

Potential of *Parthenium hysterophorous* Weed as Feedstock for Reducing Sugars Production using Organosolv Pretreatment

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Abstract—*Parthenium hysterophorous* is one of the major weed which infested millions of hectares worldwide. Due to its adverse effect on crop yield and allergic nature for humans and cattle's it has no major significance and considered as a waste. But, its easy availability, fast growth rate, and rich biomass content qualify *P. hysterophorous* to employ as potential feedstock for bioethanol production. In present study, the chopped *P. hysterophorous* was treated with temperatures 180 °C, solid to liquid ratio 1:5 and liquid ratio was maintained using ethanol and distilled water in the ratio of 1:1, 3:1 and 0:4 and pre-treatment times 60 min in presence of 2% of H₂SO₄ added as a catalyst. The hydrolysate obtained from *P. hysterophorous* pre-treated at 180°C, ethanol to distilled water ratio 3:1 and reaction time 60 min produced maximum total reducing sugars in g/100g of oven-dried material (24.82±1.2), ethanol-organosolv lignin (20.11±1.5) and minimum acid soluble lignin total (0.95±0.19) and pre-treated substrate produced total reducing sugars (32.34±1.2) and acid minimum insoluble lignin content was (1.13±0.12). Pretreated substrate was hydrolysed by *Aspergillus niger* NFCCI 4113 produced crude enzyme using 10 FPU/g enzyme dose. Characterization of pretreated material was also carried out by XRD, SEM and FTIR. XRD-analysis showed crystallinity index increased as severity of pretreatment intensified. SEM studies showed ratio of 3:1 ethanol pretreated raw material exhibit loosely bound fiber bundles due to lignin removal in comparison to ratio of 0:4 pretreated raw material because of lignin presence. FTIR spectra also showed low intensity of band stretching related to lignin and hemicelluloses due to their removal during pretreatment.

Keywords: *Parthenium hysterophorous*, *Aspergillus niger*, Organosolv-pretreatment, Cellulase, Xylanase.