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## Evaluation of alternative alkali pretreatment for oat straw saccharification and fermentation

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Introduction: Lignocellulosic biofuels production requires the sustainable pretreatment for its processing. Lime pretreatment is considered an alternative alkali pretreatment, easily to recover and inexpensive that allows to operate under milder conditions of temperature and pressure. The aim of this work was the evaluation of lime pretreatment for bioethanol production from oat straw.

Methods: Oat straw was subjected to lime pretreatment at liquid to solid ratio of 10 g/g. The following operational conditions of lime pretreatment were evaluated: temperature (in the range 90-134 ºC), time (30-120 min) and $Ca(OH)_2$/g (01-04 g/g). The pretreated oat straw was recovered by filtration, washed until pH=7 and analysed for chemical composition. The enzymatic susceptibility of lime pretreated solids was evaluated under favourable conditions of solid and enzymes loadings (25 g/g and 25 FPU of CellicTec2/g). Selected condition of lime pretreatment (134 ºC, 30 min and 0.1 g of $Ca(OH)_2$/g of oat straw) was used for the bioethanol production by simultaneous saccharification and fermentation (14 % of solids and 20 FPU/g) using an industrial *Saccharomyces cerevisiae* PE-2 strain and its metabolic engineered version (MEC1133) for xylose consumption.

Results and Discussion: Under selected conditions (134 ºC for 30 min and a Ca(OH)2 load of 0.1g/g) 96 % of glucan and 77 % of xylan were recovered and 42 % of delignification was achieved. Moreover, the lime pretreatment allowed enhancing the enzymatic saccharification achieving 75 % of glucan to glucose conversion and 100 % of xylan to xylose conversion. The use of MEC1133 strain increased a 20 % of ethanol concentration comparing to PE-2 obtaining 41 and 34 g/L of ethanol, respectively. This work provides a suitable process for the fractionation of oat straw. Lime pretreatment yields a pretreated raw material with high polysaccharide content susceptible to be efficiently converted into ethanol.