

Variability of protease activity and growth rate in isolates of *Macrophomina phaseolina* from various hosts

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BACKGROUND

Macrophomina phaseolina (MP), has >500 plant hosts and causes charcoal rot on Kansas row crops (Sinha et al., 2022; Front Microbiol 13:847832).

Genetically distinct subpopulations that vary by host (Saleh et al. 2010 Molecular Ecology 19(1):79-91).

Fewer protease genes compared to most other plant pathogenic fungi (Islam et al., 2012; BMC Genomics 13: 493).

RESEARCH QUESTIONS

Do isolates from different hosts **grow** at different **rates**?

Does **protease activity** vary among MP isolates from different hosts?

METHODS

Evaluated 344 MP isolates from multiple hosts including row crops and wild grasses.

Inoculated on potato dextrose agar to measure growth rate and casein agar (CNA) plates to measure protease activity.

Width of clearing zones measured from edge of colony to edge of zone over a one-week period (see **Figure 2**).

RESULTS

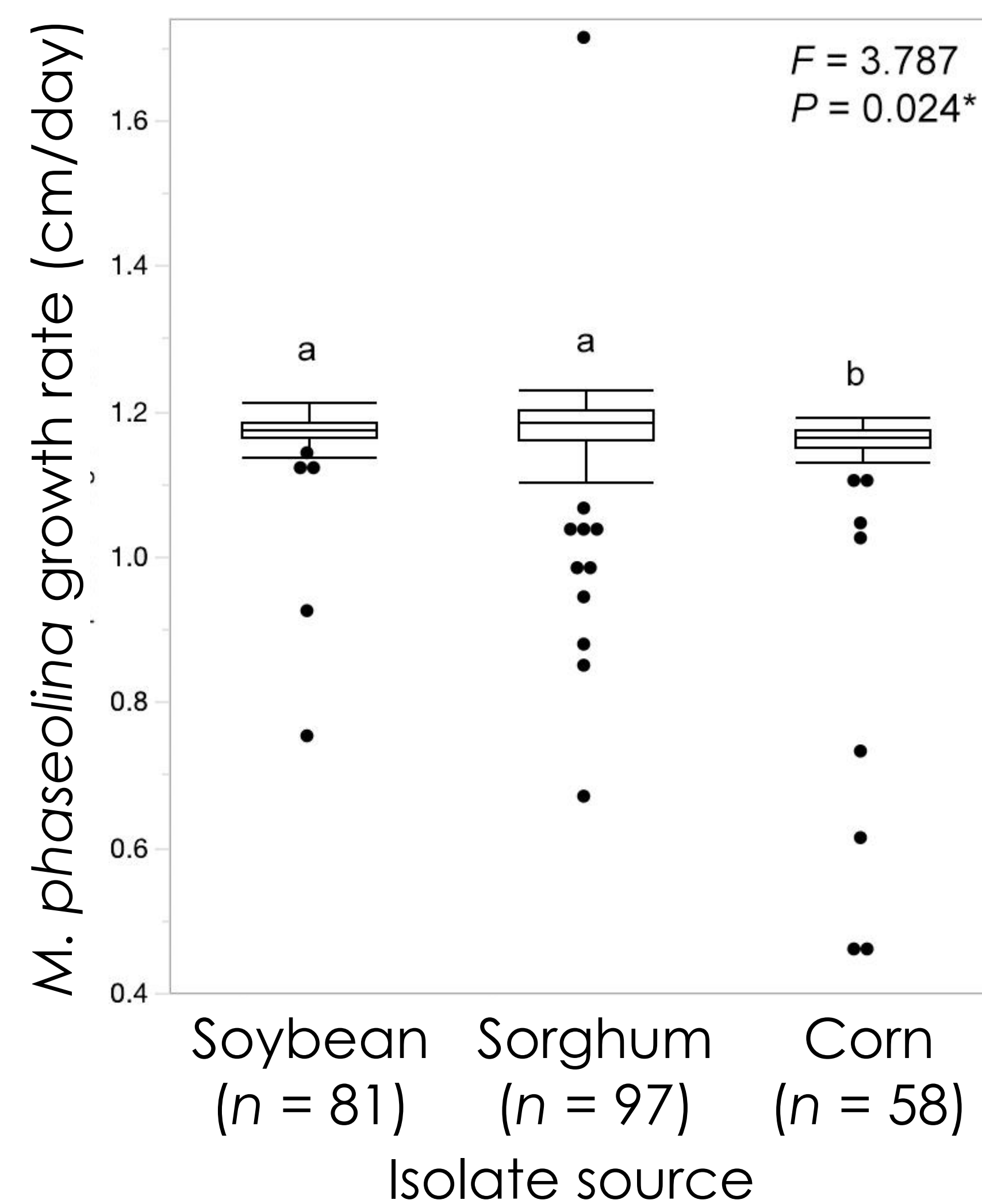


Figure 1. Isolates from maize grew slower in PDA culture than those from soybean or sorghum.

Box-plots comparing growth rates of isolate groups. Different letters indicate significant differences of underlying means at $P < 0.05$ according to Tukey's Honestly Significant Difference test.

Figure 2.

M. phaseolina exudes protein-lysing enzymes (proteases), creating a "clearing zone" in protein-based CNA.

Proteolysis is a common mechanism of attack for plant pathogens. Proteases can be injected into host cells to manipulate cell machinery and weaken the host immune response.



Sorghum bicolor isolate after 1 week at 30°C

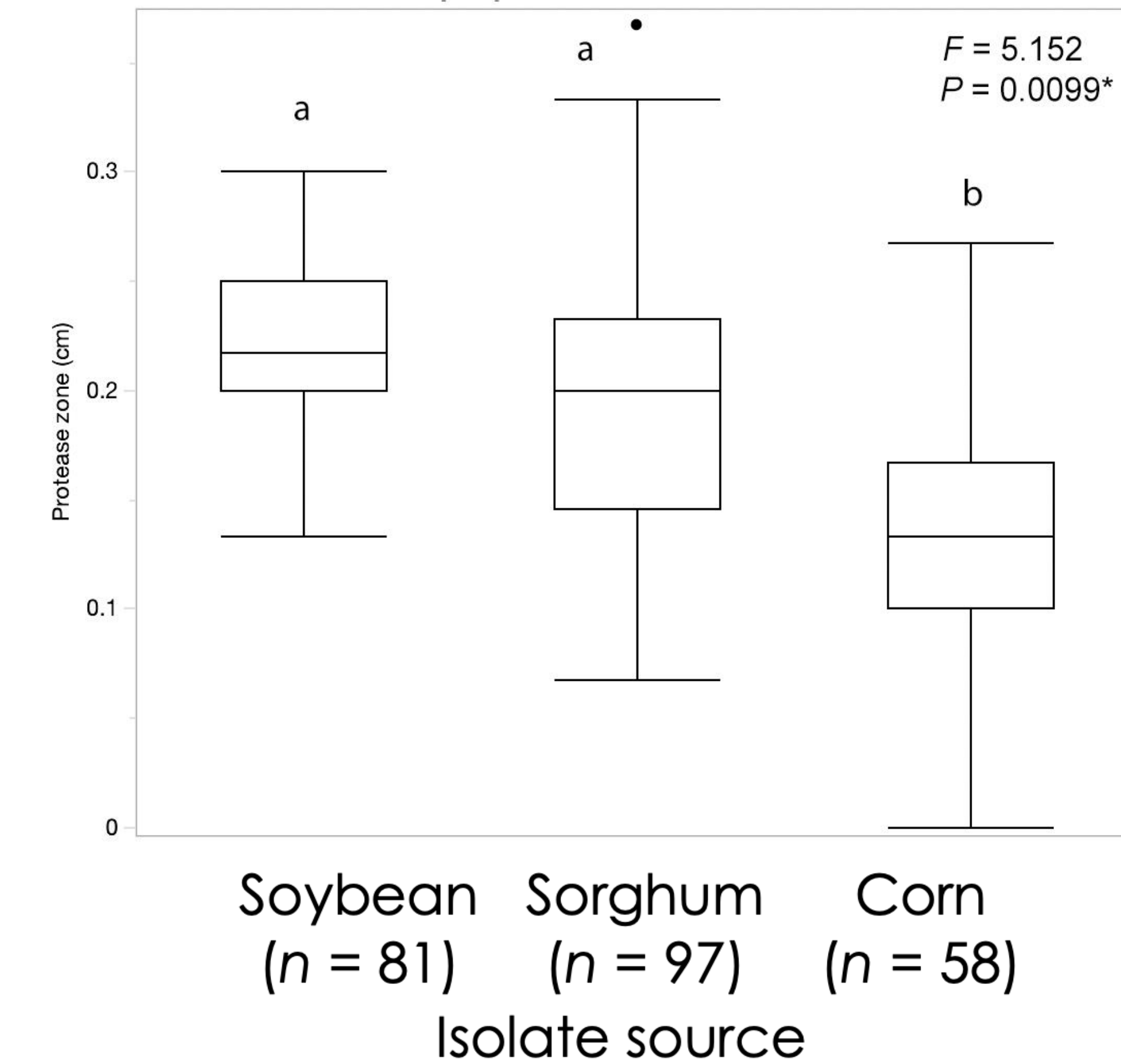


Figure 3. Isolates from maize produced smaller protease zones than those from soybean or sorghum.

Box-plots comparing protease zones in CNA. Different letters indicate significant differences of underlying means at $P < 0.05$ according to Tukey's Honestly Significant Difference test.

DISCUSSION

The protease activity and growth rate of *M. phaseolina* were **lower** in isolates from **maize** than soybean or sorghum.

This provides insight into how MP virulence mechanisms shift depending on **host identity**.

Further studies may examine the correlation between protease activity, growth rate, and **symptom severity** to understand their roles as **virulence factors**

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