



Liming effects on microbial carbon use efficiency and its potential consequences for soil organic carbon stocks

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Background

- Soil pH is a major driver of soil microbial carbon use efficiency (CUE)
- Management options, which manipulate soil pH may therefore also affect CUE and thus C cycling in agricultural soils

Experimental set-up

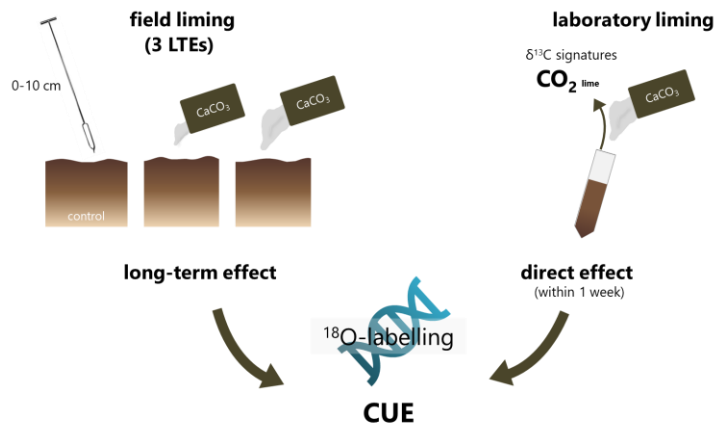


Fig 1: The effect of liming on microbial CUE was studied on soils from three long-term field experiments using the ¹⁸O-labelling method. Additionally, control soils were limed in the laboratory to test for direct effects of liming on microbial physiology

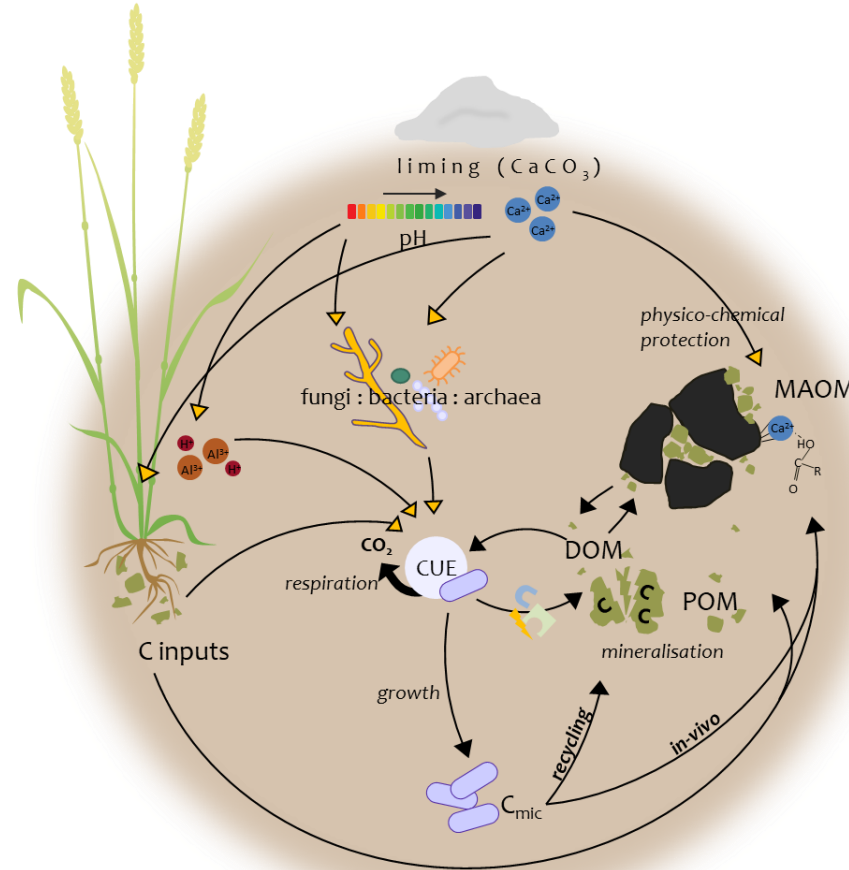


Fig. 3: Hypothesised mechanisms by which liming affects microbial CUE and C dynamics in agricultural soils. Effects of liming (yellow) and C fluxes (black) are displayed by arrows. The net effect of liming on SOC stocks is the sum of its individual effects on OC inputs, physicochemical protection of organic matter, microbial activity, and the microbial metabolic efficiency (direct and indirect controls)

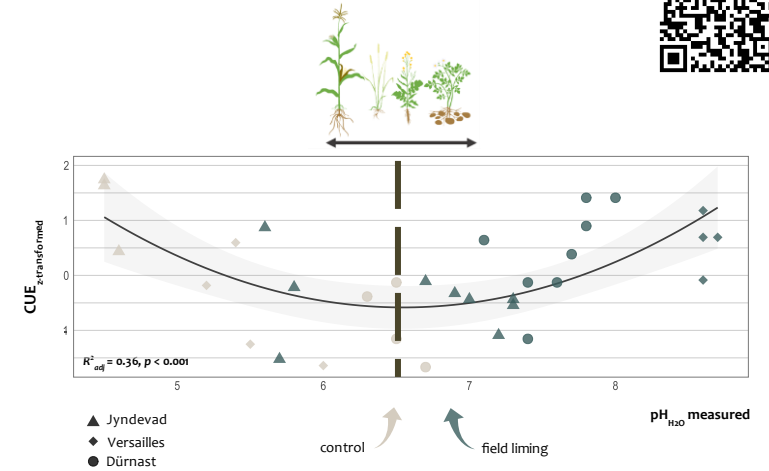


Fig 2: The overall relationship between CUE and soil pH followed a U-shape (i.e. quadratic function), implying that at a given site, CUE may be lowest at near neutral soil pH, which is considered as optimum for crop growth

Liming effect on CUE

- liming alters CUE
- decreases in CUE at low pH were associated with a shift in the microbial community
- increases in CUE at high pH may be associated to altered nutrient availability

Liming effect on SOC stocks

- Overall, significant positive effect of liming on SOC stocks
- CUE does not primarily drive SOC stocks

Further Read

