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BIOENERGÍA Y BIOPRODUCTOS

Título:
Bioethanol production from vine pruning residue by sequential steps of autohydrolysis

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Comunicación:
Lignocellulosic biomass is a renewable raw material, widespread and with a huge potential for the manufacture of biofuels as bioethanol. In Portugal, the most abundant exploitable lignocellulosic biomass derives from the agro-industrial and forestry sectors. Large amounts of residues are generated during wine processing, specially pruning residues of vine. Approximately 1.2-3.5 t/ha of vine pruning residues (VPR) are estimated to be produced per year, which are usually burnt in the field. VPR are composed by 30.6 % of cellulose, 18.2 % of hemicellulose and 29.5 % of lignin. In order to produce ethanol from this agro-industrial residue, autohydrolysis treatment in two sequential steps were proposed for solubilization of hemicellulose in a separate stream and improving the enzymatic susceptibility of cellulose following the biorefinery concept. In a first stage, VPR was submitted to autohydrolysis treatment at 180 ºC for 60 min (Severity factor, So=4.13) at liquid to solid ratio = 6 g of distilled water/g of VPR. In liquid phase, 55 g of xylan/100 g of xylan in raw material was recovered as xylooligosaccharides (13 g/L). Autohydrolyzed VPR was evaluated in a second step of autohydrolysis treatment under temperature in the range 180- 200 ºC and time 30-40 min. After sequential treatments, 90-99 % of cellulose was recovered in solid phase and enzymatic saccharification of pretreated solid was assayed using 25 FPU/g of cellulase CTec2 and solid loading of 5 and 10 % of pretreated VPR. Sequential treatment of VPR significantly improved the enzymatic hydrolysis of cellulose from 70 % to 100 % of cellulose to glucose conversion for second autohydrolysis at 200 ºC for 30 min. Under these conditions of pretreatment, two configurations of saccharification and fermentation (simultaneously –SSF- and separately –SHF-) were carried out. Ethanol production was successfully obtained from two processes achieving cellulose to ethanol conversion of 93 and 97 % for SHF and SSF, respectively.