Abstract

The work describes the isolation of cellulase producing bacterial strains from local habitats, optimization of cellulase production by the selected strain and application of cellulases for the production of ethanol from cellulosic waste materials. Forty different cellulolytic bacterial strains were isolated from soil samples and the gut of termites. All these isolates were found to produce cellulases in the submerged fermentation. A best strain was selected on the basis of its ability to produce maximum amount of cellulases. This strain was identified as belonging to the genus *Bacillus*. Cellulase production by the selected strain was optimized using submerged fermentation. Fermentation experiments for the screening of fermentation media showed that *Bacillus sp.* utilized M5 medium for the maximum production of cellulase i.e., 49 U/mL/min and 23 U/mL/min of CMCase and FPase, respectively. Similarly, the incubation period of 72 hrs was found to be the best for the maximum cellulase production. Seven different substates were evaluated for the maximum production of cellulases and out of these carboxymethyl cellulose gave the maximum production of cellulases by *Bacillus sp.* which was 72 U/mL/min and 39 U/mL/min for CMCase and FPase, respectively. Further optimization of cellulase revealed that an incubation temperature of 37°C and the initial pH of 6.0 was found to be best for the maximum cellulase production. 3% corn steep liquor was found as best nitrogen source. During the present study, the maximum cellulase production was found to be 79 U/mL/min for CMCase and 42 U/mL/min for FPase, respectively. The enzyme was concentrated using 80% ammonium sulphate precipitation. Consolidated bioprocessing was carried out for the bioethanol production and maximum bioethanol production was found to be 4.6%.