

Original article published in the Bündner Woche, August 28, 2024, p. 51

Research in Graubünden

Hidden interactions

Alpine plants and their inconspicuous herbivores



Julien Bota conducting fieldwork at Jakobshorn beside a warming chamber. Image: Léon Lepesant.

Just below the summit of Davos' Jakobshorn, at an altitude of 2500 meters above sea level with a view of the Sertig Valley, Julien Bota, a PhD student at the WSL Institute for Snow and Avalanche Research (SLF), works during the snow-free months. He reaches his research site — a mountain meadow divided into 24 five-by-five meter plots marked with blue and yellow stakes — via a bumpy gravel road in a four-wheel-drive truck.

Since last year, Bota, along with other researchers, has been exploring how herbivorous insects, snails, and fungal pathogens affect the plant communities in this area and two other sites at the Jakobshorn — one at Clavadeler Alp at 2000 meters above sea level and the other in the Landwasser Valley at 1500 meters above sea level. “We know a lot about large herbivores like marmots and deer, but the impact of insects, snails, and fungal diseases is still poorly understood,” Bota explains. Contrary to what one might intuitively assume, these smaller herbivores often enable the coexistence of various plant species.

This project is part of the international research network “BugNet”, initiated by Anne Kempel (SLF) and Eric Allan (University of Bern). Researchers across all continents except Antarctica conduct experiments in grassland ecosystems to uncover general principles about the interactions between plants and herbivores and to understand how these interactions influence ecosystems.

At the Jakobshorn, the focus is additionally on the effects of climate change on these interactions. Various scenarios are being studied to explore changes under future climate conditions. Although mountain plants and

their enemies can, to some extent, migrate to higher altitudes to escape warmer temperatures, this process can happen at different rates. As a result, high-altitude plant communities may encounter previously unknown herbivores from lower elevations to which they are not yet adapted. Additionally, warming can impact existing plant communities by increasing the activity and reproduction of herbivores or by favoring dominant plant species over slow-growing specialists.

To test these scenarios, Bota “transplants” eight plant species that occur at mid-altitudes to 2500 meters and 1500 meters above sea level. For this purpose, a nursery has grown 3000 seedlings, which Bota, with the help of students and civil service workers, plants at their new locations. Some plants grow in special warming chambers that simulate the expected temperature changes, while others are studied under natural conditions. Bota explains, “Our goal is to understand how warming changes the relationships between plants and their herbivores. It’s possible that altered interactions between species (animals, plants, fungi) could have even greater long-term impacts on plant populations and ecosystems than the direct effects of climate change on the individual species themselves.”

Julien León Bota and Daniela Heinen



Julien León Bota.

Image: Theo Fiedler

Graubünden forscht 2024”

On November 8 and 9, 2024, the Academia Raetica will host the ninth conference “Graubünden forscht” at the Davos Congress Center. On Saturday, November 9, 2024, the public is invited to gain insight into the diverse research activities in the canton at the “Mittag der Forschung” (Science Noon) and experience science up close. For details, visit www.gr-forscht.ch.

Sponsored Content: The content of this article was provided by Academia Raetica, the association for the promotion of science, research and education in Graubünden: www.academiaRaetica.ch.

Text translated with the support ChatGPT (<https://chat.openai.com>)