”Macroalgae for bioenergy processes –
pretreatment for removal of salts and extraction of sugars for ethanol production”

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Macroalgae represent a huge unexploited bioresource of the seas including several thousand species Worldwide. The production of macroalgae relies on sunlight for energy and assimilation of CO2 and nutrients, in particular N (nitrogen) and P (phosphorus), with a biomass potential of more than 4-10 times that of land based crops. Macroalgae thus, serve as a sink to assimilate CO2, N and P, minimizing their influence to the environment and converting them back into valuable carbohydrate, proteins and lipids. Algae species such as *Chaetomorpha linum* and *Ulva lactuca* are potential raw materials for bioethanol production due to their high contents of polysaccharides. One challenge for utilizing these aquatic sugar based feedstocks in a fermentation process is removal of the 90% salt water from the cell walls before drying, pelleting, storage and/or fermentation. Screw pressing was an efficient pretreatment technology to remove salts and water as illustrated for *Ulva lactuca*. *Ulva Lacctuca* had the lowest C6 content, still all C6 sugars were effectively converted to ethanol after only sterilization and enzymatic hydrolysis when fermented by *Saccharomyces cerevisiae*. *C. linum* contained by far the largest glucan content of 30- 40% and was a fine feedstock for C6-sugar extraction and following ethanol fermentation with *Saccharomyces cerevisiae*. To optimize the enzymatic sugar yield of *C. linum* for improved ethanol production, the pretreatment technologies wet oxidation (WO), hydrothermal pretreatment (HTT), steam explosion (STEX), plasma-assisted pretreatment (PAP) and ball milling (BM) were screened. Low temperature ball milling and following enzyme treatment was the most successful pretreatment resulting in a bioethanol process with 82% yield and no inhibitor formation.