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Analysis of *Fusarium graminearum* Antifungal Protein and Latrodectin-I Effect over Growth and Toxigenesis of *Aspergillus* Fungi with Agrofood Impact †

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Abstract: Crops colonization by toxigenic fungi causes important economic losses, being presumed to increase with global change. Mycotoxins presence in crops affect food security by reducing the edible yield, nutritional values, and making cereal consumption unsafe. An efficient method to reduce mycotoxin content is to avoid fungi appearance or toxigenesis. This has been traditionally achieved with antifungal chemicals that negatively affect soil and ecosystem health. Current research aims for methods less harmful for the environment, as natural proteins or biocontrol. We tested crop-associated fungi against two possible growth-inhibiting proteins: Fusarium graminearum Antifungal Protein (Fg-AFP) and Latrodectin-I (Ltd-I). The first is produced by Fusarium graminearum to compete with other fungi, and the latter is found in Latrodectus hesperus venom, and has just recently been correctly purified. In a first assay, we exposed 4 Aspergillus strains against cellulose discs with four Fg-AFP and Ltd-I concentrations (7 μg/μL, 3.5 μg/μL, 1.4 μg/μL and 0.7 μg/μL). Results show that Fg-AFP inhibited 3 of the strains development, while Ltd-I just affected secondary metabolism. We subsequently selected Aspergillus niger and A. flavus strains, based on their importance in maize crops and sensitivity to the proteins, for a second assay in which we included the protein on surface. Results show that Fg-AFP reduced A. niger and A. flavus growth by 46.3% and 24.3%, respectively, extending fungal latent period by 68.4% and 52.6%, respectively. Ltd-I had no effect over A. flavus, but increased A. niger growth by 18.4%, prolonging latent period by 67.5%. Regarding toxigenesis, ochratoxin A production by A. niger did not vary when exposed to the proteins, but aflatoxin B1 synthesis by A. flavus increased with both treatments. Though this proteins have growth-limiting potential, they must be evaluated under wider concentration ranges to asses their effect over toxigenesis and usage as an alternative to harmful chemicals.

Keywords: Mycotoxins; Antifungal Protein; Latrodectin-I; Biological Control; Agrofood

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