Study offers clues to understanding the infection mechanisms of a lethal fungus affecting more than 100 crops

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An international study on Fusarium oxysporum, one of the most lethal fungi for crops, found, contrary to what had been thought to date, that

the absence of a certain type of enzyme increases the rate of infection, although it decreases the pathogen's ability to spread, opening a door to new strategies to control its infection

The Fusarium oxysporum fungus is one of the most dangerous plant pathogens in the world due to its lethality and its ability to attack more than a hundred crops, making it a real headache for the agricultural sector. An international study in which two researchers from the University of Córdoba participated has shed new light on its infection mechanisms in a study published in the journal *Science Advances*. The results could lead to the development of new strategies to control the pathogen.

The study, carried out in collaboration with the Federal Polytechnic Institute of Zurich and the University of Paris-Saclay, focused on what is known as cellulases, a set of enzymes that the fungus uses to degrade plants' cell walls. Specifically, the research team managed to mutate a gene of the fungus to silence a large number of cellulases, at the same time 'deactivating' these proteins, which affect crops' plant walls, in order to study how the modified pathogen behaves under these conditions.

An unexpected finding of the study is that, in the absence of these enzymes, the fungus behaves much more aggressively, thus increasing the speed of infection and precipitating the plant's death. On the other hand, it decreases its ability to spread to other crops through spores, showing that these proteins are more important in the final stages of infection.

Cellulases have always been considered a key element in the infection process of fungi. However, as highlighted by the researcher Antonio Di Pietro, a professor in the Department of Genetics at the University of Cordoba, and one of the authors of the study, "this is the first time that

the absence of these proteins has been shown to accelerate the infection," contrary to what was previously thought. In this way, the study paves the way for the development of new strategies to reduce the pathogen's incidence. As the researcher stated, "the control of this protein can be a way to combat infection by the fungus."

The Fusarium oxysporum pathogen can go unnoticed in soil for years, but when it detects the root of a plant, it grows directly into it and infects its entire vascular system. In addition, once in contact with the crop, it is impossible to prevent infection, and its spores can remain in soil for more than 20 years. Therefore, curbing its contagion and spread is one of the great challenges facing the agriculture sector.

More information: Francisco M. Gámez-Arjona et al, Impairment of the cellulose degradation machinery enhances Fusarium oxysporum virulence but limits its reproductive fitness, *Science Advances* (2022). DOI: 10.1126/sciadv.abl9734

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