

Cover crop mixtures: Do they reduce greenhouse gas emissions?

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Cover crops are used to reduce nutrient losses, weed suppression, protection against erosion and stimulating soil biota. The idea is that the usage of cover crop mixtures with complementary traits have more positive effect on the soil functioning and plant performance than individual species. Cover cropping can increase carbon and nutrient input in the soil. This can lead to increased greenhouse gas (GHG) emissions. However, agricultural fields can be a methane sink. Ho et al., (2015, Global Change Biology) showed that residue application stimulates methane consumption in soils. Yet, it remains to be investigated if cover crop mixtures increase or reduce this potential. GHG fluxes were measured over more than 2 years in a field experiment with three cover crops (*Avena strigosa*, *Raphanus sativus* and *Vicia sativa*) in all combinations as monoculture, bi-culture and three species mixture. GHG fluxes were measured during plant growth at least 2 times. After mixing the plant material in the soil (in March), GHG fluxes were measured weakly over 3 weeks. During the main crop season, GHG fluxes were measured twice. GHG fluxes were during the growth of cover crops not significantly different between the treatments and from the fallow for 2 years. During cover crop decomposition however, increased emissions were shown for both N₂O and CO₂ in two species mixtures and not in the three species mixture. CH₄ was taken up at each time point, but not for all plots and certain treatments did not increase the consumption in the soil. The experiment will continue to discover if these results change over time and to understand why the three species mixture does not have increased GHG emissions even though similar high amount of cover crop biomass.