

Botanica Sudalpina Conference

20–21 November 2025



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Welcome

The Organizing Committee warmly welcomes you to the Botanica Sudalpina Conference 2025! Many of you will remember that the previous edition took place online due to COVID. We are truly delighted that this year we can once again meet face-to-face to celebrate our shared passion for the flora of the Southern Alps. Just like the conferences held in 2017 and 2021, this edition aims to unite all those engaged in scientific research on the flora of the Southern Alps—and a little beyond. The network and platform established in those earlier years continue to enable us to exchange exciting new discoveries from across the region while also fostering fresh opportunities for collaboration and innovative research directions. We remain impressed by the remarkable range of studies being carried out, from investigations into alien species to work in systematics and many other fields. Of course, none of this would have been possible without the generous backing of our host institution and sponsors, as well as the dedication and hard work of numerous individuals. We extend our sincere gratitude to the Scientific Committee for their essential contribution in reviewing abstract submissions and overseeing the award contest. Finally, our heartfelt thanks go to the Guest Speakers for sharing their inspiring presentations.

Brigitte Marazzi

Info Flora & Museo cantonale di storia naturale, Lugano (CH)

Sofia Mangili

Museo cantonale di storia naturale, Lugano (CH)

Laura Torriani,

Società Botanica Ticinese, Lugano (CH)

Antoine Jousson

Agroscope, Cadenazzo (CH)

Alessio Maccagni

Giardino botanico cantonale, Isole di Brissago (CH)

Gilberto Parolo

Fondazione Innovabridge, Caslano (CH)

Program

20–21 November 2025

Thursday 20 November 2025

–Afternoon

Time	Session	Title	Speaker
13h00		Opening check-in & Welcome coffee	
13h30		Early start some of satellite events according to their own programs	
14h00		Satellite events	
		• Potential distribution models for identifying new populations of rare and/or endangered species Lara Lucini (Museo cantonale di storia naturale) and Guido Brusa (independent biologist)	
		• Continuing efforts towards an online atlas of the flora of the Alps Philippe Juillerat, Stefan Eggenberg (InfoFlora) and other members of the AFA–Project	
		• Linking different research areas to optimize early–detection of new invasive alien plants Antoine Jousson, Ramona Maggini (Agroscope), Brigitte Marazzi and Blaise Petitpierre (InfoFlora)	
		• Beyond the invasion narrative: will non–native species save the insubric forests? Vincent Fehr and Boris Pezzatti (WSL Cadenazzo)	
17h00		Short break	
17h15	Guest	Plenary lecture Botanical Alliance in the Alps: Opportunities and Challenges	Dr. Stefan Eggenberg InfoFlora, Bern
18h00		Welcome Aperò	
20h00		Closure	

Friday 21 November 2025

–Morning

Time	Session	Title	Speaker
08h30		Opening check-in	
09h30		Welcome	
09h45	Guest	Plenary lecture Herbariomics: When tradition meets innovation	Dr. Alessia Guggisberg ETH Zurich
10h30	1.1	The earliest botanical exploration of the southern Alps illuminated through digitizing the herbarium of Caspar Bauhin (1560–1624)	Jurriaan M. de Vos University of Basel
10h45	1.2	A neglected forest species endemic to Brescia and Garda Prealps? Insights into the systematics of <i>Cardamine baldensis</i> (Brassicaceae)	Lorenzo Peruzzi University of Pisa
11h00	1.3	Towards an integrative taxonomy of the <i>Hieracium tomentosum</i> group	Simone Orsenigo University of Pavia
11h15		Poster session & coffee break	
11h45	2.1	Interactions between <i>Iris graminea</i> (Iridaceae) and ants in southern Switzerland (Canton Ticino, Switzerland)	Lucia Levorato HEPIA Genève, Natural History Museum Lugano
12h00	2.2	Floral chemistry drives pollination niche partitioning following glacier retreat	Beatrice Magnaschi University of Milan
12h15	2.3	Advances in automated insect monitoring for plant ecology and conservation	Luca Pegoraro WSL Birmensdorf
12h30	2.4	Some like it dynamic (but not too much): the balance between disturbance and persistence in a critically endangered lichen on alluvial soils	David Frey Natural History Museum Lugano, WSL Birmensdorf
12h45		Group photo!	
13h00		Lunch break	

Friday 21 November 2025

–Afternoon

Time	Session	Title	Speaker
14h00	Guest	Plenary lecture Biotic interactions in post–glacial ecosystems	Dr. Gianalberto Losapio Unimi La Statale Milan
14h45	3.1	The survey of vascular plants and bryophytes in the Biodiversity Monitoring South Tyrol	Roberto Dellavedova Institute for Alpine Environment Bolzano
15h00	3.2	Monitoring the effectiveness of habitat conservation in Switzerland: key developments since 2012	Ariel Bergamini WSL Birmensdorf
15h15	3.3	Preserving diversity through practice: grazing and mowing effects on <i>Marsilea quadrifolia</i> in agroecosystems	Anna Corli University of Pavia, National Biodiversity Future Center Palermo
15h30	3.4	Approaches to the conservation of <i>Adenophora liliifolia</i> (L.) Ledeb.: first results within Seedforce project	Mariacristina Villani Botanical Garden of Padua
15h45		Poster session & coffee break	
16h15	4.1	Biological traits and reproduction of two emerging alien lianas in Southern Switzerland	Antoine Jousson Agroscope Cadenazzo, InfoFlora Lugano
16h30	4.2	Sharpening the tools to manage early–stage invasions by alien plants in agriculture: a co–innovative case study based on <i>Asclepias syriaca</i>	Vincent Fehr WSL Cadenazzo
16h45	4.3	<i>Heracleum mantegazzianum</i> : niche dynamics of an invasive phototoxic plant across the Alps	Raffaele De Matteis University of Milan–Bicocca, National Biodiversity Future Center Palermo
17h00	4.4	When protective forests fail: the paradox of tree – induced rockfalls	Patrik Krebs WSL Cadenazzo
17h15		Final discussion	
17h30		Awards best poster/oral presentation & Closing aperò	

Scientific Committee

Bruno E.L. Cerabolini

Università degli Studi dell'Insubria, Varese, Italy

Roberta Ceriani

Centro Flora Autoctona della Lombardia, Galbiate, Italy

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Conservatoire Botanique National Alpin, Gap, France

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Franklin University Switzerland, Lugano, Switzerland

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Università degli Studi di Milano Statale, Milano, Italy

Ervan Rutishauser

InfoFlora Genève, Switzerland

Nicola Schoenenberger

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Giulia Tomasi

Museo Civico Rovereto, Rovereto, Italy

Prisca Valenti

Ufficio cantonale della natura e del paesaggio, Bellinzona, Switzerland

Collaborators

Ivan Sasu, webmaster

Michele Jurietti, photo credits *Cytisus emeriflorus*

Adriano Nicolosi, graphic designer

General information

Oral presentations

Each speaker's time slot consists of max 15 min divided into 10–12 min for the presentation and 3–5 min for questions. We kindly ask speakers to hold on to these time indications. Talks must be in English.

Posters

Posters must be hung on the designated panels in the hall during the registration time (8.30–9.30), before the start of the morning coffee break. Poster sessions will be held during the morning and afternoon coffee breaks (see program). During these breaks, participants will be able to talk directly with the authors of the posters and ask questions. Posters can be in English or Italian and must measure 84,1 x 118,9 cm (DIN A0, portrait format).

Award for the best talk and best poster

The best talk and poster will receive an award by the Botanical Society of Ticino (Società Botanica Ticinese). The winners will be selected by a special jury of the scientific committee and they will be awarded during the closing ceremony.

Guest Speakers
November 20
17h15



Dr. Stefan Eggenberg
InfoFlora, Bern (CH)

Botanical Alliance in the Alps: opportunities and challenges

With its diversity, its fascinating adaptations to an extremely varied landscape and its many endemics, the flora of the Alps has always aroused the enthusiasm of botanists in all parts of the Alps. However, the Alps as a whole have rarely been a research unit and so far there is no central data and information centre. The data and knowledge about the Alpine flora is split and based in regional botanical institutions. The high mountains and deep valleys have set limits rather than promoted cooperation. FLORAlliance is a project launched by the AtlasFloraAlpina, a consortium of regional botanical experts founded in 2023. The aim of the project is to bring all the expertise on the Alpine flora together and to show the potential use of this aggregated knowledge. In this talk, we will explain the expected challenges but also the opportunities that arise from such an alliance of the leading flora competence centers across the Alps. If we bring together our taxonomic expertise and our experiences in biogeography, flora dynamics and conservation, we may have a powerful platform based on “sharing & pooling”. Not only the regional data centers themselves will benefit from such a platform, but also the scientific community, educational institutions, policy makers and the general public.

Herbariomics: When tradition meets innovation

Herbaria are essential repositories of plant biodiversity, providing invaluable insights into species distributions across time and space. While their foundational role in systematics remains crucial, herbaria have recently gained prominence in a wide range of scientific disciplines. Advances in molecular biology now enable the extraction of DNA from centuries-old specimens, allowing for population genetic monitoring, studies of plant adaptation, and detection of associated pathogens and mutualists. Furthermore, these collections offer irreplaceable time-series data to track morphological and physiological changes in response to global warming. Chemical and isotopic analyses of herbarium specimens further inform on the presence of pollutants, such as heavy metals, in the plant tissues. More importantly in the context of the ongoing biodiversity crisis and the increasing rate of biological invasions, herbaria have proven invaluable resources for conservation planning. The value of these collections even extends to the humanities, providing historians of science a glimpse into the socio-cultural contexts of botanical exploration. In sum, herbaria are no longer merely archives of dead plant material—they are living laboratories uniquely positioned to answer fundamental questions about the past and future of the Earth's ecosystems. This talk will explore the expanding role of these collections across various scientific disciplines and highlight how their digitalisation foster modern research in innovative and unexpected ways.

Dr. Alessia Guggisberg,
ETH Zurich, Zurich (CH)

November 21
09h45

A portrait of a man with dark, wavy hair and a light beard, wearing a grey t-shirt. He is leaning against a wooden slatted fence. The background is a blurred outdoor scene with trees and foliage. The entire image has a green color overlay.

November 21
14h00

Dr. Gianalberto Losapio
Università degli Studi di Milano Statale, Milano (IT)

Biotic interactions in post-glacial ecosystems

Mountains serve as critical biodiversity observatories, offering unique insights into the ecological impacts of climate change. Among the most striking transformations in these environments is the retreat of glaciers, which is reshaping species distributions, forcing new biotic interactions, and restructuring ecological networks. However, how these emerging networks assemble, develop, and respond following glacier retreat remains poorly understood. In this presentation, I will synthesize recent studies conducted in the Biodiversity Change research group examining how glacier retreat directly and indirectly alters biodiversity, plant interactions, and ecological networks. We observed sharp shifts in plant, animal, and soil microorganism communities, plant–pollinator and plant–soil microbe networks with glacier retreat. Plant facilitation and symbiotic interactions enhance biodiversity in recently deglaciated terrains, while plant competition driven by shrub encroachment and soil acidification in later successional stages reduced species persistence. Our findings reveal an initial increase in interaction diversity following glacier retreat, followed by an ultimate decline with glacier extinction. Cascading effects of biodiversity change undermine key ecosystem functions and services, including regulating and material contribution from pioneer, threatened plant species. These results highlight the value of ecological network approaches in biodiversity assessment and underscore the need for integrated, long-term monitoring strategies that enhance biodiversity maintenance, sustain plants' contributions to people, and support human welfare in mountain regions.

Talk abstracts

In chronological order

The earliest botanical exploration of the southern Alps illuminated through digitizing the herbarium of Caspar Bauhin (1560–1624)

1.1 10h30

Jurriaan M. de Vos^{1*}

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Background and Aims

The Southern Alps played a pivotal role in the emergence of scientific botany after the Renaissance. With the invention of the herbarium in the mid-16th century, plant specimens could be permanently preserved, shifting attention from philological study of classical texts to empirical observation and paving the way for the first local floras. Surprisingly little is known about the details of early botanical explorations. We present clues as they can emerge from the oldest surviving herbaria, focusing on Caspar Bauhin (1560–1624) of Basel, the most influential botanist of his time.

Methods

In the process of digitizing Bauhin's herbarium, we rediscovered dozens of plant specimens surviving from a lively and productive exchange with the Pona family from Verona (N-Italy). These plants bear witness of their botanical field studies conducted on Monte Baldo, an Italian Alps mountain range in the province of Verona, that resulted in multiple, very early accounts of its flora. We compare the surviving plants and the context of their exchange to the existing botanical literature of the same time.

Results

By identifying species that were exchanged, we illuminate how botanical knowledge – and plant specimens – circulated among early naturalists, and how studying the southern alps contributed to the birth of scientific botany as a whole.

Conclusions

Exchanging plants from the southern Alps fueled Bauhin's motivation to compile the first global catalogue of plant names, a landmark achievement in the emergence of scientific botany. The rediscovered specimens also highlight the enduring value of herbaria today, as critical resources for biodiversity research in a time of global – botanical – change.

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A neglected forest species endemic to Brescia and Garda Prealps? Insights into the systematics of *Cardamine baldensis* (Brassicaceae)

1.2 10h45

Lorenzo Peruzzi^{1*}

Katia Francesca Caparelli¹

Jacopo Franzoni¹

Antonio Giacò¹

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Background and Aims

Cardamine heptaphylla (Vill.) O.E.Schulz and *C. pentaphyllos* (L.) Crantz are widely distributed across northern Italy. Both species share the same chromosome number and are morphologically distinct. The sterile hybrid *C. xdigenea* (Gremli) O.E.Schulz is morphologically intermediate. Sonder described from the Garda Prealps *Dentaria intermedia*, which is morphologically similar to that hybrid but differs in fertility and distinct *heptaphylla*-like leaf coloration and rhizome characteristics. Schulz, based on these features, reclassified this species as a variety of *D. pinnata* Lam. (= *C. heptaphylla*), while Fritsch considered it a separate species, renamed *C. baldensis*. To clarify the taxonomic status of this neglected taxon, we integrated nomenclatural, morphometric, cytogenetic, and molecular phylogenetic data.

Methods

Original material/types of the three taxa were studied. We sampled 90 individuals from nine populations of *C. baldensis* (Tremalzo, Pur, Monte Baldo), *C. pentaphyllos* (Monte Baldo, Lago d'Iseo), and *C. heptaphylla* (Lago d'Iseo, northern Apennines). We measured 28 morphological characters and collected leaf fragments preserved in silicagel for genome size and phylogenetic analyses (*trnL*–*trnF* IGS, ITS region, and HybSeq). We examined photographic records available on iNaturalist to assess the geographic distribution of *C. baldensis*.

Results

Cardamine baldensis is morphologically intermediate between *C. heptaphylla* and *C. pentaphyllos*, but shows a stronger overall resemblance to the former. Preliminary results concerning genome size and phylogeny suggest that *C. baldensis* shares the same ploidy level with the other species, and is closely related with *C. heptaphylla*. These two species are allopatric: the eastern distribution limit of *C. heptaphylla* corresponds to the mountains bordering the eastern shores of Lago d'Iseo, whereas *C. baldensis* is distributed from the contiguous Val Trompia eastwards to Monte Baldo.

Conclusions

The newly produced systematic data strongly support the recognition of *C. baldensis* as a distinct taxon endemic to Italy.

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³CEITEC, Masaryk University, Brno, Czech Republic

Towards an integrative taxonomy of the *Hieracium tomentosum* group

1.3 11h00

Simone Orsenigo^{1*}

Daniela Calzoni¹

Giulia Ginelli¹

Giacomo Baldesi¹

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Background and Aims

Hieracium L. (Asteraceae) is among the most diverse plant genera in the angiosperms. Its extreme morphological variability is due to complex reproductive strategies (apomixis and residual sexuality), combined with extensive interspecific hybridization and polyploidization. The latest treatment for the Italian flora largely follows Zahn's one, dating back to over a century ago and purely based on morphology. Recently an alternative approach was proposed for the *Hieracium* of the French Alps, resulting in the recognition of microspecies which are grouped in informal series. In the Alps, a revised taxonomic treatment based on morphological, cytological and genomic data is still missing.

Methods

We focused on *Hieracium tomentosum* L. and related species ("group J" according to Flora Gallica), representing a morphologically distinct group defined by the presence of more or less conspicuously plumose hairs. This group of species is endemic to the Western Alps (France, Italy, and Switzerland) extending south along the Apennines, up to Abruzzo. Because both triploid individuals and a single diploid population are known in this group, it represents a suitable candidate for elucidating taxonomic relationships through an integrative approach combining morphometric, cytological, and genomic analyses. We investigated the ploidy level of 20 populations belonging to 12 species within the group (many of them analyzed for the first time) via chromosome counts and flow cytometry. Moreover, in each population at least 3 herbarium specimens were collected to obtain morphometric data of around 30 characters. Finally, to obtain high-resolution genomic data, we applied ddRAD-seq to genotype 123 individuals, 67 of which belong solely to *H. tomentosum* (24 diploids and 43 triploids).

Results

Chromosome counts and flow cytometry revealed the presence of diploid, triploid and tetraploid geographically isolated populations. Genomic analysis showed that diploid *Hieracium tomentosum* clusters retained a higher genetic diversity compared to triploid clusters. The latter showed genetically differentiated local populations, showing signs of a partial diploid genome structure inherited from their parental species.

Conclusions

Preliminary genomic results, supported by morphometrical and cytometrical data, confirm the distinction between diploid and triploid *H. tomentosum* populations as separate taxa with distinct geographic ranges. The study also reveals a series of microspecies with narrow ranges. While triploid taxa exhibit signs of a reticulate evolutionary history, further data are required to fully elucidate their evolutionary origins and relationships. Our approach can be extended to other *Hieracium* taxa, thereby helping to shed light on this complex genus.

Interactions between *Iris graminea* (Iridaceae) and ants in southern Switzerland (Cantone Ticino, Switzerland)

2.1 11h45

Lucia Levorato^{1,3*}
Isabella Forini–Giacaleone²
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Background and Aims

Iris graminea L. (Iridaceae) is a rare, threatened, and priority species in Switzerland, found exclusively in Cantone Ticino, between the mountains Monte San Giorgio and Poncione d'Arzo. First observed in 2023, the secretion of extrafloral nectar (EFN) is one of its notable ecological traits. EFN attracts ants that in turn protect the plant from herbivores, but may also play a role in seed dispersal. The aim of this study is to map *I. graminea* populations and field–investigate the interspecific *I. graminea*–ants interactions across the plant's biological cycle, looking for evidence of the double role of ants.

Methods

Iris graminea population was documented with field observations and mapping across its range in Canton Ticino, in 2025. Seven sites were selected, presenting fertile stalks since the beginning of the study. Flower and fruit development, number of floral organs, damages by herbivores, ant presence, species and behavior were surveyed weekly during the flowering period and monthly until plant senescence and seed dispersal, for each of the 122 reproductive steam studied.

Results

Mapping efforts allowed estimation of ca. 60'000 individuals. EFN is secreted at tepal base from the bud stage until senescent tepals fall off. Ant activity from 12 identified ant species was documented 124 times: 80% was feeding on the nectar, in eight cases ants attacked herbivorous arthropods on flowers. No ants were found on or near the plants during fruit development and dehiscence. Young seeds are covered by a tissue that does not develop into an elaiosome but dries out when seeds ripen.

Conclusions

Our results indicate that the *I. graminea* population size was underestimated and that a non–specific mutualistic protective ant–plant interaction may exist. Indeed, ants benefit from the plant as an additional carbohydrate source and appear to defend it against herbivores. Although ants do not contribute to direct seed dispersal, *I. graminea* may indirectly benefit from the ants presence on flowers in form of increased chances for successful fruit development.

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Floral chemistry drives pollination niche differentiation following glacier retreat

2.2 12h00

Beatrice Magnaschi^{1*}

Bao Ngan Tu¹

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Background and Aims

The mechanisms underlying the development and stability of plant–pollinator networks as plants colonize terrain exposed by glacier retreat remain poorly understood. Floral volatile organic compounds (VOCs) influence pollinator foraging, serving as cues to locate resources and as a potential driver of interaction specialization and niche differentiation. Yet, the impact of glacier retreat on floral VOCs and their role in pollination niche structure remains unclear.

Methods

Plant–insect interactions and floral VOCs were recorded along a 170–year chronosequence at Mont Miné glacier (Switzerland). The area was divided into four deglaciation stages, each including four randomly chosen plots, allowing analysis of network development over space/time. Pollinator activity was monitored at the plot–level, recording flying flower visitors and the corresponding plant species to the finest possible taxonomic resolution. Plant–pollinator interaction data were then used for the computation of two plot–level indices, for both plants and pollinators separately: Pianka niche overlap (PNO) and functional complementarity (FC). Flowers were collected at species–level and samples were processed via gas chromatography – mass spectrometry (GC–MS), resulting in a list of VOCs which was then used to compute VOC richness at the plot–level. Data analysis was carried out in R software employing generalised linear (mixed) models (GL(M)Ms) and Type II test Anova.

Results

Results show that pollinator PNO increases, and both plants and pollinators FC and VOC richness decrease over space/time, following a primary succession trend. Moreover, as VOC richness increases, FC rises for both plants and pollinators, while pollinator PNO decreases. Yet, glacier retreat exerts a negative impact on the VOC–PNO relationship. Notably, in PNO analyses, we observed contrasting responses between plants and pollinators, reflecting pollinators' greater mobility or computational effects.

Conclusions

The study shows the deleterious impacts of glacier retreat on pollination niches, highlighting the role of VOCs as drivers of pollination niche differentiation. This is crucial for forecasting the impact of climate change on ecological systems and would inform strategies to support pollination networks.

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Advances in automated insect monitoring for plant ecology and conservation

2.3 12h15

Luca Pegoraro^{1*}

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Steven Stalder²

Kerstin Niedermaier¹

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Background and Aims

Insects underpin virtually all terrestrial ecosystems and many essential services, among which pollination. However, our knowledge of insect species occurrence and population trends is severely lacking, against a backdrop of reports of widespread insect declines. Further, plant–pollinator interactions, crucial for the reproduction of most flowering plants, remain particularly challenging to study due to their ephemeral nature. Here I present several technological advancements in automated insect monitoring, in the context of biodiversity monitoring and pollination ecology.

Methods

Camera traps have revolutionized how we monitor mammals in the wild, but they fall short when applied to insects due to their small size. To address this, we developed a system to record images in the field for extended periods of time and deployed it across multiple sites and elevations to document plant–pollinator interactions in alpine environments.

Once the images were collected, it was necessary to screen out the vast number without insects. To achieve this, we developed a custom Vision Transformer and Deep Learning algorithm to detect insects under realistic field conditions.

Results

This approach enables the collection of comprehensive data at a much larger scale than is possible with traditional methods, but the AI model remains prone to bias in some contexts, which is not always easy to correct.

We illustrate the monitoring system(s) and their limitations with examples from the pollination ecology and conservation of alpine plants in the French Maritime, Swiss, and Ligurian Alps.

Conclusions

Automated insect monitoring holds great potential to provide high quality data at scale for biodiversity assessment, community ecology and conservation biology, but many challenges remain ahead.

By cautiously adopting these emerging technologies and validating them against traditional monitoring programmes, we can realise the promises of automated insect monitoring while continuing to reduce intrinsic bias in AI models.

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Some like it dynamic (but not too much): the balance between disturbance and persistence in a critically endangered lichen on alluvial soils

2.4 12h30

David Frey^{1,2*}

Katrin Jodocy³

Silvia Stofer²

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Background and Aims

Many floodplain species are threatened by habitat loss due to changing hydrological regime and associated changes in vegetation structure. However, the frequency and intensity of the hydrological dynamics maintaining their niche are often unclear, hindering their conservation and use as indicator species in river restoration projects. This ongoing project aims to understand the mechanisms governing the spatial distribution of *Stereocaulon incrustatum*, an endangered soil-dwelling lichen, along the dynamic Alpine rivers Maggia and Verzasca in Switzerland.

Methods

We collected presence-absence and fertility data (presence of fruitbodies) on over 800 random sampling plots (4 m²) along 41 transects perpendicular to the main channels of the Maggia and Verzasca. In addition, we performed a comprehensive population census with a high spatial resolution (1 m²) that included also absence data along selected river reaches. We used statistical and numerical models to identify key environmental factors (river topography, vegetation structure and sediment size distribution) and hydrodynamic processes (inundation, sedimentation, erosion) to quantify the impact of varying discharges on observed populations.

Results

First results show that *S. incrustatum* is associated with elevated, coarse-grained alluvial soils with increased moss cover but moderate vascular plant cover. Sexual reproduction is higher under closed canopies and at high population densities. Furthermore, the species exhibits a non-linear response to distance from the main channel, with the highest abundances found in areas close to secondary channels where gravel mobility is low but periodic inundations still occur.

Conclusions

Our research suggest that rare but severe flood events are necessary for habitat formation. Older, densely populated habitat patches may harbour important source populations for colonization, thereby representing focal areas for conservation.

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The survey of vascular plants and bryophytes in the Biodiversity Monitoring South Tyrol

3.1 14h45

Dellavedova Roberto^{1*}

Simon Stifter²

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Poponessi Silvia¹

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Background and Aims

In 2019, the long-term project Biodiversity Monitoring South Tyrol (BMS) started assessing 320 terrestrial and 120 aquatic sites in 5- and 4-year cycles, respectively. The BMS encompasses vascular plants, cryptogams, birds, bats, grasshoppers, butterflies and larvae of aquatic insects. The habitats studied in the BMS include meadows and pastures, permanent crops and cultivated fields, forests, wetlands, urban areas, alpine areas, and running waters. For the selection of the monitoring sites, we used a stratified random sampling approach.

Methods

We monitored vascular plants using the European Dry Grassland Group (EDGG) protocol. This methodology involves a complete floristic survey and cover estimate of species in squared plots, but bryophytes and lichens were sampled only in four smaller random subplots. A transect survey has been applied for urban environments (two separate parallel transects 100 m long), crops (100 m along the margin of arable land) and lake shores (one parallel 50×20 m to the shore and two perpendicular to the shoreline).

Results

We recorded at least 1,364 vascular plants species, corresponding to 55% of South Tyrol's flora, and identified a total of 230 species of bryophytes in the first two years of surveys (2019–2020), accounting for 25% of South Tyrol's bryoflora. Extensive Meadows host an average of 57 vascular plants. In contrast, mays crops have only an average of 12 taxa. Six species were recorded for the first time in South Tyrol.

Conclusions

The first terrestrial monitoring cycle (2019–2023) has been completed, and the analysis of vegetational cover values is in progress. All the BMS data collected will be integrated in the database of the Museum of Nature South Tyrol (Bolzano). After completing the second monitoring cycle in the coming years, it will also be possible to make statements about trends.

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Monitoring the effectiveness of habitat conservation in Switzerland: key developments since 2012

3.2 15h00

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Background and Aims

The long-term program 'Monitoring the Effectiveness of Habitat Conservation in Switzerland' (WBS) was launched in 2011 to report on trends in the biotopes of national importance. Here we report on trends in dry meadows and pastures, bogs, fens and floodplains of national importance between 2012 and 2023.

Methods

To quantify trends in the biotopes of national importance we conducted vegetation surveys and interpreted aerial images. We selected 710 sites for vegetation surveys and distributed over 5,000 permanent plots within them by means of a complex, stratified design. The circular plots had an area of 10 m². In each plot all vascular plants (and in fens and bogs also all bryophytes) were recorded together with their cover. We further used aerial photo interpretation to quantify trends in the cover of woody vegetation.

Results

We found both positive and negative trends in the biotopes of national importance. In dry meadows and pastures, positive trends predominated: Mean nutrient indicator values decreased, and the proportion of habitat specialists and endangered species increased. Raised bogs and fens continued to dry out as mean indicator values for moisture showed, leading to qualitative and quantitative losses (e.g. decrease in the proportion of fen and bog specialist species, decrease in the cover of *Sphagnum* in bogs, loss in area of typical bog communities). Qualitative and quantitative deterioration and unsatisfactory states in comparison to expert defined reference states were also found in floodplains, where for example the area of typical hardwood alluvial forest declined, likely due to ash dieback.

Conclusions

While the negative trends highlight deficits in the implementation of conservation measures and the continuing need for restoration actions, the positive trends show that conservation measures are worthwhile. To preserve the biotopes of national importance in the long term, the measures already taken must be maintained, and additional efforts are needed to reverse the negative trends identified.

Preserving diversity through practice: grazing and mowing effects on *Marsilea quadrifolia* in agroecosystems

3.3 15h15

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Background and Aims

Wet meadows host high biodiversity and depend on extensive management such as mowing and grazing. In Europe, these habitats are declining due to land–use intensification and abandonment, leading to biodiversity loss. Appropriate management can sustain plant richness and preserve threatened species like the aquatic fern *Marsilea quadrifolia* L. However, farmer involvement and targeted financial incentives are crucial for the long–term success of conservation efforts. This study assessed the effects of mowing and grazing – alone and combined – on plant diversity and *M. quadrifolia* performance in a periodically flooded meadow managed by the organic “Bio–Angus” cattle farm within the Pian di Spagna Nature Reserve (N–Italy).

Methods

From 2022 to 2024, four treatments were implemented: Control (grazing + mowing), Grazing only, Mowing only, and No Management. Grazing took place in early spring and autumn, while mowing was performed in late summer, according to the farm’s usual practice. Vegetation surveys were conducted annually in twenty 1×1 m plots (five per treatment), recording species cover and richness. Diversity indices were calculated, and functional groups, life forms, and CSR strategies were analysed. Water table depth was recorded biweekly, and *M. quadrifolia* chlorophyll content was measured to detect ecophysiological stress.

Results

Species richness increased over time, particularly under Mowing and No Management treatment, but was lowest under Grazing alone. *M. quadrifolia* abundance peaked under the Control treatment but declined under Mowing, without signs of physiological stress. In contrast, *Phragmites australis* increased in unmanaged plots. Rushes declined over time; sedges decreased under Grazing but increased under Control and Mowing. No major differences in life forms or CSR strategies were observed, with hemicryptophytes prevailing. Water table fluctuated seasonally, with a drought peak in 2022.

Conclusions

The “Bio–Angus” model demonstrates that low–intensity, combined mowing and grazing is the most effective strategy to support biodiversity and conserve *M. quadrifolia*. Wider adoption requires economic incentives, farmer engagement, and policy support aligned with EU Biodiversity Strategy.

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Approaches to the conservation of *Adenophora liliifolia* (L.) Ledeb.: first results within Seedforce project

3.4 15h30

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Background and Aims

Seedforce is a Life project aiming to improve the conservation status of *Adenophora liliifolia* and other 28 species listed in Annex II of European Habitats Directive with unfavourable status. The main actions of the project are: collection and storage of the germplasm for long-term conservation, propagation of the species and production of 750 individuals to be used to reintroduce or reinforce wild populations in 4 Special Areas of Conservation (SACs) in Italy and Slovenia.

Methods

Used approaches: ecological niche modelling and genetic diversity analysis of the populations as preliminary action to devise the best propagation mix; seed collection and preliminary germination tests in growth chambers (using different medium and light/temperature conditions and pretreatments), to define the ecological needs of the species; adoption of the most suitable propagation method to propagate the species; translocation (1 reintroduction and 1 reinforcement), starting from 2023; monitoring of the effectiveness in all stages of plant handling, from seed collection to multiplication and translocation.

Results

As first results, two standardized guides summarized the new knowledge respectively on the desirable methods for seed collection, cleaning and storage and for the propagation of *A. liliifolia*. More than 40,000 seeds have been collected from 5 donor sites. Around 2,000 individuals have been propagated, mainly through germination in agar, after 5–6 months of cold stratification, followed by transfer in cell trays with an adequate substrate (3 parts of silica rich loam mixed with 1 of small size dolomite rock). Until today, 4 translocation actions have been carried out, for a total of 250 individuals.

Conclusions

The outcomes of the first transplanting sessions, based on the improved knowledge of the reproductive ecology of the species, highlighted key factors and critical issues for the translocation management. The most relevant is the impact of herbivores on the translocated individuals.

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Biological traits and reproduction of two emerging alien lianas in Southern Switzerland

4.1 16h15

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Background and Aims

The two ornamental Asian lianas *Fallopia aubertii* and *Reynoutria* (Syn. *Fallopia*) *multiflora* (Polygonaceae) currently appear in an early spread stage in southern Switzerland. Our main goal is to increase our understanding of the functional traits associated with their establishment and spread, thus providing crucial information for risk assessment on invasiveness and management strategies. Specifically, we investigated aspects of their spread status, morpho-anatomy, reproduction strategy and phytopathology.

Methods

Both species were documented in the field for taxonomic identification and phytopathological symptoms. Root and stem samples were analyzed with high-resolution imaging and morpho-anatomical sectioning. Seed germination and resprouting of stems, root tubers and roots were tested. Samples of plant parts with rust fungus (Puccinales) infection-like symptoms were morphologically and genetically analyzed.

Results

Most stands previously attributed to *F. aubertii* were identified as *R. multiflora*, previously unknown in Switzerland. Most stands derive from garden waste deposits. The two liana species can be differentiated by their leaf arrangement and morphology, inflorescence structure, and flower morphology and size. Root tubers occur only in *R. multiflora*. While *R. multiflora* seeds are viable (41%), tests confirmed non-viability of *F. aubertii* seeds. Stems of both species were similarly able to resprout (60%), not so roots and root tubers (0%). A rust fungus, currently unknown from Europe, was identified and corresponds to *Puccinia muehlenbeckiae*.

Conclusions

Our study is the first to comparatively investigate distributional, taxonomic and biological aspects of *F. aubertii* and *R. multiflora* in their alien range. Although these lianas can cover relatively large areas by in-situ horizontal vegetative growth, the only few (not seed-borne) stands suggest that spread to new sites currently depends on dispersal of vegetative fragments. Our results on root and root tuber morpho-anatomy are consistent with published molecular phylogenetic relationships. Finally, the discovery of a rust fungus new to Switzerland highlights the importance of studying alien species as potential reservoirs of plant pathogens.

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Sharpening the tools to manage early-stage invasions by alien plants in agriculture: a co-innovative case study based on *Asclepias syriaca*

4.2 16h30

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Background and Aims

Invasive plants pose increasing risks to agriculture, yet standardized tools for early-stage assessment and management are lacking. To address this, we developed two complementary frameworks – the Rapid Regional Invasiveness Assessment (RRIA) and the Solutions for Early-Stage Invasive Species (SESIS) – and applied them to the invasive *Asclepias syriaca* L. (common milkweed, Apocynaceae) in Canton Ticino, Switzerland. These frameworks provide a standardized approach to evaluate invasion potential during the early stages of colonization and to rapidly identify effective control strategies. These frameworks provide a standardized approach to evaluate invasion potential during the early stages of colonization and to rapidly identify effective control strategies.

Methods

RRIA combined field surveys and experiments to assess phenology, sexual and vegetative reproduction, and establishment under different soil conditions and competition levels. Within SESIS, we tested eleven management treatments. Treatment effectiveness was quantified through above-ground and below-ground responses.

Results

RRIA revealed that while sexual reproduction is limited, vegetative regeneration is highly effective and bud-driven, making it the critical invasion strategy. Through SESIS, we found that frequent mowing, early-season glyphosate application, tillage, and electrical treatments significantly reduced stem density, root biomass, and bud number within three seasons. In contrast, low-frequency mowing during peak vegetative growth increased stem density.

Conclusion

Invasion potential and impacts of invasive plants are highly context-dependent, making standardized frameworks such as RRIA crucial for robust and comparable early assessments. Our case on *Asclepias syriaca* in Ticino shows that effective control requires a context-specific, multi-stress approach that combines mechanical, chemical, and other innovative methods. Together, RRIA and SESIS deliver directly applicable tools that help practitioners and authorities implement efficient, evidence-based strategies.

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Heracleum mantegazzianum: niche dynamics of an invasive phototoxic plant across the Alps

4.3 16h45

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Background and Aims

Heracleum mantegazzianum Sommier & Levier (Apiaceae) is a highly invasive plant, native to the Western Greater Caucasus and widespread across northern and central Europe. Its invasiveness and phototoxic sap pose serious risks to ecosystems and public health, leading to its inclusion in the EU Regulation 1143/2014 list of IAS of Union concern. It has spread across the Alps, with considerable differences between sectors. However, its ecological niche in the region remains poorly understood, together with the factors driving distributional differences across sectors. This study aimed to investigate the environmental factors shaping its Alpine distribution and those determining variability among sectors.

Methods

The Alpine arc was divided into north–south and east–west sector pairs. 7000 species occurrences within them were combined with 25 environmental variables, both “climatic” and “non–climatic”, considered collectively and separately. For each sector pair and variables set, we applied a PCA–based approach and the COUE framework to assess niche dynamics. Environmental similarity was evaluated through Kernel Density Estimation (KDE) and Multivariate Environmental Similarity Surfaces (MESS). Species Distribution Models (SDM) were run in ecological space (using the R package *biomod2*), testing multiple algorithms to identify key predictors in each sector.

Results

PCA highlighted climate as the primary driver of distribution patterns. COUE analyses revealed overall niche stability, but also moderate shifts, especially along the north–south gradient, towards warmer, drier conditions in the southwest. MESS showed no broad–scale dissimilarities, though local climatic mismatches emerged. SDMs confirmed temperature and precipitation as key predictors, but also identified road density as an important non–climatic factor.

Conclusions

Climate strongly influences *H. mantegazzianum* distribution in the Alps, but the species shows considerable ecological plasticity, being able to colonize suboptimal southern and western areas. Anthropogenic elements, particularly infrastructure networks, further facilitate its spread. Management and forecasting efforts should integrate both climatic and non–climatic factors, especially near current range margins, where environmental changes may drive unexpected expansions.

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When protective forests fail: the paradox of tree-induced rockfalls

4.4 17h00

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Background and Aims

Protective forests in mountain regions play a crucial role in shielding human settlements from natural hazards. However, this study reveals a paradox: sometimes trees can themselves trigger rockfall events, a phenomenon that has so far received little scientific attention. The main objective of this research was to provide quantitative data on the occurrence of tree-induced rockfalls and to assess the effectiveness of orthophotos for identifying uprooting, one of the main mechanisms that can trigger vegetation-induced rockfalls.

Methods

A case study in Canton Ticino, covering an area of 1166 ha, was conducted to analyze the phenomenon of tree uprooting and the characteristics of rockfalls induced by vegetation using aerial images (orthophotos), surveys and measurements in the field, as well as information from the StorMe database (i.e., the Swiss national database recording natural hazard events). Factors such as terrain slope, curvature, tree diameter, and number of shoots were examined.

Results

Detecting uprooted trees on orthophotos taken during vegetative rest is fairly reliable and inexpensive. In the study area, an average 13 uprooted trees per hectare were found, with peaks up to 140 in the most affected sectors. Uprooting occurs mainly on slopes steeper than 30° and involves trees with a diameter greater than 30 cm. This expanding phenomenon is probably related to the ageing and decline of coppiced chestnut forests, which are suffering from the combined effects of abandonment, pathogens and climate change. According to the StorMe database, uprooting accounts for 45% of tree-related rockfalls, just below root action (51%). In the canton of Ticino, over the past two decades, the incidence of tree-induced rockfalls has tripled from 10 to 30% of all recorded rockfall events. The most vulnerable areas are those with slopes steeper than 40° and complex morphologies (concave and convex).

Conclusion

Vegetation-induced rockfalls represent a widespread natural phenomenon, often occurring at the base of steep mountain slopes. Characterizing this process is fundamental to improving risk management in contexts with dense human settlements and increasing occurrence of natural events such as drought periods or extreme winds that enhance this phenomenon.

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Poster abstracts

In alphabetical order
of the presenting author

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Seed morphometrics as a potential indicator of germination success: insights from endangered *Verbascum chaixii* Vill.

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Background and Aims

Verbascum chaixii Vill. subsp. *chaixii* is an endangered species in Switzerland, confined to the Canton of Ticino, where populations are small, fragmented, and show poor natural regeneration. Field observations suggest that seedling recruitment is rare despite abundant seed production, raising concerns over long-term viability. This study examined seed morphometry and germination performance under controlled conditions.

Methods

Seeds from four populations (three Swiss, one French) were characterized morphologically, then tested in growth chambers (n = 228 per population) under three temperature and photoperiod regimes: constant moderate, warm variable, and cool variable. Additional treatments included cold stratification, scarification, and germination in complete darkness.

Results

Two seed morphotypes emerged: lighter, longer, narrower seeds and heavier, shorter, broader ones. The former showed higher germination success. The French population averaged 59% germination, followed by one Swiss population (28.5%) with the same morphotype (Length-to-Width ratio > 1.6); both exceeded the 11% mean germination of the two broader-seed populations (L/W ratio < 1.4). French seeds exhibited rapid and synchronous germination, with a pronounced onset between days 2 and 6. Swiss populations often showed slower and more incomplete emergence. Constant moderate temperatures generally reduced germination, and cool variable regimes were almost entirely ineffective. Darkness strongly inhibited germination, and neither stratification nor scarification produced consistent improvements.

Conclusions

V. chaixii germination appears sensitive to maximum and average temperatures, as well as light exposure, with pronounced variation among seed sources and morphotypes. Seed morphology appeared linked to germination success, potentially accounting for population-level variations and providing better predictive traits of vitality than morphological traits previously assessed on mother plants. The higher overall performance and rapid, synchronous germination of the French population – consistent with the colonisation strategy of the species – suggests that environmental and/or genetic constraints may limit germination in Ticino. These findings underscore the urgency of securing high-performing seeds and integrating *ex-situ* multiplication into future recovery plans.

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Biodiversity payments sustain grassland plant diversity, whereas abandonment leads to loss

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Background and Aims

European grasslands rank among the most species-rich ecosystems worldwide, supporting exceptional biodiversity and vital ecosystem services. Yet, these habitats are increasingly threatened by land-use intensification on one side and abandonment on the other. Since the early 1990s, Switzerland and other European countries have implemented agri-environmental schemes to conserve grassland biodiversity, ecosystem functions, and cultural values. We evaluated long-term vegetation change in the Swiss Alps to test the effectiveness of these measures for biodiversity conservation.

Methods

We resurveyed more than 300 vegetation plots in the montane to subalpine belt (600–2000 m a.s.l.) across the Swiss Alps, drawing on multiple historical datasets. The majority of sites were first surveyed in the early 2000s, whereas a smaller subset was originally established in the 1970s–1980s and already resurveyed during the 2000s. Sites were selected using a stratified design across municipalities to cover the full gradient of management intensity and trajectories. Changes in species richness were quantified with models accounting for observer error, and shifts in community composition and mean ecological indicator values were analyzed.

Results

Biodiversity trends varied markedly among management regimes based on the agri-environmental schemes. The strongest gains in richness were observed under result-based payments (BFF QII). Management-based payments (BFF QI) and conventional management did not show a change in richness. The most pronounced declines occurred in abandoned plots, which also exhibited marked shifts in community composition.

Conclusions

Our findings provide clear evidence that result-based payments are effective in maintaining, and enhancing, plant diversity in montane to subalpine grasslands. At the same time, abandonment poses a major threat, emphasizing the need for sustained conservation policies and targeted management to safeguard grassland biodiversity under changing land-use and climatic conditions.

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Ex-situ conservation and reinforcement of *Gladiolus palustris* Gaudin in the southern and south-eastern Alps

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Background and Aims

Gladiolus palustris Gaudin, a geophyte found in open grasslands, wetlands and open woodlands, is distributed in central and southeast Europe. Despite a IUCN status of Data Deficient, populations are generally decreasing throughout its range, due to cessation of traditional management and habitat fragmentation.

It is protected by various legislations and listed in Annex II of European Council Directive 92/43/EEC. Within project LIFE–SeedForce (LIFE20–NAT/IT/001468), we focused on the *ex-situ* propagation of *G. palustris* from several sites in Italy (Lombardy and Trentino) and Slovenia, including population monitoring, seed analysis, germination testing, genetic analysis, habitat restoration where necessary, and ultimately plant translocation. Preliminary results are presented here.

Methods

For each site standard germplasm bank protocols were used for the following activities:

- *in-situ* seed harvesting and lab processing,

- seed analysis,

- *ex-situ* germination and cultivation.

Seed collection was conducted in 2022 – 2024, allowing comparison between sites over time. Genetic analysis used pooled genotyping, ddRAD–seq genotyping, including samples from Friuli Venezia Giulia (Italy). Population reinforcement is currently ongoing, with the first translocations in October 2025.

Results

Population monitoring highlighted potential confusion between *G. palustris* and *G. illyricus* W.D.J.Koch in the eastern part of the target area, with fruit morphology the most reliable character distinguishing the species. Seed harvest was possible at all sites, despite fruit predation and aborted capsules depending on year and/or location. Seed weight varied between years and/or sites; *ex-situ* germination often reached >80%. Genetic analysis showed that the Expected Heterozygosity (He) was moderate to high (18–31%), dividing the populations into three groups: 1.Lombardy; 2.Trentino; 3.Friuli Venezia Giulia–Slovenia. Several hundred plants are currently in cultivation for translocation in autumn 2025.

Conclusions

Ex-situ cultivation of *G. palustris* does not present particular concerns.

Population differences were confirmed by seed functional characters and genetics; some differences were also related to climatic variation between collection years.

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Root functional traits across successional stages of an alpine glacier foreland

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Background and Aims

Glacier retreat due to climate change provides a natural laboratory to study ecological succession, where plants colonize newly exposed terrain. Root functional traits involving morphological characters and nutrient contents are critical in determining plant strategies for resource acquisition. However, little is known about how these traits vary across successional stages in alpine glacier forelands. This study aims to (i) characterize root morphological and chemical traits across plant species colonizing different stages of a glacier foreland, (ii) assess how these traits change along a 160-year chronosequence.

Methods

Fieldwork was conducted in an alpine glacier foreland in Ferpecle (CH) with four successional stages over a 160-year period since deglaciation. We selected thirty-eight plant species to capture both stage uniqueness and persistence, and ecological relevance. For each species, we will measure root traits, including specific root length, root diameter, root tissue density, and CHN content. Statistical analyses will combine trait-based approaches (e.g. community-weighted means, functional diversity metrics) with ordination and regression methods to test how root functional trait composition and diversity change with glacier retreat.

Results

We expect root traits to display clear successional trends, with early-colonizing plants exhibiting acquisitive strategies (high SRL, small diameter, low C:N ratio) and later-stage plants showing more conservative strategies (low SRL, large diameter, high C:N ratio). Root trait diversity is expected to follow a similar pattern to above-ground functional diversity, peaking at intermediate stages and being lowest in the earliest and latest stages of succession.

Conclusions

This study will provide new insights into the role of belowground functional traits in community assembly following glacier retreat, highlighting the importance of roots in shaping ecosystem development. These findings will contribute to a broader understanding of how alpine plant strategies and functional diversity respond to climate change.

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FLORAlago: a floristic investigation of reed bed and the aquatic and shore habitats of Orta lake (Piedmont region, Northern Italy)

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Background and Aims

This study investigates the coastal reed beds of Lake Orta and the surrounding aquatic and shore habitats. Special efforts were made to rediscover old locations of valuable floristic elements (e.g. *Isoëtes echinospora* Durieu). A first checklist of the flora for this area is provided.

Methods

Sampling was carried out during the summer in 2021 and 2022. Reed beds were mapped through photo interpretation. Observations of the habitat were mainly carried out from land, and from the lake, with a canoe. The submerged vegetation was explored by diving.

Results

At least 130 floristic surveys were conducted, and as a result, 10 habitat types were identified. Orta lake hosts 70 populations of *Phragmites australis* (Cav.) Steud. Until 2010, the larger stands covered by reed beds was approximately 1.4 hectares; by 2021, the lost area amounted to approximately 40%. For Gozzano bay alone, there was a reduction of 84%. The total number of species recorded is 329, of which 11 are included in red list or protected by regional law 32/82 (3%), about 27% are non-native species, and 9% are invasive.

Conclusions

The most degraded reed beds are located in Gozzano and Buccione bay. The remaining reed beds of Orta lake are stable. The causes of this stress should be further investigated but, as a first hypothesis, it could be a direct consequence attributable to the nutria (*Myocastor coypus* Molina, 1782). To a lesser extent, it might be connected to swans (*Cygnos olor* Gmelin, 1789) feeding on *Phragmites* rhizomes and/or stems. The census along the lake has made it possible to identify 10 habitats, most of which can be traced back to the codes for natural and semi-natural habitats of the EU Habitats Directive belonging, including habitat 3110 (Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)), present in Piedmont only in the depths of Lakes Orta and Maggiore.

Dry grasslands in the Canton of Ticino (Switzerland): towards a modern syntaxonomic classification

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Background and Aims

Vegetation surveys are important tools for basic ecological research, biodiversity studies, conservation and environmental monitoring. Dry grasslands are among the most biodiverse, yet also the most threatened, habitat types in Europe. Despite containing elements not found elsewhere in Switzerland, the dry grasslands in the Canton of Ticino have received little phytosociological attention and do not fit well into current classification systems, be it the Swiss national habitat typology or European syntaxonomic systems. Furthermore, while Switzerland's national habitat typology only considers basiphilous dry grassland alliances (*Festuco–Brometea*) and rocky outcrop communities (*Sedo–Scleranthetea*), we expect that Ticino also hosts sandy dry grasslands (*Koelerio–Corynephoretea*), which do not occur anywhere else in Switzerland. The main objective of this study is to develop a revised syntaxonomic classification system for dry grasslands in Ticino.

Methods

Our focus were all dry grassland types in the sense of the phytosociological. We selected sampling site to represent the entire geographic and ecological spectrum of the classes *Festuco–Brometea*, *Koelerio–Corynephoretea* and *Sedo–Scleranthetea* in the canton of Ticino. We used the standardised Eurasian Dry Grassland Group (EDGG) methodology for sampling grassland diversity using 10–m² plots. Apart from vascular plants, we included terricolous bryophytes and lichens, which are important elements of dry grassland syntaxa. Moreover, we measured topographic, soil and structural variables. We will apply unsupervised classification, place our units into the international phytosociological classification system and statistically determine diagnostic species.

Results

In total, we sampled 123 10 m² plots. The analyses are ongoing.

Conclusions

Our anticipated results will for the first time provide a syntaxonomic classification system for all dry grasslands of the canton of Ticino, based on a comprehensive dataset analyzed with modern methods. They will be an important input to ongoing international activities to update the European syntaxonomic system. Moreover, highlight the sandy dry grasslands, a very rare but higherto largely neglected vegetation type in Switzerland.

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Integrating socioeconomic data into alien plant distribution models: the case of *Senecio inaequidens* in Northern Italy

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Background and Aims

Invasive alien species pose a significant threat to global biodiversity, economies, and public health. SDMs are widely applied to predict the potential spread of alien species but often neglect human-dependent variables. Human activities strongly influence biological invasions, so their omission weakens the predictive accuracy and applicability of SDMs. The aims of this research are twofold: to review which type of socioeconomic variables are integrated into SDMs for invasive species, and to develop an SDM for protected areas in northern Italy that incorporates these factors.

Methods

We systematically reviewed scientific literature from Web of Science platform to identify studies using socioeconomic variables in SDMs for all types of invasive species, selecting the type of explanatory variables used.

We then developed an SDM for *Senecio inaequidens* DC. using the *biomod2* R package. Two independent models were developed within an ensemble framework: a Bioclimatic Suitability Model, parameterized with climatic predictors, and a Habitat Suitability Model, incorporating land-use, elevation, and socioeconomic predictors (tourism, population density, Gross Domestic Product, transport infrastructure). Predictor variables were checked for multicollinearity using the Variance Inflation Factor, and highly collinear variables were removed. Models were calibrated using presence and pseudo-absence data and evaluated by internal random cross-validation (70% training, 30% testing, 5 replicates) in *biomod2*. Finally, we combined these two models to generate a comprehensive suitability model.

Results

The analysis revealed a rising use of socio-economic variables in SDMs, mainly population density and proximity to urban infrastructures and roads. SDM is expected to show that human-related variables are key drivers of species spread, identifying areas with high human activities as potential invasion hotspots.

Conclusions

Incorporating socioeconomic predictors in our model is expected to highlight the role of human-related factors in the potential distribution of *Senecio inaequidens* DC. and enhance our understanding of human-driven invasions, providing a better tool for risk assessment and management.

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Presence, phenology and plant–animal interactions of the invasive alien species *Asclepias syriaca* (Apocynaceae) in southern Switzerland

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Background and Aims

In Switzerland, some hundred alien species are classified as invasive or potentially invasive. While only about one fifth were regulated in 2008, this proportion had risen to nearly half by 2024. Increasing attention is now shifting towards recently prohibited, lesser-known species such as *Asclepias syriaca* L. (common milkweed, Apocynaceae), a herbaceous plant with sprouting roots introduced as an ornamental, fiber crop, and nectar source for bees. This study investigates the presence of *A. syriaca* in Canton Ticino (southern Switzerland) and documents its phenology and plant–animal interactions.

Methods

Asclepias syriaca records in Canton Ticino from the InfoFlora database were validated in situ or through recent photographs. Populations were revisited for fruit and seed collection. In 2023, phenological and reproductive traits were monitored in three control plots within the largest *A. syriaca* population (Quartino). Within each plot, 50 reproductive stems were tagged, measured, and surveyed for inflorescence and fruit development, as well as mortality and flower, fruit and seed counts. Plant–insect interactions were qualitatively recorded during peak flowering.

Results

In Canton Ticino, *A. syriaca* was confirmed at nine scattered and localized locations, mostly from ornamental cultivation and no evidence of naturalized populations. In Quartino, *A. syriaca* emerged in early May and completed its phenological cycle by mid–November. Peak flowering occurred in June, followed by fruit development from late June onward and first fruit dehiscence in early October. Besides common pollinators such as bees, bumblebees, and wasps, the abundant nectar attracted 26 insect species from 25 genera and 7 orders, encompassing florivores, nectarivores, herbivores, and predators. Although many fruits aborted early (after ovary enlargement), 38% of reproductive stems produced at least one mature fruit, each containing roughly 100 wind–dispersed seeds.

Conclusions

In Canton Ticino, *A. syriaca* is still restricted to small, cultivated or ornamental populations escaped via vegetative growth and shows minimal sexual reproduction, indicating low propagule pressure. Thus, early eradication is still feasible and strongly recommended to prevent future spread and minimize long–term management costs.

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Ecology and conservation biology of *Vicia pisiformis* in Switzerland

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Background and Aims

Vicia pisiformis L. is a rare and critically endangered species in Switzerland, with remnant populations confined to Valais and Graubünden. Its ecology and conservation biology remain poorly understood, yet essential for preventing further declines. This study aimed to update the species' distribution, assess demographic status, identify key ecological requirements, and develop evidence-based conservation measures.

Methods

Between 2022 and 2024, systematic field surveys, including phytosociological relevés, were conducted across historical and current sites using standardized monitoring protocols. Population size, reproductive performance, and habitat conditions were recorded. Threats were assessed through stakeholder interviews and direct observation. Complementary *ex situ* actions included seed banking and cultivation trials.

Results

In Graubünden, the species was not confirmed in the existing sites, but a new small population was found in Val Poschiavo, where conservation measures stabilized its size. In Valais, the largest Swiss population persists in the Champ Long–Les Salaux area, covering ~50,000 m² and supporting several thousand individuals under semi-open chestnut groves and shrublands. Smaller satellite populations, growing in the close surrounding areas, host only 1–10 individuals each and are at high risk of extinction. Ecologically, *V. pisiformis* thrives in forest edges and open forests (*Geranion sanguinei*, *Trifolion medii*, *Pruno–Rubion*, Chestnut and Beech forests), benefiting from extensive grazing and late mowing that limit habitat closure. Main threats include successional overgrowth, premature mowing, fungal infections, and inbreeding depression in small populations.

Conclusions

The updated distribution highlights Switzerland's crucial responsibility – especially the canton of Valais – for safeguarding *V. pisiformis*. An inter-cantonal Action Plan (2025–2028) has been promoted by the Amt für Natur und Umwelt Graubünden (ANU), integrating *in situ* management (habitat improvement, reinforcement, reintroductions) with *ex situ* conservation (seed banking, botanical garden cultivation). Coordinated, long-term efforts are essential to secure the persistence of this species.

Is climate warming affecting the forage quality and diversity of alpine hay meadows?

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Background and Aims

The effects of climate change on forage crops have been widely documented worldwide, but they have been scarcely investigated in Alpine contexts, where they often intertwine with land abandonment or management intensification. This study aimed to assess floristic changes in the hay meadows of central Alps (Valtellina, Northern Italy) over the last two decades, in order to identify signals potentially attributable to climate warming.

Methods

In 2022, seventy-nine phytosociological relevés, originally surveyed in 2005 and randomly stratified along an altitudinal gradient (valley bottom, slope, high elevation), were revisited. Biodiversity indices and Landolt ecological indicators were calculated. Temporal differences were tested using the Wilcoxon non-parametric paired sample test.

Results

Biodiversity indices (species richness, Shannon index, evenness) did not show significant variations. The forage value index increased in valley bottom and high-elevation grasslands, though not significantly, while it decreased on slopes. Landolt's F index (moisture) significantly decreased across all grassland types, indicating a progressive increase of thermophilus and meso-thermophilus species, consistent with a generalized climate warming. Conversely, Landolt's N index (nitrogen) significantly decreased, contrary to expectations based on increased nitrogen loads in valley bottoms. This trend may be explained by greater soil aridity, which limits the development of nitrophilous species. The significant positive correlation between N and F indices confirmed that nitrophilous species are associated with higher edaphic moisture.

Conclusions

Our findings indicate that climate warming is not significantly altering species richness or overall biodiversity of Alpine hay meadows. However, it is reshaping community composition through a thermophilisation process, with a marked increase of warm-adapted species and a reduction of moisture-demanding and nitrophilous taxa. These changes are accompanied by divergent trends in forage quality: a slight, non-significant increase in valley bottom and high-elevation grasslands, and a decrease on slopes. Therefore, while forage quality is showing localized and contrasting responses, the broader floristic shifts clearly reflect the influence of climate warming on Alpine hay meadow communities.

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Drivers of invasion success and impacts of the alien *Senecio inaequidens* in Northern Italy

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Background and Aims

Understanding the drivers of invasion success and the impacts of alien species is essential to tackle this global issue, particularly given the context-dependence of invasion outcomes. *Senecio inaequidens* (Asteraceae) is one of Europe's most rapidly spreading alien plants, especially in mountainous systems. This study aimed to identify the factors promoting its invasion and evaluate its ecological impacts across different habitats in Northern Italy.

Methods

In Lombardy, we selected six sites (three high- and three low-productivity habitats), each with five invaded and five uninvaded plots (60 in total).

We measured soil properties, resident vegetation, and bacterial communities in bulk soil, rhizosphere, and root endosphere of *Senecio*. Correlations between these variables and alien plant performance were assessed in invaded plots, while ecological impacts were evaluated by comparing invaded and uninvaded plots.

Results

Senecio inaequidens performed better in low-productivity habitats, showing higher cover and floral production. Its invasion success decreased in denser and species-rich communities but increased where native species were phylogenetically and functionally similar to *Senecio*. Roots hosted distinct endophytic bacterial communities, including many plant growth-promoting strains that correlated with *Senecio* height and cover. No negative effects on resident diversity were detected: plant and, to a lesser extent, bacterial diversity were higher in invaded plots, particularly in low-productivity sites, suggesting facilitation under stressful conditions. Soil chemistry remained unaffected.

Conclusions

Our findings show that *Senecio* success is shaped by both abiotic and biotic factors. The integration of plant, community, and microbial data highlights the potential role of endophytic bacteria in promoting invasion, especially in stressful habitats. These insights contribute to a more nuanced understanding of biological invasions across environmental contexts.

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The drivers of urban plant diversity in Lugano, Zurich and Geneva

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Background and Aims

Compact city development and urban green spaces (UGS) have gained political momentum as key strategies for sustainable cities. However, limited space creates tension between urban densification and green spaces, placing increasing pressure on plant diversity. The heterogeneity of UGS, shaped by diverse uses and management practices, plays a key role in driving urban plant diversity. This diversity includes native and non-native species, which likely respond differently to human-related and environmental drivers. Understanding and quantifying these mechanisms across types of UGS is important for guiding urban planning strategies that balance ecological sustainability and urban needs.

Methods

We recorded plant species in five representative UGS types (allotment, private garden, real estate, park, ruderal) across three culturally distinct Swiss cities (Geneva, Zurich, Lugano). Using community ecology concepts and General Linear Models, we assessed how UGS type, cultural context, ecological conditions, and management practices affect native and non-native plant diversity.

Results

We observed consistent positive associations between habitat diversity and alpha diversity across the different plant categories, suggesting that structurally complex UGS support richer communities. In contrast, higher levels of disturbance and local built surface (100m radius) were generally associated with lower alpha diversity. Time investment showed a modest positive effect, while built infrastructure at a broader scale (1000 m) had little to no apparent influence.

Conclusions

Our findings highlight the critical role of human management in promoting urban plant richness, underscoring its value for sustaining biodiversity within compact city frameworks. Management practices that reduce disturbance and maintain structural complexity, can enhance native and non-native plant diversity. These insights can inform urban planning strategies that balance densification with ecological sustainability by emphasizing habitat diversity and low-disturbance management practices.

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Primi censimenti del progetto di monitoraggio di piante vascolari prioritarie in Cantone Ticino

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Introduzione e obiettivi

Nel 2022, nel Cantone Ticino (Svizzera), è stato avviato un progetto di monitoraggio volto a stabilire lo "stato zero" di 12 piante vascolari prioritarie e di rilevanza cantonale, identificando potenziali minacce. Le specie monitorate erano: *Asphodelus albus*, *Botrychium lanceolatum*, *B. multifidum*, *Cytisus emeriflorus*, *Gladiolus imbricatus*, *Inula hirta*, *Isoëtes echinospora*, *I. lacustris*, *Phyteuma scorzonerifolium*, *Pseudostellaria europaea*, *Saponaria lutea* e *Tulipa sylvestris* subsp. *australis*.

Metodi

I censimenti si sono svolti dal 2022 al 2024 e sono stati eseguiti attraverso l'applicazione FlorApp e un GNSS. Per ogni taxon sono stati adottati metodi di monitoraggio adattati alle dimensioni delle popolazioni conosciute nel Cantone Ticino: conteggio, definizione del perimetro delle stazioni o applicazione del metodo PopCount.

Risultati

Asphodelus albus è presente con 21 stazioni ed è minacciato dall'imboschimento naturale. *Botrychium lanceolatum* e *B. multifidum* sono stati individuati in singole stazioni con un solo individuo. *Cytisus emeriflorus* è stato ritrovato in una grossa stazione, ma sembra in regressione nelle radure sassose in altitudine. *Gladiolus imbricatus* è presente in otto stazioni, mentre *Inula hirta* in 27, entrambe le specie sono minacciate dal cambiamento nella gestione del territorio. *Isoëtes echinospora* ed *I. lacustris* presentano popolazioni importanti, ma vulnerabili al calpestio. *Phyteuma scorzonerifolium* è stata ritrovata in 26 stazioni e a volte è confusa con specie simili. *Pseudostellaria europaea* è presente in cinque stazioni e non è minacciata dalla gestione attuale del bosco. *Saponaria lutea* è stata censita in otto stazioni e non presenta minacce immediate. *Tulipa sylvestris* subsp. *australis* è stata confermata in tre stazioni ed è stata scoperta in una nuova, ma è a rischio per le dimensioni molto ristrette delle superfici su cui si trova.

Conclusioni

La continuità del monitoraggio sarà fondamentale per valutare l'evoluzione delle popolazioni e sviluppare strategie di conservazione mirate. Si raccomandano censimenti a intervalli differenziati in base alla specie e alla vulnerabilità del loro ambiente.

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Flora Raetica: a citizen science project capturing a century of floristic changes in Grisons (Switzerland)

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Background and Aims

Flora Raetica (FloRae) is a Citizen Science project aiming to produce a new regional Flora of Grisons, the largest Swiss canton (7105 km²), to be published 100 years after the legendary “Flora von Graubünden” by Braun–Blanquet & Rübel (1932–35). After the first half of the planned survey period (2021–2028; followed by a period of preparing the flora manuscript, 2029–2031) with the contribution of 130 citizen scientists, FloRae is already generating significant impacts on both science and society.

Methods

Volunteer botanists detect the current occurrences of approximately 3000 taxa from 2021–2028 using Infoflora’s methods (missions, flash quadrats) and tools such as FlorApp. Historical species occurrences are being georeferenced based on 100’000 locations published in the old flora (1932–35). A mid–term analysis has been conducted to evaluate how representative the collected data are so far, with respect to geographical coverage, topographic gradients, and taxonomic groups.

Results

During the first four years of field exploration, 250’000 observations were recorded, reaching 2’750 taxa. Most of the data are from the lower Engadine and the valleys of Rhine, Landwasser and Landquart. In contrast, the South–Alpine valleys of Mesolcina, Bregaglia, and Poschiavo show comparatively few survey hikes. Volunteers tend to prefer easily accessible regions with well–developed tourist infrastructure rather than high altitude remote valleys and mountains. Comparing historical and current species occurrences, using functional groups, showed that mountain species haven’t changed in distribution (97% persistence) in contrast to species of arable land (63%) and waterbodies (60%). The highest proportion of species newly recorded in Grisons were found in pioneer habitats. Most newly reported species are neophytes.

Conclusions

Comparisons between current and historical records indicate substantial changes in the flora of low–elevation areas. In contrast, species of high elevations have persisted in their habitats. The project strengthens botanical knowledge among non–specialists, raises public awareness about the value of biodiversity and enhances floristic databases for nature conservation planning.

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Abundance-based plant species identity shifts pollinator-plant interaction structures in alpine meadows

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Background and Aims

Plant communities often exhibit a strongly skewed abundance distribution, with a few species being locally abundant and many others remaining rare. In flowering communities, such abundance-based “species identity” (i.e., abundant vs. rare flowering species) is not static but can shift over time due to environmental change or biotic feedbacks. However, it remains unclear how such identity shifts affect both intra- and interspecific interactions mediated by shared pollinators, and ultimately shape plant community structure and species coexistence.

Methods

We conducted a potted transplant experiment in alpine meadows of the Qinghai-Tibetan Plateau to simulate bidirectional identity shifts along a flower abundance gradient. We reduced the flower abundance of a naturally abundant species (*Ranunculus tanguticus*) and increased that of a naturally rare species (*Aster souliei*), while keeping the co-flowering associate (*Trollius farreri*) constant. We monitored pollinator visitation and pollen deposition to evaluate how species identity shifts influence pollination dynamics.

Results

Across both identity shifts, pollinator-mediated interactions showed a consistent pattern: when focal species (*R. tanguticus* and *A. souliei*) were rare, they facilitated or neutrally coexisted with neighbours; as their abundance increased, interactions shifted toward competition, reducing pollination on co-flowering species through pollinator preference and heterospecific pollen interference. Meanwhile, conspecific pollen deposition on focal species declined with abundance, indicating negative density dependence.

Conclusions

Our findings demonstrate that flower abundance-based identity shifts can fundamentally reshape pollinator-mediated interactions. It is not species-specific traits, but the status of being abundant that tends to experience and exert more competition, while rare species are more likely to benefit from facilitation. These abundance-based identity shifts highlight the dynamic nature of species interactions and their importance for biodiversity maintenance in changing communities.

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