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**Second Generation Bioethanol Production: Green Alternative Energy for Future Energy Crisis****Chandrasiri Y.S.<sup>1</sup>, Weerasinghe W.M.L.I.<sup>1</sup>, Madusanka D.A.T.<sup>1</sup>, Manage P.M.<sup>1,2\*</sup>**

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**Abstract**

Emerging environmental pollution and depleting fossil fuel resources issues are creating a requirement for more environmentally friendly alternative renewable fuels. In that case bioethanol has gathered much attention as a fuel additive and fuel enhancer. In the current study, corncob and paper waste were used as lignocellulosic biomass and followed the simultaneous saccharification and fermentation via bacterial pathways to produce second generation bioethanol. Both biomasses were pretreated initially using mechanical and chemical pretreatments and they were hydrolysed by two bacterial strains; *Bacillus* sp. and *Norcardiopsis* sp. and fermented by *Achromobacter* sp. which were previously isolated. The bioethanol production was followed by hydrolysing of biomass by *Bacillus* sp. and *Norcardiopsis* sp. for 72 hours at 37° C and then the fermentation was done using the bacterium *Achromobacter* sp. for 72 hours at 37° C. Detecting gas trapped in Durham tubes and Solid Phase Micro Extraction coupled with GCMS were used to screen and quantify the ethanol production respectively. The highest ethanol percentage (v/v) was obtained from alkaline pretreated paper waste hydrolysed by the *Bacillus* sp. (0.734±0.154%) and the lowest ethanol percentage (v/v) was obtained from alkaline pretreated corncob hydrolysed by the *Norcardiopsis* sp. (0.155±0.154%). Acid pretreated corncobs, alkaline pretreated corncobs, and acid pretreated paper waste which was hydrolysed by *Bacillus* sp. and fermented by *Achromobacter* sp. produced ethanol percentages (v/v) of 0.726±0.154%, 0.564±0.154%, and 0.657±0.154% respectively. Acid pretreated corncobs, acid pretreated paper waste, and alkaline pretreated paper waste which was hydrolysed by *Norcardiopsis* sp. and fermented by *Achromobacter* sp. produced ethanol percentages (v/v) of 0.587±0.154%, 0.599±0.154%, and 0.627±0.154% respectively. Thus, the results of the study revealed that both corncobs and paper waste have high potential for bioethanol production, and paper waste is the best feedstock for second-generation bioethanol production among used biomasses.

**Keywords:** Bioethanol production, Lignocellulosic biomass, Corncobs, Paper waste