



Carbon balance of short-rotation forestry on a drained and rewetted fen

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Peatland soils store about a third of the world's soil organic carbon (SOC). However, over 95 % of German peatlands have been drained and thus turned from carbon sinks into carbon sources. In our project we investigate the effects of turning agriculturally used peatland from grassland into short-rotation forestry (SRF) with poplars and alders. Part of the study site constitutes conventionally farmed SRF (ploughed prior to establishment, mean water table of -70 ± 2.6 cm). In another area of the study site we raised the water table by inserting sheet piling and use wet cultivation (paludiculture) with a mean annual water table of up to -11 ± 1.5 cm (wet alder treatment in 2016). Our results for the first 42 months after SRF establishment show a stark difference between the wet and dry treatments, but also the two tree species. SOC losses through gaseous emissions (carbon dioxide & methane) range from 29 ± 1.6 (alder wet) to up to 122 ± 6.7 t C ha⁻¹ (alder dry & ploughed). Carbon allocation is largely dependent on tree species. In both the paludiculture (6.4 ± 0.63 vs. 2.7 ± 0.48 t C ha⁻¹) and conventionally farmed (14 ± 1.0 vs. 7.0 ± 1.3 t C ha⁻¹) treatments alders sequestered at least double the amount of carbon of poplars. Short-rotation plantations with alders had the lowest as well as highest carbon footprint in the first 42 months after SRF establishment. The paludiculture treatment showed a loss of 23 ± 1.0 t C ha⁻¹ during that period, while the conventionally farmed alder SRF plantation lost 108 ± 5.7 t C ha⁻¹.