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Effect of harvest age on bioethanol production from short rotation woody crops

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One way to increase the supply of woody biomass is short rotation coppice, where fast-growing wood species such as poplar and willow are planted on agricultural land and harvested for bioenergy or material use after a short rotation period. Moreover, wood chips from short rotation coppice have better fuel properties than other renewable raw materials such as Miscanthus or straw. Fast-growing woods such as *Populus nigra* × *Populus maxiwiczii, Populus euramericana, Populus alba* × *Populus glandulosa, Salix alba, and Liriodendron tulipifera* are widely distributed in South Korea; however, their utilization for biofuel production is limited and further development is required. In this study, we evaluated the potential of fast growing woods (*P. nigra* × *P. maxiwiczii, P. euramericana, P. alba* × *P. glandulosa, S. alba, and L. tulipifera*) as a biomass resource for bioethanol production for different growth time periods. Poplar wood (*P. nigra* × *P.maxiwiczii, P. euramericana, and P. alba* × *P. glandulosa*) generally has a higher content of cellulose than glucose compared to other wood samples (*S. alba, and L. tulipifera*). We found that bioethanol production by enzymatic hydrolysis of cellulose was higher in immature (3 years) than in mature (12 years) fast-growing woods. The highest reducing sugar yield reached after 72 h of enzymatic hydrolysis was 3.63 g/L and 3.91 g/L for *P. nigra* × *P. maxiwiczii (3 years), and S. alba* (3 years), respectively. Similarly, immature *L. tulipifera* woods (3 years) produced the highest amount of ethanol. These results suggest that immature fast-growing woods are a potential biomass resource for bioethanol production as an alternative energy source. Furthermore, optimizing the harvest age to take advantage of the rapid growth of fast-growing woods may be one strategy for obtaining a more suitable fast-growing wood material for bioethanol production.

Figure. 1 : Effect of harvest age on glucose conversion and ethanol yield.

Biography

Ji Young Jung is a PhD candidate at Gyeongsang National University, South Korea. Currently, she works on bioethanol production, especially in the evaluation of chemical pre-treatment of lignocellulosic material with steam explosion as a step previous to the hydrolysis of cellulose. Additionally, her research interests are in biorefinery processes and optimization for bioethanol production.

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