



Potential of selected weed biomass for bioethanol production

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Abstract: The escalating population growth and industrial activities, declining supplies of petroleum-based chemicals, and the harmful impacts of fossil fuel burning on the environment have fascinated researchers to find low-cost, environmentally friendly substitutes. Lignocellulosic biomass from invasive weedy plants represents a potential alternative feedstock for the production of second-generation bioethanol. The present study was done with two weedy plant species, *Chromolaena odorata* and *Tridax procumbens*. The aim of the study was to select the suitable acid or alkaline pretreatment agent to hydrolyze the lignocellulosic biomass from the selected weed species and to identify the best weed species for the production of bioethanol. The collected plants were cleaned and treated with different acids (H_2SO_4 , HNO_3 , CH_2O_3) and bases ($NaOH$, $Ca(OH)_2$) (4% v/v) at 121 OC for 15 min in the autoclave. Then the reducing sugar content was determined by 3,5-Dinitrosalicylic acid method. The remaining sample was incubated with *Saccharomyces cerevisiae* in the peptone yeast extract and nutrient medium at room temperature at pH 5.0. After 24 hours the alcohol contents of the fermented samples were determined directly by using Dujardin-Salleron ebulliometer and expressed in terms of percentage (v/v). All the experiments were done in triplicates and the statistical analysis were done using Minitab 18.0 version. Significantly higher reducing sugar contents were obtained from H_2SO_4 acid pretreatment agent for both plant varieties. However, the considerable amount (0.2%) of ethanol production was only shown by *Tridax procumbens* weedy plant substrate with the performic acid pretreatment agent. This study confirmed that the performic acid has high effectiveness as a pretreatment agent with less inhibitor formation and *Tridax procumbens* weed plant has more potentiality to produce bioethanol than the *Chromolaena odorata*.

Keywords: Acid hydrolysis, Bioethanol, Lignocellulosic biomass, Pre-treatment, Weeds