

New functions of a protein may improve biocontrol methods in sustainable agriculture

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Professor Diego Romero of the University of Malaga, main author of this study, at BacBio Laboratory, where he conducted the research. Credit: University of Malaga

The laboratory of the UMA "BacBio" has proved that *Bacillus subtilis*

cells, when deprived of an amyloid protein (TasA), exhibit a range of cytological anomalies and dysfunctions leading to their premature death. This discovery enables progress to be made in understanding the role of these proteins, widely distributed in the microbial world, and helps improve biological control methods in sustainable agriculture. This research has been recently published in the scientific journal *Nature Communications*.

The UMA research team has particularly evidenced how this [amyloid protein](#) TasA, required for the assembly of the bacterial communities known as "biofilms," also prevents bacterial cell death, but preserves cell membrane integrity. "That is, we observed a complementary role in these proteins in addition to their merely structural role," explains the main author of this study, the researcher Diego Romero, who is also a member of the Institute for Mediterranean and Subtropical Horticulture "La Mayora" (IHSM), a joint research institute of the Spanish National Research Council (CSIC) and the UMA.

According to the expert, this dual functionality is reflected in bacterial attachment to plant surfaces, where the [protein](#) contributes to combat pathogen attack and improve bacterial fitness. "We aim to boost its use in sustainable models of crop production and protection," says the Professor of the UMA Department of Microbiology.

Thus, this study has worked on the bacterium *Bacillus subtilis* placing emphasis on two aspects: the study of its molecular bases, that lead to the formation of bacterial communities known as "biofilms," and how these biofilms contribute to the beneficial activity of *Bacillus* as a biocontrol agent in sustainable agriculture models.

The amyloids: Dual functionality

Amyloids are proteins primarily known for their relation to degenerative

diseases in human beings. In fact, "amyloidosis," an ailment caused by amyloid accumulation in organs or tissues, is named after them.

However, as noted by this research, amyloid proteins (TasA among them) have the ability to adopt a great variety of purposes in nature, the reason why they are called functional amyloids.

"The fact that these proteins are widely distributed in the [microbial world](#) entails the possibility that they might play a role in other [bacterial species](#) stabilizing cell integrity, or at least a different and complementary role to that initially observed in each of these systems," clarifies Romero.

The expert states that the importance of these results is twofold. From the agrobiotechnological point of view, it allows researchers to better understand the behaviour of beneficial bacteria, and hence to improve and reinforce its use in sustainable production and protection programmes. On the other hand, from the microbial point of view, where [amyloid](#) proteins are highly distributed, a new target has been identified for attack should they wish to target pathogenic microorganisms.

The study has been supported by funding granted by the European Research Council (ERC-StG programme), which promotes top-quality research projects, and the Spanish Ministry of Economy and Competitiveness.

BacBio Laboratory, located in the Bioinnovation building of the UMA, has been studying bacteria physiology and their interaction with the environment since 2013. Plants are another priority line of research, particularly the Cucurbitaceae, a plant family which comprises melon and cucumber.

More information: Jesús Cámara-Almirón et al. Dual functionality of

the amyloid protein TasA in *Bacillus* physiology and fitness on the phylloplane, *Nature Communications* (2020). DOI: [10.1038/s41467-020-15758-z](https://doi.org/10.1038/s41467-020-15758-z)

Provided by University of Malaga

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