

# Stem and Root Lengths Predict Severity of Gibberella Seedling Blight in Maize

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## Introduction

*Fusarium graminearum* is a widespread pathogen of maize that produces mycotoxins when it infects maize kernels, making it unacceptable for animal and human consumption (2). Experimentally, the addition of gibberellic acid causes normal growth in dwarf maize plants (1). When *F. graminearum* is inoculated on to maize roots, gibberellic acid is produced. This stimulates the maize plant to move more resources for growth. The purpose of this research is to identify early fungal-induced phenotypes as predictors of resistance against maize seedling blight disease caused by *F. graminearum*.

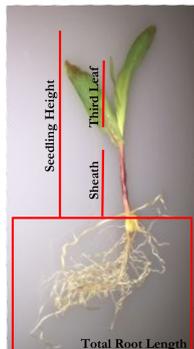
**Hypothesis:** Early *F. graminearum* induced phenotype such as root and stem lengths quantitatively correlate with seedling survival rate and can predict disease severity.

## Materials and Methods

**Materials:** Three fungal isolates with different levels of pathogenicity and nine commercial maize hybrids lines with different susceptibility levels.

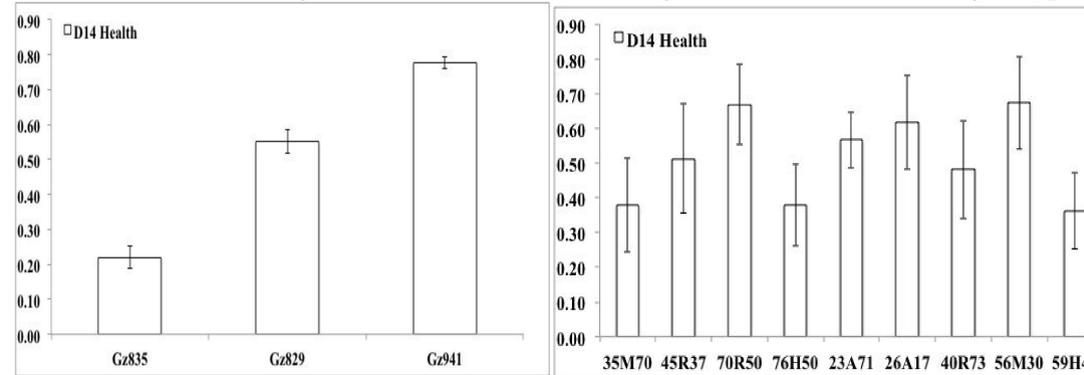
Phenotypes measured: stem and root lengths, sheath elongation, and third leaf emergence.

	Gz829	Gz835	Gz941
35M70			
45R37			
70R50			
76H50			
23A17			
40R70			
56M30			
59H44			
26A71			

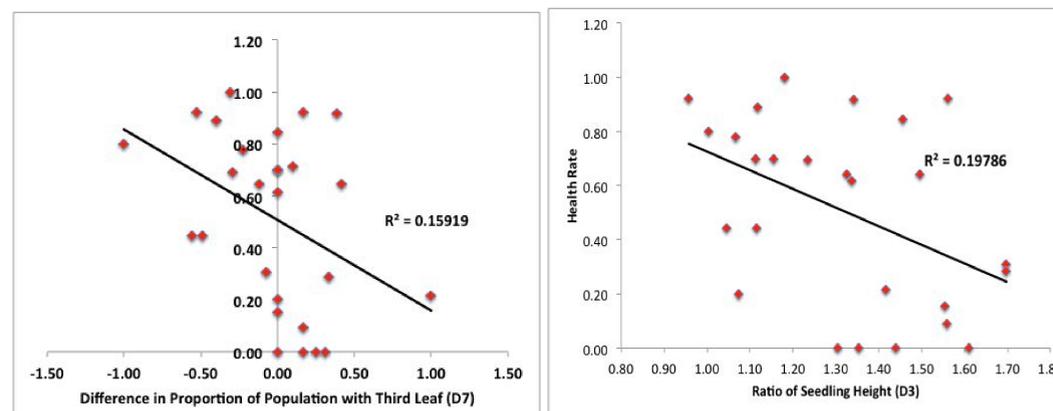


## Results

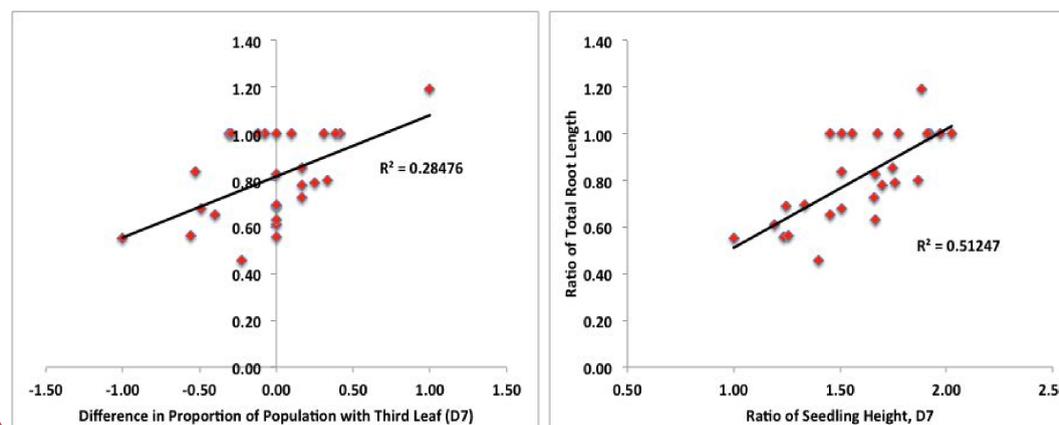
- Plant health rate is significantly different across fungal isolates but not maize genotypes



- Third leaf emergence rate and seedling height are significantly correlated with the health rate of maize seedlings inoculated with *F. graminearum*.



- Third leaf emergence rate and seedling height are strongly correlated with reduction of total root length by *F. graminearum*.



## Conclusions

- Fungal isolates have more significant effects on plant health than maize genotype.
- Earlier third leaf emergence and elongated seedlings are warning signs of severe seedling blight later on.
- Surprisingly, reduction of total root length caused by *F. graminearum* is not directly correlated with plant health, but is correlated with other disease severity-predicting phenotypes.

## Future work

- Educate farmers about our discoveries.
- Develop a disease severity forecasting system based on our works.
- Investigate the genetic basis of the quantitative variation in *F. graminearum*-induced symptoms in maize shoots and roots with quantitative trait loci (QTL) mapping.

## Literatures cited

- Bernard O. Phinney (1956). Growth Response of Single-Gene Dwarf Mutants in Maize to Gibberellic Acid. Vol 42:186-189.
- Pestka, J.J. (2010). Deoxynivalenol: Mechanism of Action, Human Exposure, and Toxicological Relevance. Arch. Toxicol. 84:663-679.

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