Plant response to carbon dioxide emissions depends on their neighbours

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Elizabeth Kleynhans in the field. Credit: University of British Columbia

Plant species that have evolved to withstand elevated levels of carbon dioxide grow poorly when moved to a plant community with a different make up, according to a new study in Nature Communications.

"In an effort to save certain species, there has been an interest in the movement of plants or animals to more climatically suitable habitats," said University of British Columbia ecologist Elizabeth Kleynhans, lead author of the study. "Our research indicates how one species adapts in one community may not transfer to other communities."

The researchers tested the impact of community diversity on plant evolution by looking at Kentucky bluegrasses which were exposed to elevated levels of carbon dioxide in plots of low or high species diversity for 14 years, part of a long-term climate change experiment in Minnesota. Seeds of these grasses were then transported to Vancouver and their offspring were transplanted back into plots with either the same diversity of species they had experienced as they evolved to elevated carbon dioxide, or a different diversity of species.

The response of the grasses to the carbon dioxide depended on whether the grasses were surrounded by the same plant species or by a variety of different plant species.

Kentucky bluegrasses. Credit: University of British Columbia

"If plants evolved to elevated carbon dioxide in one neighbourhood, then experienced elevated carbon dioxide in a different neighbourhood, the benefits disappeared. This result was very surprising to us," said Mark Vellend, a biologist at the Université de Sherbrooke also involved in the study.

The researchers suggest further studies could focus on exposing plants of various species to other environmental changes, such as increases in temperature.

"We might not be able to predict how plants are going to respond to

climate change by looking at physical factors like carbon dioxide or temperature alone. We also need to account for who else a species is living with because interactions between species influence evolution as well, " Kleynhans concluded.


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Elizabeth Kleynhans, lead author of the study, sorts plant roots. Credit: University of British Columbia

More information: Elizabeth J. Kleynhans et al. Adaptation to elevated CO2 in different biodiversity contexts, *Nature Communications* (2016). DOI: 10.1038/ncomms12358

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