

Antifungal activity of *Penicillium yarmokense* isolated from the Atacama Desert against *Botrytis cinerea* under different light conditions and its impact on *Solanum lycopersicum* germination promotion

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The tomato plant *Solanum lycopersicum* holds significant commercial and nutritional value. Considering the climate crisis, it is crucial to address new alternatives in which it can be produced under sustainable conditions. Due to this, studies on endophytic fungi have become relevant, which have been applied to achieve an improvement in the resistance of plants to counteract the negative effects of biotic and abiotic stresses. Recently, endophytic fungi have been found isolated from Solanaceae plants that inhabit the extreme conditions of the Atacama Desert. In this context, one of the fungi was identified as *Penicillium yarmokense* through phylogenetic analysis of the molecular markers ITS- RNA pol II y β - tubulin. With this information, the *in vitro* antifungal activity of *P. yarmokense* against the agriculturally significant phytopathogen *Botrytis cinerea* was tested through confrontation assays under constant light/dark conditions and a photoperiod of 12 hours each, with the expectation that this would modulate the production of soluble antifungal secondary metabolites against the phytopathogen. Simultaneously, commercial tomato seeds (*S. lycopersicum* cv Roma) were methodologically incubated with the endophytic fungus and left to germinate for a week in Murashige and Skoog media. The results of the confrontation assays indicate that *P. yarmokense* has the potential to significantly inhibit the growth of the phytopathogen through antibiosis mechanisms under constant light and darkness conditions, as well as under a 12-hour photoperiod, showing different levels of inhibition against *B. cinerea*. On the other hand, incubating the endophytic fungus with the seeds significantly increases the germination frequency in *S. lycopersicum* compared to the negative control (without fungi). For this reason, considering these results as the first characterization of the fungus *P. yarmokense* as an endophyte could be relevant for future studies on its application in commercial *S. lycopersicum* to promote germination and resistance to biotic stress against *B. cinerea*.

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