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Combustibility and nutrient export potential of biomass from rewetted fens in North Eastern Germany

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Paludiculture can be applied for water buffer zones as an integrative concept using biomass from wet peat soils. Solid biofuels are one option for biomass utilisation from paludiculture, but have to meet high quality standards to fulfill legal requirements. The late harvest in winter is a common practise to increase combustibility of solid-biomass, especially for herbs and grasses. Critical elements for combustion will be reduced in the standing biomass by leaching through precipitation. Additionally some plant species reallocate nutrients to the rhizomes during autumn (f.e. Common Reed).
Combustion quality of Common Reed (Phragmites australis) and Sedges (Carex spp.) are also increased by a late harvest in winter. Common Reed showed low critical elemental concentration, with 0,4% N, 0,1% S and 0,08 % Cl (d.b.) in February. Sedges lost 95% of the total chlorine concentration, from 0.62 (summer) to 0.03 % (winter), but N and S decreased only slightliy from summer (1.4 % N/0.21 % S) to the winter (1.24 % N/0.16 % S (d.b.)).
Coincidently, winter harvest of the plants goes along with lower yields and lower nutrient contents resulting in lower nutrient uptake potential. Carex-acuta yield decreased from August (4.5 t/ha) to February (3 t/ha) with nutrient contents of 6 kg P/ha and 63 kg N/ha in August and 1 kg P/ha and 38 kg N/ha in February. Phragmites australis yields of the studied sites were relatively low with 7.6 t/ha (October) and 5.6 t/ha (February) in comparison to values from other studies in Northeast Germany that ranged from 2-12 t/ha (d.b.), in February. The measured biomass nutrient content was 5 kg P/ha and 61 kg N/ha in October, and 2 kg P/ha and 22 kg N/ha in February.
Harvesting in early autumn is most appropriate to combine the production of solid biofuels with the removal of nutrients in water buffer zones. If nutrient export from the wetland buffer zone is the more important issue, harvesting should be realised in summer. This biomass with low quality for combustion can be mixed with high quality biomass (f.e. wood) or other kinds of pre-conditioning (washing, mechanical dehydration) are required.