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Research Article

In vitro Antifungal Activities of Dose-Dependent Bioactive Compound from Potato Peels to Combat Powdery Mildew Disease in Cucumber

Abhishek Shahapurkar[1] and Sudisha Jogaiah[1&2]

[1]*Laboratory of Plant Healthcare and Diagnostics, PG Department of Studies in Biotechnology and Microbiology, Karnatak University, Pavate Nagar, Dharwad-580 003, Karnataka, India;* [2]*Department of Environmental Science, Central University of Kerala, Tejaswini Hills, Periye (P.O), Kasaragod, Kerala-671 316, India; Email: jsudish@cukerala.ac.in*

Abstract

The search for biopolymer-based materials to replace dangerous chemicals in agriculture has become increasingly important in recent years for sustainable crop development. In our study enzymatic synthesis of isomaltose was done using potato peels. Isomaltose solvent extracts were tested for their ability to inhibit fungal pathogens like *Erysiphe cichoracearum* and *Fusarium oxysporum*. Among those tested, a dose-dependent isomaltose extract exhibited significant inhibition on *E. cichoracearum* and *F. oxysporum* pathogen conidial sporulation, number of conidia and their motility. Under the *in vitro* studies, with isomaltose extract at (2.5 mg mL^{-1}) recorded a maximum *E. cichoracearum* conidial inhibition of 86.2, average number of conidia 4-27 and 5 per cent motility. While, sterile distilled water and DMSO showed maximum growth of the both the pathogens and also their motility was 92-97 per cent, respectively. Similarly, *F. oxysporum* maximum conidial inhibition of 88.3 and average conidia of 9-30 with motility of 7 per cent was observed after treating with 2.5 mg mL^{-1} isomaltose. Moreover, isomaltose a biopolymer derived from potato peel was used in different concentrations as priming agent to cucumber seeds and were evaluated for its effectiveness to enhance plant growth parameters. Among the treatments, seeds-primed with 2.5 mg mL^{-1} of isomaltose extracts in water exhibited early seedling germination of 96.8 per cent and vigor of 2210.3 and also cucumber seeds treated with 2.5 mg mL^{-1} of isomaltose extracts in DMSO showed significant germination rate of 95.5 per cent and vigor index of 1987.7. Overall, these results determine that the antifungal property of water dissolved isomaltose is highly significant in exhibiting remarkable inhibitory action against *Fusarium* and powdery mildew phytopathogens, further the dose-dependent concentration of water dissolved isomaltose showed fair to good enhancement of seed germination which will lead to establishing a novel bio-waste agricultural formulation for the management of plant pathogens and in particular *Fusarium* and powdery mildew disease of cucumber and other cucurbitaceous crops.

Key words: Bio-polymer, optimize, pathogen inhibition, plant growth, seed treatment

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