MICROORGANISMS FOR MUSTARD GROWTH PROMOTION

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Background: Medicinal plants are natural sources of bioactive compounds whose therapeutic properties have been recognized for millennia. Among these, mustard stands out due to its wide range of biological properties, being used as an expectorant, analgesic, antibacterial, antioxidant, digestive stimulant, and diuretic. Mustard cultivation is influenced by several risk factors, including soil quality, susceptibility to diseases common to other crops, pest pressure, and occasionally reduced seed germination capacity.
The aim of this study was to evaluate the potential of three *Pseudomonas* bacterial strains as plant growth-promoting agents for mustard, with the objective of improving seed germination and supporting plant development under cultivation constraints.
Materials and methods: mustard seeds were treated with suspensions of *Pseudomonas fluorescens* CNMN-PsB-01, CNMN-PsB-02, and CNMN-PsB-12, cultivated in King B liquid medium.
Results: The treatment of mustard seeds led to increases in seed germination, seedling length, and dry weight by 11.6–15.0%, 16.0–18.7%, and 20.0–22.9%, respectively, compared with the control. In addition, total chlorophyll content—particularly chlorophyll *b*—increased significantly. In the most effective treatments (*Pseudomonas fluorescens* CNMN-PsB-02 and *Pseudomonas fluorescens* CNMN-PsB-12), chlorophyll *b* content was 52.6–71.8% higher than in the control.
An increase in chlorophyll content in mustard leaves has important physiological and agronomic implications, as this pigment plays a central role in photosynthesis. Elevated chlorophyll levels, especially chlorophyll *b*, enhance the efficiency of light energy capture. Consequently, an intensified photosynthesis leads to greater production of assimilates necessary for plant growth and development, which likely explains the observed stimulation of mustard growth. In mustard, enhanced photosynthetic activity may contribute to faster leaf development and improved formation of reproductive organs. Plants with a well-developed photosynthetic apparatus can sustain active metabolic processes for longer periods, providing a competitive advantage. Furthermore, increased chlorophyll content may reflect improved mineral nutrition, particularly with respect to nitrogen and magnesium—key elements in the chlorophyll molecule. Thus, the stimulation of chlorophyll biosynthesis may serve as indirect evidence of enhanced nutrient uptake and utilization.
Conclusion: The tested *Pseudomonas* spp. strains demonstrate significant potential as growth promoters for mustard. Their application improves seed germination, plant growth, and chlorophyll content, thereby contributing to increased productivity and resilience under variable environmental conditions.

Keywords: microorganisms, plant growth promoters, mustard

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