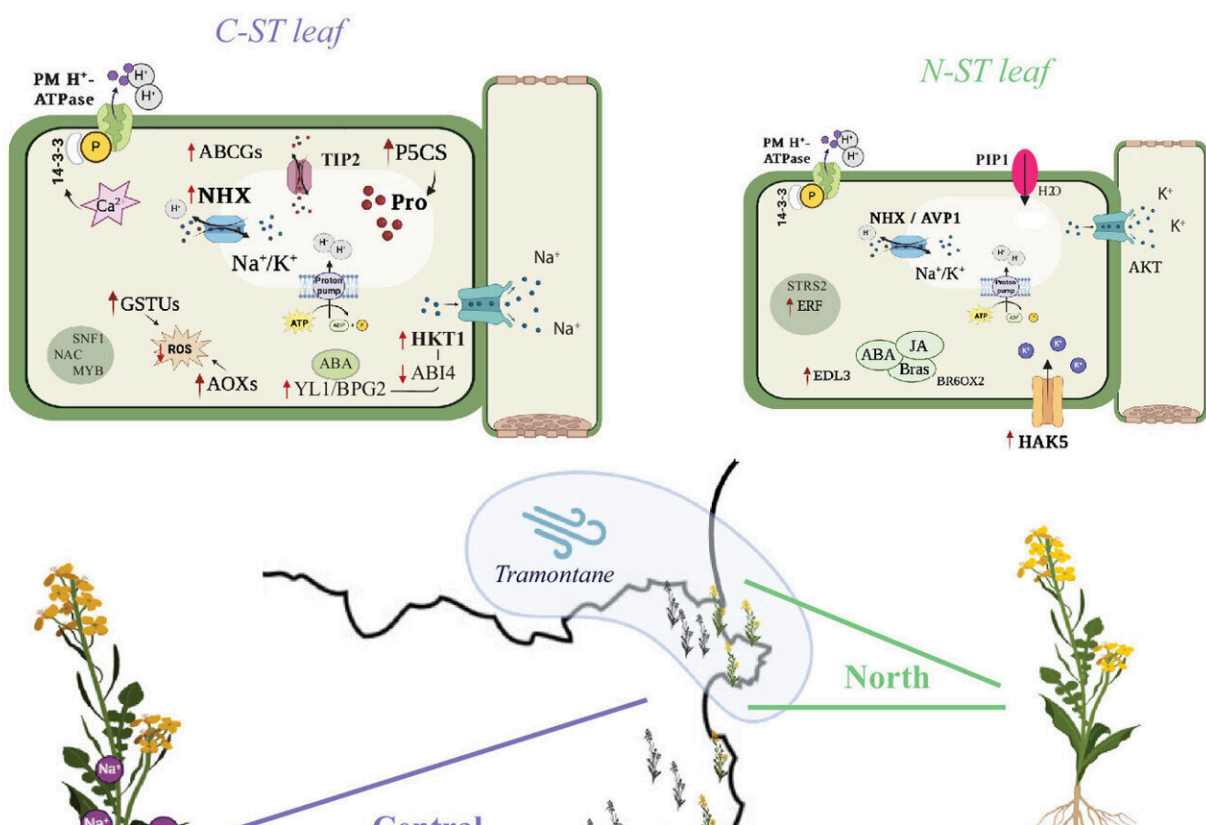


Closely related plants shows species use different methods to adapt to extreme environments, study shows

September 26 2024, by Charlotte Anscombe



Overview of the contrasting salinity tolerance strategies of the North and Central *B. fruticulosa* coastal metapopulations. Credit: *Proceedings of the National Academy of Sciences* (2024). DOI: 10.1073/pnas.2407821121

Scientists have found that different populations of a plant species, which is closely related to many crops of worldwide importance, use very different strategies to adapt to environmental changes, which gives experts new options to engineer crops to better survive climate change and tackle future food security.

A common assumption is that populations of the same [species](#) use the same processes to adapt to common stressors, but experts at the University of Nottingham have discovered that this is not always the case. Instead, they reveal a surprising degree of "evolutionary flexibility."

In a new study, [published](#) in the *Proceedings of the National Academy of Sciences*, Professor Levi Yant from the School of Life Sciences discovered that neighboring "sister" populations of a previously unstudied Brassica species adapt to a coastal habitat in very different ways. In this case, very high [salinity](#) levels, which are an increasing threat due to climate change.

The species studied—*Brassica fruticulosa*—is a close relative of cabbage, broccoli, cauliflower, rapeseed and radish.

Studying these wild relatives of these important crops can reveal existing "natural solutions" that evolution has already found. Scientists can then use this information to "future-proof" important crops worldwide to adapt to environmental stressors—such as climate change.

To carry out the research, the team of researchers exhaustively surveyed all the Brassica species in the region of Northern Spain and identified this single one that had exceptional populations that were adapted to high salinity, while the rest of the populations of the same species were not. The plants in this region naturally evolved to very salty Mediterranean coasts in Spain.

They then grew all the *Brassica fruticulosa* populations in the lab and using genomics, physiology, and [molecular biology](#), they determined the differing populations adapted to the same stressor, in this case, high salinity, in different ways.

The different adaptation strategies to high salinity, each with different genetic and mechanistic foundations, were very surprising.

Professor Yant said, "People generally expect that closely related populations of a given species would adapt to the same environmental stressor in the same way due to genetic or physiological constraints. However, this hasn't been commonly tested due to practical limitations. Here, my collaborator, Dr. Silvia Busoms, decided to look at many populations, not only a few.

"In our new study, we show that, even at the level of neighboring populations, contrasting adaptive strategies control adaptive responses to high coastal salinity in *Brassica fruticulosa*. This indicates multiple options for engineering an agriculturally crucial adaptation: soil salinization.

"These results will be of interest to not only those studying fundamental mechanisms of adaptation, but also resilience improvement in *Brassica* species."

More information: Silvia Busoms et al, Local cryptic diversity in salinity adaptation mechanisms in the wild outcrossing *Brassica fruticulosa*, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2407821121](https://doi.org/10.1073/pnas.2407821121)

Provided by University of Nottingham

Citation: Closely related plants shows species use different methods to adapt to extreme environments, study shows (2024, September 26) retrieved 27 September 2024 from <https://phys.org/news/2024-09-species-methods-extreme-environments.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.