

Nathan Gross, Plant Sciences

Year in School: Senior

Hometown: Arnold, MO

Faculty Mentor: Dr. James T. English, Plant Sciences

Funding Source: U.S. Wheat & Barely Scab Initiative

Combinatorially selected defense peptides as an innovative approach to the management of fusarium head blight in wheat

Nathan Gross, Zhiwei Fang, Carol Murphy, & James T. English

Fusarium graminearum (teleomorph *Gibberella zeae*) is the causal agent of head blight in wheat. In wheat-producing areas of the world, incidence of this disease can result in dramatic reductions in grain yield and quality. Another important concern associated with *Fusarium* head blight is the accumulation of various mycotoxins that are produced by the fungus. These mycotoxins cause serious illness in livestock and also in humans. Currently, only limited genetic resistance to head blight is available; management is primarily based on chemical controls. Amid worries of the potential dangers to human, animal, and environmental health associated with pesticide use, new management strategies must be developed. Defense peptides, from combinatorial libraries, have been shown to inhibit growth and development of *Phytophthora capsici* and *Phakopsora pachyrhizi*. We are now endeavoring to identify defense peptides that bind to receptors along the surface of *Fusarium graminearum* germlings and similarly inhibit their growth and further development. In addition to plant disease, several other members of the genus *Fusarium* are known to cause human infections. This is particularly a problem for those individuals who possess compromised immune systems. As an extension of this research, it is our hope to use defense peptide technologies against these pathogens, and that the resulting therapies show less human toxicity than those available today.

This project was completed to fulfill a Capstone requirement.