Abstract Formatting Guidelines

- **Title:** Times New Roman, 14-point, bold, centrally aligned.
- **Author(s):** Times New Roman, 12-point; presenting author's name should be underlined.
- **Affiliation(s):** Times New Roman, 11-point, including department, institution, city and country.
- **Corresponding author:** Provide a valid email address.
- **Abstract text:** Times New Roman, 12-point, single-spaced, justified alignment.
- **Length:** 200–300 words, excluding title, author details and keywords.
- **Keywords:** 4–6 keywords, placed immediately after the abstract.
- **Page layout:** A4 paper, 2.54 cm (1 inch) margins on all sides.
- **Language:** English.

SAMPLE ABSTRACT

Purification of cellulase from *Penicillium Spp.* and its application for effective hydrolysis of lignocellulosic biomass for bioethanol production

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ABSTRACT

In the present study, fourteen cellulolytic fungal strains were isolated from mangrove soils of Bhitarkanika and screened for cellulase production using Congo red agar assay. Among the isolates, strain BCDF2 exhibited the highest hydrolysis zone (4.2 cm) with cellulase activity of 9.4 U mL^{-1} under submerged fermentation conditions. Cellulase production was further optimized using Response Surface Methodology (RSM), resulting in a maximum enzyme activity of 11.648 U mL^{-1} under optimized conditions of pH 6.5, temperature 30 °C, incubation time 160 h, and 5% substrate concentration. Among different lignocellulosic substrates tested, finger millet straw supported the highest cellulase production (14.728 U mL^{-1}). The crude enzyme was purified through ammonium sulfate precipitation, dialysis, and gel filtration chromatography, achieving a purification fold of 5.82. SDS–PAGE analysis revealed a molecular weight of approximately 45 kDa. The purified cellulase demonstrated efficient hydrolysis of pretreated lignocellulosic biomass, producing 607.69 mg g^{-1} reducing sugars from corn husk and 518.08 mg g^{-1} from finger millet straw, showing hydrolysis efficiency comparable to commercial enzymes such as Celluclast and Viscozyme. The potent fungal isolate BCDF2 was identified as *Penicillium* spp. based on morphological characteristics and 18S rRNA gene sequencing showing 99% sequence similarity. Furthermore, simultaneous saccharification and co-culture fermentation using *Saccharomyces cerevisiae* and *Pichia pastoris* yielded a maximum ethanol concentration of 29.8 g L^{-1}, indicating efficient conversion of lignocellulosic sugars into bioethanol. The study highlights the potential of mangrove-derived native fungal cellulase as a cost-effective and sustainable alternative to commercial enzymes for lignocellulosic biomass conversion and bioethanol production.

Keywords: Cellulase, *Penicillium* spp., mangrove fungi, lignocellulosic biomass, enzymatic hydrolysis, bioethanol production, RSM optimization.