ABSTRACT BOOK OF THE INTERNATIONAL SYMPOSIUM FloraMac2022

San Sebastián de La Gomera
Canary Islands

12-16 September 2022

ABSTRACT BOOK

INTERNATIONAL SYMPOSIUM

FloraMac2022

San Sebastián de La Gomera, Canary Islands

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PRESENTATION

FloraMac 2022 is an international symposium that aims to bring together during a week, both senior and novel local-based or continental researchers working on different disciplines (i.e. taxonomy, ecology, biogeography, reproductive biology, vegetation science, genetics, phylogeography, paleoecology, evolutionary biology, conservation biology, history of science, etc.) regarding the terrestrial and marine flora and vegetation of the Macaronesia biogeographical region (Azores, Madeira, Salvages, Canaries and Cabo Verde).

FloraMac (diminutive of Flora of Macaronesia) conferences started in summer 2010 with the very first event held in Ponta Delgada (São Miguel) in Azores and hosted by the University of Azores. Two years later, it moved to another Macaronesia archipelago, this time Madeira, where the University of Madeira organized the 2nd FloraMac event in summer 2012. It was not until summer 2015 when FloraMac jumped for its first time to the Canaries, specifically to Gran Canaria, where the Jardín Botánico Canario "Viera y Clavijo" - Unidad Asociada al CSIC, hosted the 3rd FloraMac event in Las Palmas de Gran Canaria. Three years later FloraMac jumped back to Madeira, where our colleagues from the University of Madeira organized the 4th FloraMac event, which took place in summer 2018. Finally, a couple of years ago the University of La Laguna and the Institute of Natural Products and Agrobiology – IPNA CSIC (Tenerife) assumed the responsibility of organizing the 5th FloraMac event, which although initially scheduled for summer 2021 was inevitably postponed due to the COVID pandemic to September 2022 and take place in San Sebastián de La Gomera.

FloraMac conferences continue with the tradition that started ca. 50 years ago in 1973 in Las Palmas de Gran Canaria (Canary Islands), followed in 1977 by the 2nd event in Funchal (Madeira), with the organization of a regional symposium called "Congreso Internacional Pro-Flora Macaronésica" that gathered researchers working with very different approaches in the terrestrial and marine flora and vegetation of the Macaronesia Region. Some decades later, this event was replaced with the "International Symposium Fauna and Flora of the Atlantic Islands" which took place as much as five times in several places (1st in Funchal, Madeira in 1993; 2nd in Las Palmas de Gran Canaria, Canaries in 1996; 3th in Ponta Delgada, São Miguel, Azores in 1998; 4th in Praia, Santiago, Cabo Verde in 2000, and 5th in Dublin Ireland in 2004), before its final disappearance.

In this book you will find all the abstracts of the contributions presented by invited researchers, oral communications, and posters of the fifth FloraMac conference, which take place in San Sebastián de La Gomera (Canary Islands) between the 12th and 16th of September 2022.

The organization committee

FloraMac2022

San Sebastián de La Gomera, Canary Islands
12-16 September 2022

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of coastal habitats via changes in important physical, chemical, and biological processes, which can strongly impact the structure and functioning of coastal ecosystems. Studies here will show how coastal defense structures could be modified, including adding simple topographic features such as pits, grooves, cracks, or water-retaining structures, to increase the biodiversity they support. Especially relevant ecosystems in these archipelagoes, also affected by coastal urbanization, are coastal marine forests, key species increasing the structural complexity and providing habitat and food for many associated species, and extremely threatened by different impacts of local and global origin, putting their stability and survival in question. Research developed will provide some inputs to build solutions and feed strategies for restoring marine ecosystems. This information is particularly relevant in the recently launched United Nations Decade of Ocean Science for Sustainable Development, Decade on Ocean Science for Sustainable Development, and Decade of Ecosystem Restoration.

Searching the keys of invasiveness on islands: a phylogenomic and functional approach in the family Asteraceae

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Invasive species are recognized as one of the key drivers of global biodiversity loss. Oceanic islands harbor a fragile and unique biota that make them especially vulnerable to invasive species. However, the factors behind the invasive success of certain species remain uncertain. Charles Darwin proposed two opposing hypotheses to predict the species invasive potential, known as the Darwin's Naturalization Conundrum (DNC). First, the "pre-adaptation hypothesis" proposes that species closely related to the native community have similar characteristics that make them pre-adapted to establish and spread under the same local environmental conditions. Alternatively, the "naturalization hypothesis" predicts that species distantly related to native species can exploit empty niches and avoid competitive exclusion, having a higher invasive potential. These two hypotheses, which rely on environmental and biotic filters respectively, can contribute to determine invasive success. In practice, the study of the DNC can be addressed by assessing two different dimensions of relatedness between species: phylogenetic and functional relatedness. In this talk we present the project ASTERALIEN that aims to test the DNC in the Compositae family, the most species-diverse plant family in the Canary Islands. From a phylogeny that includes all the genera and most of the species present in the archipelago, we estimated the phylogenetic relatedness between alien (invasive and non-invasive) and native species. In addition, functional traits were measured from all the species collected in the field and functional distances were calculated between alien and native species. Integrating both phylogenetic and functional approaches, it allows us to explicitly assess the invasive potential of alien species of the Compositae family under the framework of the DNC.

integration of scientific and local knowledge is required, but no comprehensive list of the useful plants is available. Many species have been introduced since the 15th century to support colonization and commercial interests. The main goal of this communication is to evaluate: 1) the floristic diversity and its phytogeography; 2) the role of geophysical, historic, and socio-economic factors in the distribution and use of these species; 3) species potentially relevant to sustainable development. Data were obtained from floras, scientific publications, historical documents, herbarium specimens and field work. We identified 518 useful taxa, of which 145 are natives, 38 of them endemic, 373 introduced and 44 endangered. The number of useful taxa is correlated with altitude and agricultural areas, as well as with rural population indicators, but not with socio-economic indicators such as total population or gross domestic product. Native species are mainly used for wood, firewood, fodder, and other purposes. The data and information collected indicate that agrobiodiversity and traditional practices seem crucial to cope with recurrent droughts and ensuring food security. They also indicate that overuse of some native taxa has caused, and continues to cause, significant impacts on their conservation that must be minimized. The sustainable management of populations of native species can contribute not only to the food security of local communities, but also to the sustainable growth of the local economy.

OP11

Biogeographic origins and drivers of alien plant invasions in an oceanic archipelago

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Understanding the historical and contemporaneous determinants of invasion success in island systems can help to decisively contribute to identifying sources and designing strategies against the scenarios that are more likely to give rise to new invaders. Herein, we investigate the origins of the invasive alien flora of the Canary Islands, with emphasis on the mechanisms shaping its spatial organization within the archipelago. An updated checklist of the invasive alien flora of the Canary Islands was compiled together with key complementary information, including native biogeographical regions, stage of invasiveness, and dates of naturalization. Our updated list includes 149 alien plant species with a certain degree of invasiveness. The Neotropics stood out as the region providing the highest number of invasive species, followed by the Cape Region, tropical Africa, and the Mediterranean Basin. We observed a slow but steady increase in numbers of invasive species until the 1950s, followed by a stronger rise thereafter. Among various possible mechanisms, we reveal that climatic similarity seems to best explain patterns of composition dissimilarity within the invasive flora among islands. Interestingly, the Neotropical region stands out as the main source of plant invasions to the Canary Islands, outnumbering those from other regions with a Mediterranean-type bioclimate, emphasizing the importance of historical trade networks. Our study brings attention to the importance of archipelago dependent assessments of the underlying mechanisms that contribute to plant invasion success in oceanic archipelagoes.

OP19

Climate change impact in laurel forests at Garajonay National Park

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Garajonay National Park is well known because of the laurel forest, a unique ecosystem that demands high humidity and mild temperatures. Potential distribution of this very special ecosystem is associated with the presence of frequent fogs in the western Canary Islands. The values of the environmental parameters conditioning the growth of laurel forests, especially precipitation, are reaching critical minimum or extreme levels. There is a clear reduction of normal rainfall in the last three decades. Same happens with forest throughfall, with some remarkable exceptions, like the ridge areas of the Park, where it has hugely increased. Though we have no clear evidence of temperature rise at the Park, a worrying decrease of permanent streams water flow has been detected. Severe impacts in some forest areas are especially visible during the dry season, when vegetation show clear signs of crown defoliation, leaf damage and desiccation. Forest dieback is also a real issue in extensive areas and take place in different ways, depending on topography, forest maturity, soils and other factors. There is not a clear explanation for this dieback, but climate change will aggravate, with no doubt, this phenomenon. All of this will increase the vulnerability of these forests to wildfires. This risk is exponentially multiplied with the abandonment of traditional uses of the land of the human populations surrounding the Park. This facilitates the expansion of young forests and the increase of shrub cover, both of them highly flammable, in the outskirts of the mature laurel forests. There is also a rise in the number of fires provoked by humans, as a consequence of the loss of the previous existing links with their ancestral land. This set of factors will induce a growing exposition of laurel forests to the danger of great catastrophic wildfires.

OP20

Vulnerability of cloud forests to climate change: what can we learn from high-resolution climatologies in a topographically complex oceanic archipelago?

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Cloud forests, ecosystems experiencing from persistent to frequent low-level cloud cover, exhibit extremely high levels of biodiversity with large percentages of endemism. On islands, cloud forests are often relatively small, isolated patches, which make them sensitive to climate change. To improve our understanding of cloud forest response to global warming, we developed CanClim, a high spatial resolution climate model of the Canary Islands. In particular, by downscaling the 30-arc-second resolution climate model

pollinator to the visitor type. c) Reward: structural changes the reward step (a role played mostly by nectar) ensures the binding of the mutualistic network; we had established the correlation between nectar output and the size and thickness of secretory tissues in sepal trichomatous nectaries. Based on the previous knowledge of the transcription factor (CRC) gene and its conserved role across Malvales as the homeotic gene for nectary establishment, we detect unequal expression patterns that can be associated to nectar outputs between ornithophilous an entomophilous species. By using this dual genomic and transcriptomic approach, we gain insights into the mechanisms of evolution ocurring in pollinator-flower interaction shifts across the whole flower structure, which have so far being studied from an ecological perspective or on isolated traits.

Session 9:
Management and conservation

OP41
Assessing the environmental framework and dispersal ability of threatened Canarian endemic plants as a tool to improve their conservation status

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NEXTGENDEM (MAC2/4.6d/236) is an ongoing research project that provides a bioinformatic framework to address *ex situ* conservation questions through the analysis of multiple biotic and abiotic data associated with Canarian endemic species and their distribution areas. This context is increasingly allowing us to develop biotic and environmental characterizations of a large number of taxa endemic to Gran Canaria and other Macaronesian islands. In this communication, we pick out some representative actions suggested by the analyses of 25 Canarian endemic plants catalogued in different threat categories, which were selected as prominent examples of taxa that may require a holistic analysis to properly design management strategies that help ensure their preservation. We hereby present the results of an integrated Geographic Information analysis of multiple data layers related to ecological, geographic, biometric and reproductive parameters tentatively related to dispersal ability to improve their management and conservation status on the island of Gran Canaria, and to help propose new protected areas. Importantly, NEXTGENDEM actions have also substantially increased the representation of many Gran Canarian endemic species in our repositories and banks of biological samples and data, even increasing the number of living individuals in reinforced populations of highly threatened taxa, as *Sideritis amagroi* (Lamiaceae) or *Digitalis chalcantha* (Plantaginaceae), among other.

OP42
Preliminary quantification of the role of *Euphorbia balsamifera* dominated scrubland in the carbon stock of Tenerife, Canary Islands

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The consideration of terrestrial ecosystems as carbon sinks is usually linked to forests and arboreal species. However, in the Canarian archipelago there are mature ecosystems dominated by native shrub species that could be acting as sinks and contributing to the Canarian carbon stock. Scrublands occupy around 25% of the archipelago land area, and specifically, sweet spurge scrub occupies 13% of the scrubland zones of Tenerife. Here we present preliminary data about the total amount of carbon stored in sweet spurge scrub or "tabaibal dulce" on the island of Tenerife. The carbon stored in this community was calculated from the estimation of its amount of biomass per unit area and plant cover. A total of 15 plots of 400 m^2 were set up to achieve a representation of the community throughout the island. We measured all the individuals of a set of seven species that we considered major contributors to the scrubland biomass. Measurements included height, two diameters and basal stem diameters when possible. We built preliminary allometric equations using their volumetric data to estimate the dry biomass of individuals of *Euphorbia balsamifera, E. canariensis, E. lamarckii, Kleinia neriifolia, Launaea arborescens, Plocama pendula*, and *Schizogyne sericea*. Once the average of the carbon stored in the sweet spurge scrubland per unit area was calculated, it was extrapolated to the total area occupied by this plant community in Tenerife. The necessity of protection and conservation of the Canarian ecosystems with the aim of preserving the natural heritage is more than accepted. However, the ecosystem service of carbon sequestration done by native species, not only trees, but also shrubs, could be another reason for the conservation and restoration of natural and degraded areas, respectively, in the Canaries.

OP43
INVASION project: towards an integrative approach for the study of plant invasion processes on the islands of Tenerife and Gran Canaria

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The introduction of plant species by human action is currently one of the main threats against the conservation of biological diversity. When exotic species invade new territories, they significantly modify the structure of native communities and the ecosystem functioning. The mechanisms that modulate the stages of invasion are still under debate and deeply rely on exotic specific-level traits and their relationship with native communities. In this context, the Darwin Naturalization Conundrum (DNC) provides opposing hypotheses about the potential of exotic species to invade native communities. On one hand, the "naturalization hypothesis" posits that alien species far related with native species should be more likely to invade due to niche partition or niche emptiness (biotic filtering acting). On the other hand, the "pre-adaptation hypothesis" proposes that close relativeness of alien species with native communities may facilitate the establishment due to potential adaptations to similar environmental conditions (environmental filtering acting). In the INVASION project, we focus on three of the main ecosystems (laurel forest,

pine forest and dry shrublands) of the islands of Tenerife and Gran Canaria to study invasive processes under the framework of the DNC. Our main objective is to deepen our knowledge of the mechanisms of invasion in oceanic islands. We integrate ecological, functional, and phylogenetical approaches to explicitly test the hypotheses proposed in the DNC. Our preliminary results highlight that functional relatedness between exotic species and native community together with species richness have a role on establishment and invasion success.

OP44

Eradication treatments of an invasive species (*Ulex europaeus* L.) in Tenerife and their effect on local vegetation composition

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Understanding natural plant succession on abandoned areas is important for ecosystem restoration. However, invasive plant species affect natural processes. This is especially challenging in island ecosystems characterised by high biodiversity in reduced areas, where invasive species can displace endemic flora, impacting their development, reducing their distribution, and potentially leading to extinctions. In this study we test the effect of different eradication treatments on two abandoned agricultural areas in Tenerife (Canary Islands, Spain), which are currently dominated by gorse (*Ulex europaeus L.*). We applied four different treatments: mechanical, chemical, mixed (mechanical and chemical) and mixed with endemic flora plantation. Sampling was carried out monthly from January 2018 to January 2019. We use detrended correspondence analysis (DCA) to compare the effects of the different treatments and seasonal variation on vegetation composition. Preliminary results show that the most aggressive mechanical treatments generate changes in vegetation composition. Seasonal changes were also observed, but overall, we report that mixed treatments can help natural succession of native plants reducing gorse cover.

Session 10:
Management and conservation

OP45

A worrying arrival: The first record of *Rugulopteryx okamurae* in Madeira Island and its invasive risk

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new focus and containment). A catalog of IAS or potentially invasive species for the island has been elaborated and a management requirement card with useful information prepared for each taxon. We have identified their main introduction pathways and the most relevant impacts on their habitats of interest. The prioritization carried out does not provide a single priority list, but aims to provide flexible lists to suit different, clear, and achievable management objectives. These lists should be susceptible to future changes, unavoidable due to the rapidly changing dynamics of this problem. This study, financed by the Government of the Canary Islands, and framed within the actions carried out by RedEXOS (Red de Alerta Temprana de Canarias) contributes to building collaboration channels between the different administrations. This is necessary to achieve actions with a high possibility of success, follow actions performed so far with several species in an effective way, and increase the number of taxa managed based on existing resources.

P37

Carbon storage of *Euphorbia balsamifera* on the island of Tenerife, Canary Islands

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Euphorbia balsamifera is the dominant species in the vegetation community of "tabaibal dulce" or sweet spurge scrub. It is accompanied by other relevant species such as *Schizogyne sericea*, *Plocama pendula* or *Kleinia neriifolia.* This scrub ecosystem is well represented in the Canary Islands, contributing with a significant amount of biomass and therefore having a role in the reduction and compensation of the carbon footprint. The main objective of this work is to estimate the biomass and the carbon content stored by *E. balsamifera* in the sweet spurge scrub on the island of Tenerife. We studied the coverage of *E. balsamifera* within the sweet spurge scrub. We set up 15 plots on the island of Tenerife considering different elevations to get a good characterization of the community throughout its distribution. Our data show that *E. balsamifera* has on average, a 35% of coverage within this plant community. We then estimated the aerial biomass of *E. balsamifera* per unit area. In total, 21 individuals with different sizes and morphologies were cut off in well preserved areas of sweet spurge scrub. Additionally, we measured volumetric data from each individual. Biomass per unit area and plant coverage were then used to estimate the total amount of carbon stored by *E. balsamifera* on Tenerife. Finally, we developed an allometric equation to estimate the aerial biomass (fresh and dry) for the species from morphometric data, to avoid the use of destructive methods when estimating biomass in future research. This study showed the contribution of *E. balsamifera* on carbon storage of the Canarian coastal vegetation and will be useful for future management measures aiming to offset the carbon footprint of Tenerife.

P38

IV inventory of flora of La Caldera de Taburiente National Park: GIS applied to field data collection

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identification rates for flowering plants are impressive, for ferns they are lower, and bryophyte observations rarely reach species level. This is unlikely to improve since citizen scientists cannot provide microscopic details required for reliable identification of bryophytes. In conclusion, the project delivers high-quality distribution data for flowering plants but its use for bryophytes seems limited.

P40

Development of an allometric equation to estimate the carbon storage in *Plocama pendula* Aiton

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Understanding the contribution of different species to the carbon sequestration in the current climate crisis could guide conservation plans in different ecosystems to mitigate human carbon emissions. The Canaries are a particular case because of their biodiversity and the uniqueness of the flora, so it is necessary to carry out specific studies for most species. *Plocama pendula* (known as balo) can be found in the coastal scrubland in the island of Tenerife, an ecosystem characterised by shrubs and herbs adapted to dry and warm conditions. Within the coastal scrubland, P. pendula can be found in different vegetation communities such as baleras (the community dominated by P. pendula itself) and the tabaibal dulce (the coastal scrubland dominated by *Euphorbia balsamifera*). The aim of this study is to construct an allometric equation to estimate the dry biomass of *P. pendula* individuals from their volumetric data. For developing this equation, 18 individuals of P. pendula were cut off in different sites within Natural Protected Areas of Tenerife. In the field, we measured the fresh weight, and, in the laboratory, the dry weight by drying the samples in the oven. Sampled individuals had different sizes to try to obtain the whole variability within the species. We also took volumetric variables, two main diameters and height, phenology and vitality of each individual. In the laboratory, the woody part was separated from the photosynthetic part, to obtain the ratio and their percentage of water content for the species. With the dry weight of each individual and the volumetric variables we created an allometric equation for the species. This equation can be used to estimate biomass for each individual of the species in a certain area, thus making the destructive method of cutting the individual no longer necessary. This research is part of an ongoing project financed by the Canarian government that will assess the Canarian ecosystem capacity to capture and store atmospheric carbon.

P41

Does fitness of *Cenchrus setaceus* modulate germination?

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Fountain-grass, *Cenchrus setaceus* (Forssk.) Morrone (syn. *Pennisetum setaceum* (Forssk.) Chiov.), is an invasive species which greatly expands in Tenerife, Gran Canaria and La Palma, outcompeting endemic flora. In the last years, across islands, weaken plants with symptoms like stunting, chlorosis and browning of leaves, leafspots and blackened leaves