The Betulaceae family joins us together. Iceland, Slovenia and Spain have more things in common than we thought

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Introduction

The group of the Alders, Birches and their relatives is characterized for being deciduous and monoic dicotyledonous trees. They are usually found in temperate zones and mountain zones located in the tropics. There are between 70 and 157 species, classified into six genus. Many of these are found in the North Hemisphere, Europe, some parts of Asia, North America and North of Africa.

Our research goal is to see how temperature, altitude (which directly affects the temperature of the environment), rainfall, latitude and soil type influences the growth of specific species of Birch, Alder and relatives, and what conditions are the most favourable to the development some species instead of others depending of their geographic location conditions.

Materials and methods

In order to study this aspect, we have analysed which type of Birches, Alder and relatives there are in some regions of the North of Spain (Pamplona), Iceland and Slovenia, and we have also compared the different climates, levels of precipitation and the type of soils characteristic to these regions . In addition, we have analysed which species three places have in common, and which one of them appears individually in each of them.

To carry out the data collection necessary for the investigation, we have used the following platforms: iNaturalist and Iberian chrysomelids. From the data collected in these platforms, we have created three tables (one for each country) in order to pick up which species appear in each region, be able to compare their similarities, and investigate how the climatological and orographic characteristics influence the existence of one type of species or another in these countries.

In the platform https://www.inaturalist.org (species) the research terms used are: *Betulaceae* family and its location (Pamplona, Iceland or Slovenia)

In the web site http://crisomelidosibericos.com/ (species) the research terms used are: plants, families, *Betulaceae.*

In the web site: *https://es.climate-data.org/* (type of climate) the research terms used are: continent: Europe, country: Spain, Iceland, Slovenia and place (a specific city).

In the web site https://www.geodatos.net/coordenadas (latitude) the research terms used are: country (the three of them) and specific cities.

In the following web sites (average temperatures) the research terms used are: country
https://www.weather-atlas.com/es
https://www.weather-es.com/es
https://es.weatherspark.com

Results

We have seen the great diversity of species in the Betulaceae family, able to live in different climates and environments. Analysing the data of the tables we have prepared to register the different species, we have inferred that the main species from each country are: the Common Birch, which is found in the three countries; *betula nana*, found in Iceland; the *Ostrya carpinifolia*, found in Slovenia and the *Corylus maxima*, found in Spain


Common Birch, from Naturaleza Para Todos


Betula nana. from: Wikimedia Commons


Ostrya Carpinofolia. from: Guía Verde


Corylus máxima. from Botánica y Jardines

To verify what was the cause for these species to grow in some places or others, we investigated the characteristics of the three countries and growing conditions of these species.

Place	Type of Climate	Average temperature: Winter	Average temperature: Summer	Average rainfalls	Latitude
Spain (Pamplona)	Oceanic	5,8 ºC	20,3ºC	1042 mm	42°N
Slovenia (Ljubljana)	Oceanic with continental characteristics	2,6ºC	20,5ºC	1290 mm	46°N
Iceland (Reykjavik)	Oceanic	0,4 ºC	10,2ºC	869 mm	64°N

Table 1: Variables

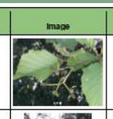
Name	Image	Place
Aliso (*Alnus glutinosa*)		Pamplona
Avellano (*Corylus avellana*)		Irache
Carpe Blanco (*Carpinus Betulus*)		Taxón amenazado (ubicación no disponible)
Avellano (*Corylus maxima f. atropurpurea*)		Cantabria
Aliso Común (*Alnus lusitanica*)		Soria
Abedul Común (*Betula pendula*)		Pamplona

Table 2: Spain's birches

Name	Image	Place
Betula pubescens		Reykjavik, Iceland
Betula nana		Southern Region, Iceland
Abedul común		Akranes, Iceland Reykjavik, Iceland
Alnus incana		Western Region, Iceland Lyngbraut, Iceland Gnúpverjahreppur, Iceland
Betula pumila		Northeastern Region, Iceland

Table 3: Iceland's birches

Name	Image	Place
Avellano (*Corylus avellana*)		Ljubljana
Carpinus (*Carpinus betulus*)		Ljubljana
Abedul Común (*Betula pendula*)		Ljubljana
Aliso Común (*Alnus glutinosa*)		Ljubljana
Carpe Negro (*Ostrya carpinifolia*)		Idrsko
Abedul Gris (*Betula populifolia*)		Zagreb

Table 4: Slovenia's birhces

In the table 1, we can appreciate some of the variables we have taken into account to do the research. As we can see, the climate is very similar in the three countries; however, the climate from Spain and Slovenia has more similarities than with the one from Spain and Iceland, both of the countries have a similar average temperature, while the one in Iceland is much different (with more extreme temperatures). That is the reason why we think that the latitude and the altitude have a powerful influence in the climate, and because of that, also in the species of plants and animals that can live there.

On the other hand, thanks to the resistance to different climates or environments of this specie, it is common that it can grow in different regions.

Conclusions

From the results we have obtained during this investigation, we can conclude that climate conditions are the key that determine which type of species grows in each region.

As seen, *Betula nana* is adapted to the low temperatures of Iceland; *Ostrya carpinifolia* is adapted to the huge amount of water from the average of rainfalls (1290) in Ljubljana (Slovenia); and *Corylus maxima* grows better in Spain since it requires a milder climate and more light. Only *Betula Pendula* is adapted to all three clymates.

Unexpectedly, we found out that the members of the Betulaceae family, present in these three regions, have more characteristics in common that we first thought in spite of the different weather conditions and latitudes of each country. Although it was not possible to study its phenology, we have been able to know more about the variety of species the Betulaceae family has, its remarkable resilience to adversities and the different medical properties the Birches have.

Acknowledgements

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