Global warming has driven Europe's mountain plants to migrate 2.7 meters upwards in 7 years

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Researchers at the University of Granada Department of Botanic have participated in an international study that has confirmed that global warming is causing plants to migrate to higher altitudes. The study –recently published in *Science*– analyzed species diversity shifts in 66 summits of 17 European ranges between 2001 and 2008.

In the Iberian Peninsula, two target regions were selected in the Pyrenees (Ordesa) and Sierra Nevada (Granada). Researchers found that the species under study had migrated an average of 2.7 m upwards. "This finding confirms the hypothesis that a rise in temperatures drives Alpine flora to migrate upwards. As a result, rival species are threatened by competitors, which are migrating to higher altitudes. These changes pose a threat to high-mountain ecosystems in the long and medium term" the authors state.

Boreal-Temperate and Mediterranean Summits

The study also reveals an average increase of 8% in the number of species growing in summits of European mountains. However, such increase is not general, as of the 66 peaks in boreal and temperate areas, the majority revealed an increase in species diversity, while 8 out of the 14 summits in the Mediterranean area revealed a decline in the number of species represented.

Furthermore, the study revealed that species diversity has changed more significantly at low elevation sites –at the upper limit of the forest or an equivalent altitude– in the Mediterranean region than in other regions.

In Mediterranean mountains (Sierra Nevada, Corsica, Central Apennines and Crete), the rise in temperatures is causing a decline in annual average rainfall, which results in longer summer droughts. Consequently, temperature rise and droughts pose a threat to unique endemic species.

The mountains that present the most significant shifts in species diversity are Mediterranean mountains –located in Southern Europe–, where climate is different to that of the rest of Europe. In general, moist-soil species are more vulnerable to climate change, though high-mountain endemic species are also affected. "For example, in Sierra Nevada, the observation plots revealed a decrease in the number of emblematic species such as *Androsacevitalianasubsp. Nevadensis* and *Plantagonivalisy Artemisia granatensis*", the University of Granada professor, Joaquín Molero Mesa, explains.

Another Sampling Site

Sierra Nevada has very special characteristics, as it is the only mountain range in the Iberian Peninsula that has Mediterranean climate from top to the hill foot. Consequently, the research group coordinated by professor Molero Mesa –with the special collaboration of Mª Rosa Fernández Calzado– placed another sampling site (four summits located at an elevation above 2500m high) in 2005. The purpose was to increase the sample size and obtain more reliable results. In two years, a comparative study of the results obtained in the first and second study will be conducted.

Thus, Sierra Nevada is the only mountain range with two target regions under observation. The research group is coordinated with the Observatorio de Cambio Global de Sierra Nevada, and has established –in collaboration with a research group from Morocco– another target region in the high Western Atlas, where observation plots and thermometers will be installed next summer. The purpose of this action is to better understand climate and species variations in the most vulnerable environment: the Mediterranean region.

Source: **University of Granada**

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