INFLUENCES OF COMBINATORIALLY SELECTED PEPTIDES ON INHIBITIOIN OF *GIBBERELLA ZEAE* SPORE GERMINATION AND CYTOLOGICAL MODIFICATION OF EMERGING GERM-TUBES

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ABSTRACT

The ascomycete *Gibberella zeae* causes the head blight of wheat, a floral disease that reduces kernel weight, limits yield, and induces mycotoxin accumulation. To develop novel disease-management strategies, peptides were affinity selected from phage-display combinatorial libraries against *G. zeae* macroconidia to identify molecules that inhibit spore germination.

Two peptides, f3-16 and f8-18, were identified that significantly inhibited spore germination and germ-tube growth. Experiments were conducted to evaluate how the inhibitory peptide f3-16 affects constituents of the germ-tube apical cell that are important for polarized elongation, including endocytic system components, sterol-rich plasma membrane domains (SRD), and patterns of cell wall deposition.

When incubated without f3-16, *G. zeae* germ-tubes were stained to visualize plasma membrane, endocytic vesicles, endosomes, and the Spiztenkörper. These components were stained in the same temporal sequence that was observed in other filamentous fungi. Staining of SRDs and cell-wall chitin also agreed with previous observations in other fungi.

The peptide f3-16 caused endosomes to densely accumulate within the germ-tube cytoplasm, and vacuole formation appeared to be inhibited. The distributions of SRDs and chitin were also altered in germ-tubes incubated with the peptide.

This study provides the first description of cytological changes in germinating ascospores induced by a combinatorially selected inhibitory peptide. Characterization of these cytological phenotypes provides the groundwork for mechanistic studies of inhibitory peptides.