OFFICIAL ABSTRACT and CERTIFICATION

# Multifaceted approach to eradicate the lethal plant pathogen, Botrytis cinerea, by examining the role of proteins ADF4, ILR3, XanDH, and FLS2

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Botrytis cinerea (gray mold) is a worldwide destructive necrotrophic fungal disease that causes disease on more than 500 plant species, resulting in diminishing food crop yield and worldwide economic losses. B. cinerea is difficult to control because the pathogen genome displays a relatively high degree of plasticity – enabling frequent mutations that make biological/chemical control impractical. Resistance inducers, method to alter agents to prompt the plant ' s own immunity mechanisms, can reduce the use of pesticides and maintain high crop yields; however, plant defense mechanisms in relation to Botrytis cinerea are largely unknown. Several proteins, including ADF4, ILR3, XanDH, and FLS2 have been selected for further study based on their central role(s) in plant immunity processes and/or impacts in fungal/bacterial defense. To examine the role(s) of these proteins during B. cinerea-plant interactions, a forward genetics-based approach was used to evaluate mutant plants which no longer express these key genes. This was performed by Agrobacterium-derived insertions in model organism Arabidopsis thaliana. As experimental controls, wild-type Col-0 plants were evaluated in parallel to the mutants. After growing the mutants for six weeks, plants were infected with the B. cinerea BO5.10 strain and infection was tracked by monitoring fungal lesion size on the infected plants. The chitin fluorescence value of the fungus was also evaluated, using the WAC assay, utilizing the inoculated leaves and WGA-FITC counter stain. The results demonstrate that fls2 and adf4 mutants both led to increased susceptibility and removal of fls2 led to greatest fungal lesion diameter and fungal biomass. Additionally, the absence of the proteins XanDH and ILR3 led to an improved resistance, with XanDH mutants almost entirely fully resistant against B. cinerea. However, these results provide a working hypothesis for further investigation regarding removal or overexpression of certain proteins in targeted plants to fight fungal pathogen B. cinerea.

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