

Unraveling the mode of action of a nematicidal and fungicidal dipeptide produced by *Bacillus velezensis* UMAF6639

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In the last decades, the use of beneficial bacteria has become a promising strategy to combat plant diseases. Previous studies have shown that the *Bacillus velezensis* UMAF6639 strain had an excellent biocontrol capacity against fungal and bacterial diseases of cucurbits. In addition, it had been observed that it could also be effective against plant parasitic nematodes.

Currently, the application of chemical agents remains the most common method for managing and controlling these pathogens. However, due to the increasing concern about environmental and public health safety issues, many highly toxic chemical compounds have been restricted in their use. Therefore, there is an urgent need to develop more environmentally friendly ecological alternatives for controlling these pathogens.

Therefore, in this study, the identification, characterization, and mode of action description of a molecule produced by *Bacillus velezensis* UMAF6639, a cyclic dipeptide, which was demonstrated to have nematicidal and fungicidal activity, was carried out. The results indicated that the activity of this molecule was based on a common mechanism capable of altering the physical characteristics of the pathogens plasma membrane, which is key to the physiology and homeostasis of these organisms. This discovery is important because it provides a basis for the development of new biological control agents that are effective against plant diseases caused by pathogens other than fungi and bacteria.