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# Soil $CO_2$ flux in alley-cropping systems composed of black locust and poplar trees, Germany

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The understanding of soil carbon dynamics after establishment of alley-cropping systems is crucial for mitigation of greenhouse $CO_2$ gas. This study investigates soil $CO_2$ fluxes in alley-cropping systems composed of strips of black locust (*Robinia pseudoacacia L.*) and poplar (*Max 1*) trees and adjacent to them crop strips (*Lupinus*). Soil $CO_2$ flux was measured monthly over a period from March to November 2012, using a LI-COR LI-8100A automated device. Concurrently with $CO_2$ flux measurements, soil and air temperature and soil moisture were recorded within 10 cm of each collar. Soil samples were collected nearby each soil collar for microbial C and hot water-extractable C analyses. At each study plot, root biomass was measured to a depth of 15 cm. In all vegetation types, soil $CO_2$ flux increased from May to August, showing a significant positive correlation with air and soil temperature, which can be a reflection of increase in photosynthesis over the warm summer months. $CO_2$ flux was the highest in poplar followed by black locust and lupines. The relationships between $CO_2$ flux, microbial biomass and hot water-extractable carbon were not straightforward. Among the measured parameters, root density was found to be the main factor to explain the higher $CO_2$ flux in tree strips.