ABSTRACT

The study was aimed at pretreating the lignocellulosic biomass (sawdust) with a novel green solvent i.e., Deep Eutectic Solvent (DES). The levulinic acid-based DES was prepared initially with three varying Hydrogen Bond Acceptors (HBAs), acetamide, betaine and choline chloride in combination with levulinic acid acting as Hydrogen Bond Donor (HBD). The molar ratio prior to the appropriate selection of HBA in levulinic acid-based DES was 2:1 (HBD: HBA). Whereas, after the lignocellulosic content estimation and saccharification appropriate HBA for levulinic acid-based DES was selected to be levulinic acid: choline chloride (2:1). The DES constituting HBD and HBA molar ratio was optimized to be 1:0.5 with maximum delignification of 91%, hemicellulosic content of 13.9% and cellulosic content of 70.16%. The percentage saccharification and total reducing sugar for sawdust (100 mg) pretreated with this DES was 15.44% and 10.84 mg. Upon physicochemical optimization of saccharification parameters, maximum saccharification of 25.87% was obtained from 125 mg of DES pretreated sawdust with simultaneous addition of three thermostable cellulases i.e., endo-1,4-β-D-glucanase (240 U), exo-1,4-β-D-glucanase (180 U) and β-glucosidase (320 U) for 5 hours of incubation at 75°C. The reducing sugar slurry obtained from the saccharified biomass was added aseptically in to the fermentation medium and maximum ethanol production of 11.82% was obtained at 30°C, 72 hours, 180 rpm using 2.5% of 24 hours old *Saccharomyces cerevisiae* culture.