Influence of soil substrate on the biocontrol capacity of *Pseudomonas* CMR12a against Rhizoctonia root rot on bean (*Phaseolus vulgaris*)

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Abstract

Rhizoctonia solani is an important soil-borne pathogenic fungus associated with severe economic losses in commercial bean-growing areas throughout the world. Widely distributed in soil as mycelium and sclerotia, *R. solani* can attack the stem below and above the soil surface of young bean seedlings. In this study, we aim at determining the biocontrol capacity of *Pseudomonas* CMR12a, a beneficial bacterium isolated from cocoyam roots in Cameroon, towards Rhizoctonia damping-off on bean in different substrates consisting of various proportions of potting soil and sand. Being a promising antagonistic agent, *Pseudomonas* CMR12a is able to produce a wide range of metabolites, including phenazine antibiotics and cyclic lipopeptides. Data collected 14 days after inoculation showed that disease pressure increased with the portion of sand present in the substrate. In substrates containing 50% or 75% potting soil, the presence of either phenazines or cyclic lipopeptides was sufficient to suppress bean root rot. However, in substrate containing only 25% potting soil, the involvement of both compounds was required to achieve successful biocontrol activities. Additionally, the spread of *Rhizoctonia* hyphae and the growth of bean seedlings were also substrate-dependent. Soil substrate containing 50% potting soil seemed to be the most suppressive one against the spread of *Rhizoctonia* hyphae while substrate containing 75% potting soil was optimal for seedling growth.