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# Evaluation of the biomass potential for the production of lignocellulosic bioethanol from various agricultural residues in Austria and Worldwide

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Due to the fact that the resources of fossil fuels are steadily decreasing, researchers have been trying to find alternatives over the past few years. As bioethanol of the first generation is based on potential food, its production has become an increasingly controversial topic. Therefore the focus of research currently is on the production of bioethanol of the second generation, which is made from cellulosic and lignocellulosic materials. However, for the production of bioethanol of the second generation the fibres have to be pre-treated. In this work the mass balances of various agricultural residues available in Austria were generated and examined in lab scale experiments for their bioethanol potential. The residues were pretreatment by means of state of the art technology (steam explosion), enzymatically hydrolysed and fermented with yeast to produce ethanol. Special attention was paid the mass balance of the overall process. Due to the pretreatment the proportion of cellulose increases with the duration of the pre-treatment, whereby the amount of hemicellulose decreases greatly. However, the total losses were increasing with the duration of the pre-treatment, and the losses largely consist of hemicellulose. The ethanol yield varied depending on the cellulose content of the substrates. So rye straw 200 °C 20 min reaches an ethanol yield of 169 kg/t, by far the largest yield. As result on the basis of the annual straw yield in Austria, approximately 210 000 t of bioethanol (266 million litres) could be produced from the straw of wheat (Triticum vulgare), rye (Secale cereale), oat (Avena sativa) and corn (Zea mays) as well as elephant grass (Miscanthus sinensis) using appropriate pre-treatment. So the greenhouse gas emissions produced by burning fossil fuels could be reduced significantly. About 1.8 million tons of motor gasoline are consumed in Austria every year. The needed quantity for a transition to E10 biofuels could thus be easily provided by bioethanol from straw. We also evaluated the production of world′s most important grains (wheat, corn, rice, sugar cain) and we calculated the worldwide production of the relevant lignocellulosic residues. On the basis of our labs scale experiments on bioethanol production, the possible lignocellulosic bioethanol production word wide was determined.