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## Titel

Cover crops grown in monoculture and mixed cropping affect soils differently

## Abstract

Cover crops provide various benefits to agricultural soils. The legumes among cover crops may provide fixed nitrogen as nutrient. Other species show high uptake and storage capacity for nitrogen, thus preventing losses as water polluting nitrate or greenhouse effective nitrous oxide. The input of carbon by shoot and root biomass, as well as rhizodeposition and root decay after harvest or mulching increases soil quality e.g. in form of nutrient supply and organic matter buildup. Brassicaceae lack mutualism with mycorrhizal fungi and some species can reduce the number of phytopathogenic nematodes, thus affecting food web structures. However, many benefits provided by single plant species may be affected when these species grow under mixed cropping. In a pot experiment ten typical cover crop species were grown in monoculture: *Phacelia tanacetifolia*, *Brassica rapa* var. *rapa*, *Raphanus sativus* var. *oleiformis*, *Sinapis alba*, *Trifolium incarnatum*, *Vicia villosa*, *Avena strigosa*, *Lolium multiflorum*, *Sorghum bicolor* x *S. sudanense*, and *Fagopyrum esculentum*. These were compared to six mixtures ranging in complexity from two to six species including the classics *R. sativus*/*S. alba*, *R. sativus*/*A. strigosa*, and the "Landsberger Gemenge". Six plants per pot grew in two differently textured soils (silty loam, loamy sand) in a greenhouse for 60 days. Plant parameters measured, included shoot and root dry matter, their C and N content, root morphology, plant height as well as chlorophyll content. In the soil, the pH, C-to-N-ratio, inorganic nitrogen, microbial biomass, and abundance of microbial domains were measured. Already plant parameters indicated effects caused by mixed cropping. Height and chlorophyll content of *P. tanacetifolia*, *S. alba*, and *S. bicolor* were higher in monocultures than in mixtures indicating interspecific competition. Furthermore, below-ground biomass of two-species-mixtures containing *R. sativus* appeared to be higher than those of the corresponding monocultures. While monocultures increased soil pH differently, mixtures showed no significant difference between each other. This study aims to show that the impact on soil by different cover crop species are not necessarily realised the same way under mixed cropping.