

Publication

Community and species level responses to elevate CO2 in designed calcareous grassland communities

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We present a synthesis of two independent glasshouse experiments in which we investigated the short term response of model communities of calcareous grassland species to CO2-enrichment. Communities consisted of six species in the first study and of 14 species in-the second study. Communities were grown in containers filled with ca. 20 liters of natural soil. Total aboveground biomass production was increased by 14% (n.s., p=0.21) in the first study and by 8.5% (p=0.03) in the second study. This community level response was due to a significant stimulation of growth in 2 and 5 species, respectively. In each of the experiments, one species responded negatively to CO2-enrichment. The remaining species, including all legumes, remained unaffected by CO2-enrichment. Positive or negative responding species did not belong to specific functional groups, hence responses could not have been predicted from a priori knowledge of individual plant traits. Bromus erectus, which is the dominant species in calcareous grasslands of the Jura mountains, did not exhibit a CO2-response at the species level, but genotype-specific responses in this species varied significantly and included positive as well as negative responses. No such genotypic differentiation of CO2-response was observed in Fes tuca ovina. In the long term, we expect directional selection of positively responding genotypes and shifts in species composition to alter both population and community structure of calcareous grass lands - a conclusion that may also hold for other diverse plant communities.

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