolini C, Bernardo L, Costalonga S, Di Pietro R, Fascetti S, Giardina G, Giovi E, Gubellini L, Lattanzi E, Lavezzo P, Peccenini S, Salerno G, Scoppola A, Tinti D, Turrisi R (2006) Contributo alla conoscenza floristica della Basilicata: resoconto dell'escursione del gruppo di floristica (S.B.I.) nel 2003. *Inform Bot Ital* 38(2):383–409
- Conti F, Bracchetti L, Gubellini L (2007a) Flora vascolare della Riserva Naturale Regionale Sentina (Marche). *Delpinoa* 49:89–110
- Conti F, Bartolucci F, Tinti D, Bernardo L, Costalonga S, Lattanzi E, Lavezzo P, Salerno G, Fascetti S, Iocchi M, Mele C, Tardella FM (2007b) Secondo contributo alla conoscenza floristica della Basilicata: resoconto dell'escursione del Gruppo di Floristica (S.B.I.) nel 2004. *Inform Bot Ital* 31(1):11–33
- Conti F, Ciaschetti G, Di Martino L, Bartolucci F (2019) An annotated checklist of the vascular flora of Majella National Park (Central Italy). *Phytotaxa* 412(1):1–90
- Corazzi G (2008) Contributo alla conoscenza della flora del Sannio: il complesso montuoso del Camposauro (Benevento, Campania). *Webbia* 63(2):215–250. <https://doi.org/10.1080/00837792.2008.10670843>
- Crisafulli A, Siviglia M, Spampinato G (2006) Note floristiche per la Serre Calabre (Calabria centro-meridionale). *Inform Bot Ital* 38(2):363–372
- Crisi V, Katinas L, Apodaca MJ, Hoch PJ (2020) The end of botany. *Trends Plant Sci* 25(12):1173–1176. <https://doi.org/10.1016/j.tplants.2020.09.012>
- Croce A, La Valva V, Motti R, Nazzaro R, Strumia S (2008) La flora vascolare del Vulcano di Roccamonfina (Campania, Italia). *Webbia* 63(2):251–291. <https://doi.org/10.1080/00837792.2008.10670844>
- Croce A (2015) Vascular flora of eight water reservoir areas in southern Italy. *Check List* 11(2):1–23. <https://doi.org/10.1556/011.2.1593>
- D'Antraccoli M, Bedini G, Peruzzi L (2022) Next generation floristics: a workflow to integrate novel methods in traditional floristic research. *Plant Biosyst* 156(2):594–597. <https://doi.org/10.1080/11263504.2022.2056650>
- Del Guacchio E, La Valva V (2017) The non-native vascular flora of Campania (southern Italy). *Plant Biosystems* 152(4):767–779. <https://doi.org/10.1080/11263504.2017.1338626>
- Di Marco F, Bernardo L, Peruzzi L (2012) Contribution to the vascular flora of Papisidero (north-western Calabria, Italy). *Atti della Società Toscana di Scienze Naturali, Memorie, Ser. B* 119:33–50
- Domina G (2024) Stato della Botanica sistematica in Italia. *Notiziario Soc Bot Ital* 8:11–12
- Domina G, Marino P, Castellano G, Amato F, Cambria S, Cancellieri L, Crisafulli A, Cristaudo A, Faraoni F, Galesi R, Guarino R, Lattanzi E, Lavezzo P, Longo D, Maiorca G, Peccenini S, Perrino EV, Salerno G, Scolastri A, Soldano A, Stinca A, Wagensommer RP, Xibilia L, Raimondo FM (2015) Contributo alla conoscenza floristica dei monti Sicani (Sicilia): resoconto dell'escursione del Gruppo di Floristica (S.B.I.) nel 2012. *Inform Bot Ital* 47(2):155–177
- Domina G, Peruzzi L, Bedini G (eds) (2016 onwards) *Wikipantbase #Sicilia* [Database online] <http://bot.biologia.unipi.it/wpb/sicilia>. Accessed 14 Mar 2026
- Domina G, Venturella G, Gargano ML (2018) Synthetic cartography for mapping biodiversity in the Mediterranean region: Sicily as a case study. *PhytoKeys* 109:77–92. <https://doi.org/10.3897/phytokeys.109.28297>
- Domina G, Abeli T, Alessandrini A, Angiolini C, Argenti C, Astuti G, Bacchetta G, Bagella S, Ballelli S, Banfi E, Barberis G, Barone G, Bernardo L, Bertolli A, Bianchi E, Bonari G, Bouvet D, Bovio M, Briozzo I, Brullo C, Brullo S, Calvia G, Caria MC, Caputo P, Caruso G, Casazza G, Cecchi L, Cibeï C, Cogoni D, Conti F, Crisafulli A, Croce A, Dagnino D, Del Guacchio E, Gristina ED, Marzio PD, Fanfarillo E, Farris E, Fascetti S, Fenu G, Ferrando U, Ferretti G, Fiaschi T, Fortini P, Fois M, Franzoni J, Galasso G, Galesi R, Ganz C, Gargano D, Giacò A, Gianguzzi L, Giardini M, Galdo GGD, Guarino R, Gubellini L, Hofmann N, Iamónico D, Iberite M, Laface VLA, Lallai A, Lastrucci L, Lavezzo P, Lazzaro L, Longo D, Lucchese F, Maiorca G, Manca M, Marchetti D, Marsili S, Martini F, Mascia F, Medagli P, Mondello F, Montagnani C, Mugnai M, Musarella CM, Nicoletta G, Orsenigo S, Passalacqua NG, Peccenini S, Pennesi R, Peruzzi L, Picone RM, Pinzani L, Podda L, Prosser F, Rieviccio G, Roma-Marzio F, Rosati L, Salerno G, Santangelo A, Sciandrello S, Selvaggi A, Selvi F, Spampinato G, Stinca A, Tardella FM, Tavilla G, Tilia A, Tondi G, Tognon G, Urbani M, Villani M, Wilhelm T, Zappa E, Bartolucci F (2025) Refining the

- inventory of the vascular flora of Italy: unconfirmed, doubtful, excluded or extinct taxa. *Phytotaxa* 723(1):1–137. <https://doi.org/10.11646/phytotaxa.723.1.1>
- Environmental Systems Research Institute (Esri) (2016) ArcGIS Desktop (Version 10.5) [Computer software]
- Filipello S (ed) (1978) Carta delle conoscenze floristiche d'Italia. *Inform Bot Ital* 9(3):281–284
- Fois M, Marcenò C, Franklin SB (2023) Editorial: Floristic and vegetation studies in the era of big data: challenges, trends and applications. *Front Ecol Evol* 11:1220026. <https://doi.org/10.3389/fevo.2023.1220026>
- Galasso G, Gentili R, Gilardelli F, Sgorbati S, Cappelli CI, Banfi E (2012) Flora delle mura del castello sforzesco di Milano (Lombardia, Italia). *Dati Preliminari Pagine Botaniche* 35(2011):3–25
- Gariboldi L, Banfi E, Galasso G (2007) Primo contributo alla conoscenza della flora del Parco regionale delle Groane (Lombardia, NW di Milano). *Pianura* 21:65–135
- Gerstner K, Moreno-Mateos D, Gurevitch J, Beckmann M, Kambach S, Jones HP, Seppelt R (2017) Will your paper be used in a meta-analysis? Make the reach of your research broader and longer lasting. *Methods Ecol Evol* 8:777–784. <https://doi.org/10.1111/2041-210X.12758>
- Giardina G, Raimondo FM, Spadaro V (2007) A catalogue of plants growing in Sicily. *Boccone* 20:1–582
- Gory P (1982) *La Flora della Valle d'Aosta*. Musumeci Editore, Saint-Christophe
- Gubellini L, Pinzi M (2019) *Flora vascolare dei Monti del Furlo*. I Quaderni del Furlo, 4. Leardini Guerrino, Macerata Feltri
- Isaja A, Dotti L, Bombonati D (2017) *Orchidee del Piemonte*. Atlante e guida al riconoscimento. Edizioni Boreali, Camino (AL)
- Istituto Geografico Militare (1940–today) *Carta topografica d'Italia*, scala 1:25.000. Istituto Geografico Militare, Firenze
- Longo D, Baglivo A, Cibeì C, Dose G, Giordana F, Magni C, Salvai G, Servodio S, Tomasi D, Zepigi M, Nicoella G (2021) *Acta Plantarum*, more than a forum: a new national floristic distribution database completes the numerous online IPFI facilities. *Biogeographia* 36:s004. <https://doi.org/10.21426/B636049352>
- Lucchese F (2017–2024) *Atlante della flora vascolare del Lazio*, vol 1–4. DigitaliaLab, Roma
- Maiorca G, Puntillo D (2015) Contributi alla conoscenza floristica della Catena Costiera (Calabria). 1. La Forra della Fiumara dei Bagni. *Inform Bot Ital* 47(2):187–204
- Maiorca G, Crisafulli A, Cameriere P, Spampinato G (2007) Flora vascolare e vegetazione della Riserva Naturale Regionale “Foce del Fiume Crati” (Calabria, Italia meridionale). *Webbia* 62(2):121–174
- Martini F (2005) *Atlante della flora vascolare di Udine*. Museo Friulano di Storia Naturale – Comune di Udine, pubbl. n.46. Arti Grafiche Friulane, Tavagnacco
- Martini F (2010) *Flora vascolare spontanea di Trieste*. Ed. LINT, Trieste
- Montanari S (ed) (2016) Verso un Atlante Floristico della Romagna. Atti della giornata di studio e incontro per la costituzione di un progetto comune per un Atlante Corologico della Romagna Zangheriana. In: *Quaderni di Studi e Notizie di Storia Naturale della Romagna*, vol 43. Società per gli Studi Naturalistici della Romagna, pp 1–37
- Martini F, Pavan R (2008) *La flora vascolare spontanea di Pordenone*. Ed. Comune di Pordenone, Pordenone
- Martini F, Filippini L (2012) Uno sguardo di sintesi sulle flore vascolari urbane di alcune città del Friuli Venezia Giulia (NE Italia). *Gortania* 33(2011):21–30
- Martini F (ed), Bertani G, Boscutti F, Bruna A, Danelutto A, Pavan R, Peruzovich C (2023) *Flora del Friuli Venezia Giulia: repertorio critico diacronico e atlante corologico*. Forum Edizioni, Udine
- Martini F, Bona E, Danieli S, Fantini G, Federici G, Fenaroli F, Mangili L (2012) *Flora vascolare della Lombardia centro-orientale*, vol 1-2. LINT Editoriale, Trieste
- Motti R, Salerno G (2006) *La flora del complesso dei monti Vesole, Soprano, Sottano e Chianello (appennino Campano, Salerno)*. *Webbia* 61(2):325–357. <https://doi.org/10.1080/00837792.2006.10670809>
- National Geospatial-Intelligence Agency (2025) *GEOnet Names Server (GNS)*. Retrieved December 12, 2025, from <https://geonames.nga.mil/gns/html/>
- Nazzaro R, Menale B, La Valva V (2007) Check-list della flora del Monte Taburno (Campania). *Delpinoa* 47:37–55
- Peccenini S, Bartolucci F, Bernardo L, Cancellieri L, Conti F, Costalonga S, Del Vico E, De Mattei R, Di Turi A, Iocchi M, Lattanzi E, Lavezzo P, Lupino F, Magrini S, Salerno G, Scoppola A, Tilia A, Tinti D (2007) Contributo alla conoscenza floristica della Liguria: resoconto dell'escursione del Gruppo di Floristica nel 2005 sull'Appennino Ligure orientale. *Inform Bot Ital* 39(2):281–306
- Peccenini S, Barberis G, Bartolucci F, Cancellieri L, Conti F, Costalonga S, Dente F, Iocchi M, Lattanzi E, Lavezzo P, Lupino F, Magrini S, Salerno G, Tardella FM, Terzo V, Tinti D, Zappa E (2010)

- Contributo alla conoscenza floristica della Liguria: resoconto dell'escursione del Gruppo di Floristica nel 2006 sulle Alpi Liguri meridionali. *Inform Bot Ital* 42(1):3–25
- Perrino EV, Signorile G (2009) Costa di Monopoli (Puglia): check-list della flora vascolare. *Inform Bot Ital* 41(2):263–279
- Perrino EV, Signorile G, Marvulli M (2013) A first checklist of the vascular flora of the Polignano a Mare coast (Apulia, southern Italy). *Nat Croat* 22(2):295–318
- Peruzzi L (2018) Floristic inventories and collaborative approaches: a new era for checklists and floras? *Plant Biosyst* 152(2):177–178. <https://doi.org/10.1080/11263504.2017.1419997>
- Peruzzi L (2025) Some claim for the end of Botany... but what is Botany today? *Ital Bot* 19:15–20. <https://doi.org/10.3897/italianbotanist.19.145382>
- Peruzzi L (2026) The vascular flora of Tarsia (Calabria, southern Italy). *Ital Bot* 21:35–46. <https://doi.org/10.3897/italianbotanist.21.184523>
- Peruzzi L, Bedini G (eds) (2013 onwards) Wikiplantbase #Toscana [Database online]. <http://bot.biologia.unipi.it/wpb/toscana/index.html>. Accessed 14 Mar 2026
- Peruzzi L, Viciani D, Bedini G (eds) (2010) Contributi per una flora vascolare di Toscana. I (1–85). *Atti della Società Toscana di Scienze Naturali, Memorie, Serie B* 116(2009):33–44
- Peruzzi L, Barbo M, Bartolucci F, Bovio M, Carta A, Ciccarelli D, Conti F, Costalonga S, Di Pietro R, Galasso G, Gestri G, Lattanzi E, Lavezzo P, Marsili S, Peccenini S, Pierini B, Tardella FM, Terzo V, Turrisi RE, Bedini G (2011) Contributo alla conoscenza floristica delle Colline Pisane: resoconto dell'escursione del Gruppo di Floristica (S.B.I.) nel 2009. *Inform Bot Ital* 43(1):3–27
- Peruzzi L, Bagella S, Filigheddu R, Pierini B, Sini M, Roma-Marzio F, Caparelli KF, Bonari G, Gestri G, Dolci D, Consagra A, Sassu P, Caria MC, Rivieccio G, Marrosu M, D'Antraccoli M, Pacifico G, Piu V, Bedini G (2017) The Wikiplantbase project: the role of amateur botanists in building up large online floristic databases. *Flora Mediterr* 27:117–130. <https://doi.org/10.7320/FIMedit27.117>
- Peruzzi L, Roma-Marzio F, Pinzani L, Bedini G (eds) (2019 onwards) Wikiplantbase #Italia [Database online]. <http://bot.biologia.unipi.it/wpb/italia>. Accessed 14 Mar 2026
- Pistarino A, D'Andrea S (2015) Campanulaceae: dati distributivi per l'Italia nord-occidentale. *Boll Mus Regionale Sci Nat Torino* 31(1–2):5–569
- Pistarino A, Forneris G, Bovio M, Matteucci E, Pandolfo G, Dal Vesco G (2010) L'Herbarium Alpium occidentalium di Bruno Peyronel e Giovanna Dal Vesco: un contributo alla conoscenza della flora valdostana e piemontese. *Museo Regionale di Scienze Naturali della Valle d'Aosta, Saint-Pierre (Aosta)*
- Portal to the Flora of Italy (2026) Retrieved January 1, 2026, from <http://dryades.units.it/floritaly>
- Prosser F, Bertolli A, Festi F, Perazza G (2019) Flora del Trentino. Fondazione Museo Civico di Rovereto, Rovereto
- Roma-Marzio F, D'Antraccoli M, Angeloni D, Bartolucci F, Bernardo L, Cancellieri L, Caruso G, Conti F, Dolci D, Gestri G, Gubellini L, Hofmann N, Laface VLA, Lattanzi E, Lavezzo P, Maiorca G, Montepaone G, Musarella CM, Noto D, Perrino EV, Proietti E, Masin RR, Scoppola A, Stinca A, Tiburtini M, Tilia A, Peruzzi L (2020) Contribution to the floristic knowledge of Sillaro, Santerno, and Senio high valleys (Toscana, Italy). *Ital Bot* 10:101–111. <https://doi.org/10.3897/italianbotanist.10.60118>
- Rosati L, Romano VA, Bartolucci F, Bernardo L, Bouvet D, Cancellieri L, Caruso C, Conti F, Faraoni F, Banfi E, Galasso G, Lattanzi E, Lavezzo P, Peccenini S, Perrino EV, Salerno G, Sciandra A, Soldano A, Stinca A, Totta C, Fascetti S (2017) Contribution to the floristic knowledge of the Maddalena Mountains (Basilicata and Campania, southern Italy). *Ital Bot* 3:73–82. <https://doi.org/10.3897/italianbotanist.3.12519>
- Santangelo A, Bernardo L, Bertani G, Bronzo E, Cancellieri L, Costalonga S, Croce A, Del Vico E, Fascetti S, Fortini P, Gangale C, Gubellini L, Iocchi M, Lapenna MR, Lattanzi E, Lavezzo P, Lupino F, Magrini S, Marino R, Paura B, Peccenini S, Peruzzi L, Rosati L, Salerno G, Scoppola A, Strumia A, Trdella FM, Uzunov D (2010) Contributo alla conoscenza floristica del Massiccio del Matese: resoconto dell'escursione del Gruppo di Floristica (S.B.I.) nel 2007. *Inform Bot Ital* 42(1):109–143
- Scoppola A (2012) Stato delle conoscenze floristiche in Italia. In: Taffetani F (ed) *Herbaria. Il grande libro degli erbari italiani*. Nardini Editore, Firenze, pp 634–638
- Scoppola A, Blasi C (eds) (2005) *Stato delle conoscenze Floristiche d'Italia*. Palombi Editori, Roma
- Scortegagna S, Tomasi D, Casarotto N, Masin R, Dal Lago A (2016) *Atlante floristico della provincia di Vicenza*. Comune di Vicenza, Musei Civici, Vicenza
- Selvaggi A, Soldano A, Pascale M (2005) Note floristiche piemontesi n. 1–12. *Riv Piem Stor Nat* 26:371–375

- Selvaggi A, Dellavedova R, Gallino B (2022) Cartografia floristica in Piemonte. *Ann Mus Civico Rovereto Sezione Archeologia Storia Sci Nat* 37:39–55
- Simonetti G (2005) Flora del Matajûr. In: AA.VV. Matajûr. In cammino sul monte: 97–115. A cura della sezione del C.A.I. di Cividale del Friuli. Arti Grafiche Friulane, Tavagnacco (Udine)
- Stinca A, Ravo M, Giacanelli V, Conti F (2017) Integrazioni alla flora vascolare dell'Isola di Capri (Campania, Sud Italia). *Atti Soc Toscana Sci Nat Mem B* 123(2016):65–70. <https://doi.org/10.2424/ASTSN.M.2016.05>
- Stinca A, Ravo M, Giacanelli V, Conti F (2019a) Additions to the vascular flora of the islands of Procida and Vivara (Campania, southern Italy). *Atti Soc Toscana Sci Nat Mem B* 125(2018):87–93. <https://doi.org/10.2424/ASTSN.M.2018.14>
- Stinca A, Chianese G, D'Auria G, Fascetti S, Ravo M, Romano VA, Salerno G, Astuti G, Bartolucci F, Bernardo L, Bonari G, Bouvet D, Cancellieri L, Carli E, Caruso G, Catalano I, Cennamo GD, Ciaschetti G, Conti F, Di Pietro R, Fortini P, Gangale C, Lapenna MR, Lattanzi E, Marcucci R, Peccenini S, Pennesi R, Perrino EV, Peruzzi L, Roma-Marzio F, Scoppola A, Tilia A, Villani M (2019b) Contribution to the floristic knowledge of eastern Irpinia and Vulture-Melfese area (Campania and Basilicata, southern Italy). *Ital Bot* 8:1–16. <https://doi.org/10.3897/italianbotanist.8.37818>
- Tardella FM, Pennesi R, Ballelli S, Cancellieri L, Caruso G, Falcinelli F, Fascetti S, Galasso G, Gigante D, Laface VLA, Lattanzi E, Lavezzo P, Musarella CM, Pinzani L, Quattrini G, Rosati L, Spada F, Stinca A, Tilia A, Catorci A (2024) Contribution to the floristic knowledge of Mount Pennino massif (Umbria-Marche Apennines, central Italy). *Ital Bot* 18:1–11. <https://doi.org/10.3897/italianbotanist.18.128215>
- Toffolo C, Gentili R, Banfi E, Montagnani C, Caronni S, Citterio S, Galasso G (2021) Urban plant assemblages by land use type in Milan: Floristic, ecological and functional diversities and refugium role of railway areas. *Urban For Urban Green* 62:127175
- Tomasella M (2013) La flora esotica nelle acque interne del Friuli Venezia Giulia. *J Freshw Biol* 35:61–72
- Tomaselli V, Sciadrello S (2017) Contribution to the knowledge of the coastal vegetation of the SIC IT9110005 “Zone Umide della Capitanata” (Apulia, Italy). *Plant Sociol* 151(4):673–694. <https://doi.org/10.1080/11263504.2016.1200689>
- Villa M, Banfi E, Galasso G (2022) Flora vascolare del Parco regionale di Montevicchia e della Valle del Curone (Lombardia, Italia settentrionale). *Natura* 112(2):1–64
- Wagensommer RP (2023) Floristic Studies in the Light of Biodiversity Knowledge and Conservation. *Plants* 12:2973. <https://doi.org/10.3390/plants12162973>
- Wagensommer RP, Marrese M, Perrino EV, Bartolucci F, Cancellieri L, Carruggio F, Conti F, Di Pietro R, Fortini P, Galasso G, Lattanzi E, Lavezzo P, Longo D, Peccenini S, Rosati L, Russo G, Salerno G, Scoppola A, Soldano A, Stinca A, Tilia A, Turco A, Medagli P, Forte L (2014) Contributo alla conoscenza floristica della Puglia: resoconto dell'escursione del Gruppo di Floristica (S.B.I.) nel 2011 nel settore meridionale dei Monti della Daunia. *Inform Bot Ital* 46(2):175–208
- Wilhelm T, Niklfeld H, Gutermann W (2006) Katalog der Gefäßpflanzen Südtirols. Naturmuseum Südtirol, Bolzano
- Zanotti E (2008) Flora della pianura bresciana centro-occidentale. V Aggiornamento. *Nat Bresc Annal Museo Civico Sci Nat Bresc* 35(2007):177–182
- Zanotti E (2010) Flora della pianura bresciana centro-occidentale. VI Aggiornamento. *Nat Bresc Annal Museo Civico Sci Nat Bresc* 36(2009):157–162

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