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# Pharmacological potential of *Curcuma longa* endophytes

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ABSTRACT

Endophytes contribute to plant fitness and defence by producing bioactive secondary metabolites, which may be utilized in various industrial applications. We assessed the potential of bioactive compounds from the endophytes of *Curcuma longa* for therapeutic properties. We screened phytochemicals obtained from the *C. longa* endophytes for host-specific bioactive compounds which were also evaluated for their antimicrobial, anti-inflammatory and antioxidant potential. 59 endophytes were isolated from leaves and rhizome of *C. longa,* among which isolates *Fusarium fujikuroi* PCLCUT2 and *Bacillus pacificus* NCLALC2 showed significant antioxidant and anti-inflammatory properties. PCLCUT2 showed strong antioxidant potential ($IC_{50}$ 1.33 mg/mL) and the presence of compounds such as (-)-epicatechin and curcumin. *B. pacificus* NCLALC2 exhibited strong anti-inflammatory and antimicrobial potential (MIC 200 μg/L) against *Mycobacterium smegmatis.* NCLALC2 showed the presence of 12 potential bioactive compounds including Calciferol D, terpinolene and alpha-phellandrene. With the presence of host-specific compounds, the two endophytes hold promising potential as cost-effective sources of bioactive metabolites for pharmacological applications.

## 1. Introduction

In recent decades, the isolation and use of natural therapeutic products over synthetic drugs has gained increased attention due to fewer adverse side effects. Plant-based bioactive compounds contribute to about 80 % of total natural drugs available in the global market and in recent years 24.6 % of the new drugs approved worldwide are derived from such natural products (Singh and Dubey, 2015; Newman and Cragg, 2020). Conversely, the synthesis, quality and biological activity of these bioactive compounds mainly depend on plant parameters such as developmental stage, nutritional availability, environmental and stress conditions (Chandra, 2012; Dudeja and Giri, 2014; Namdar et al., 2019). However, the plant parameters are sometimes difficult to identify and maintain *in-vitro*. Furthermore, large-scale industrial demands of such plant-based natural compounds are met with limitations such as synthesis in low quantities, extraction from complex mixtures, sensitivity to environmental degradation (due to light or temperature) and loss of activity (Albuquerque et al., 2021; Bryda and Stadnytska, 2021). Utilizing microbes to produce similar natural compounds and their derivatives with improved target affinity and/or efficacy, may thus provide an efficient and controlled therapeutic alternative to both extraction from the plant source as well as the synthetic drugs.

*Abbreviations:* AqE, Aqueous extract; ATCC, American Type Culture Collection; BSA, Bovine serum albumin; CFE, Cell-free extract; CFU, Colony forming unit; CTAB, Cetyltrimethylammonium bromide; DDW, Double distilled water; DNA, Deoxyribonucleic acid; DPPH, 2,2-diphenyl-2-picrylhydrazyl; ESI, Electrospray ionisation; IC50, Half-maximal inhibitory concentration; ITS, Internal transcribed spacer; LB, Luria broth; LC, Liquid Chromatography; MH, Mueller-Hinton; MIC, Minimum inhibitory concentration; MS, Mass Spectrometry; MTT, 3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide; NCBI, National Center for Biotechnology Information; PD, Potato Dextrose; PVPP, Polyvinylpolypyrrolidone; Q-TOF, Quadrupole Time of Flight; RPMI, Rosewell Park Memorial Institute; rRNA, Ribosomal ribonucleic acid; TS, Tryptic Soy.

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