

Evaluation of Pea (*Pisum Sativum* L) Rhizosphere Bacteria as Biocontrol Agents of Aphanomyces Root Rot

Ashebir T. Godebo,* James J. Germida and Fran L. Walley

Department of Soil Science, University of Saskatchewan, Saskatoon, SK, Canada, S7N 5A8

*Corresponding author (atg881@mail.usask.ca)

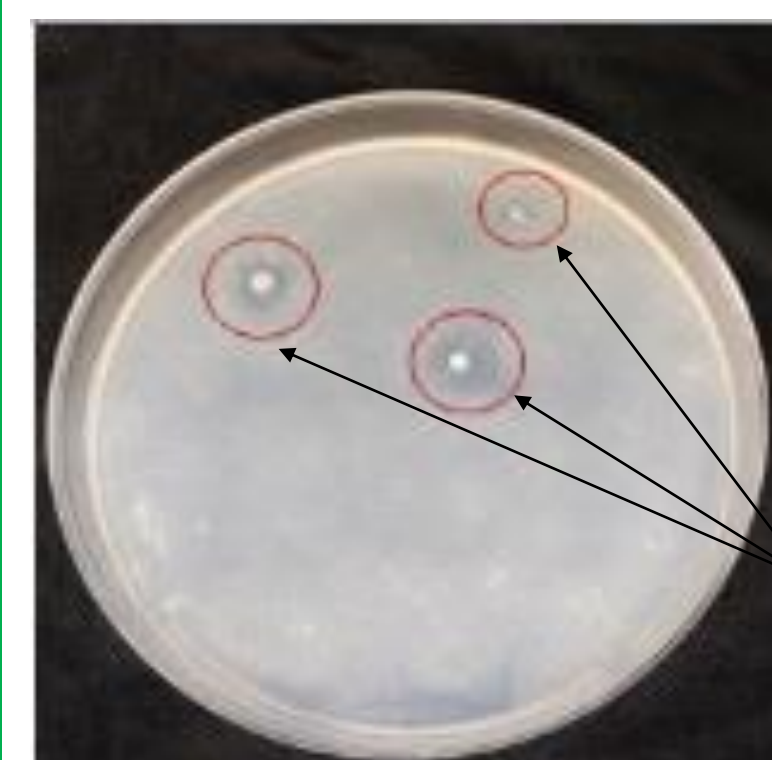
Background

Aphanomyces root rot caused by *Aphanomyces euteiches* has recently emerged as a significant threat to field pea production in Western Canada¹. Until the recent introduction of INTEGO™ Solo (ethaboxam) for the suppression of *A. euteiches* in field pea there were no chemical control products available in Canada² and disease avoidance and crop rotation practices were the only control measures. Microbial inoculants that can control or reduce the severity of the disease offer another potential control measure. Zoospore and mycelia are the pathogen infective stages primarily responsible for the development of water-soaked, honey-coloured lesions on the root, cortex and epicotyl that result in stunting, yellowing and wilting leaves, and often death of the entire plant³. Therefore, interrupting the pathogen life cycle by using a biological control method can provide an alternative approach to control Aphanomyces root rot. **The objective of this research was to evaluate pea rhizosphere bacteria as inoculants against *A. euteiches*.**

Protocol and Results

Identification of antagonistic bacteria

Antagonistic bacteria were identified using agar overlay assay plate⁴.

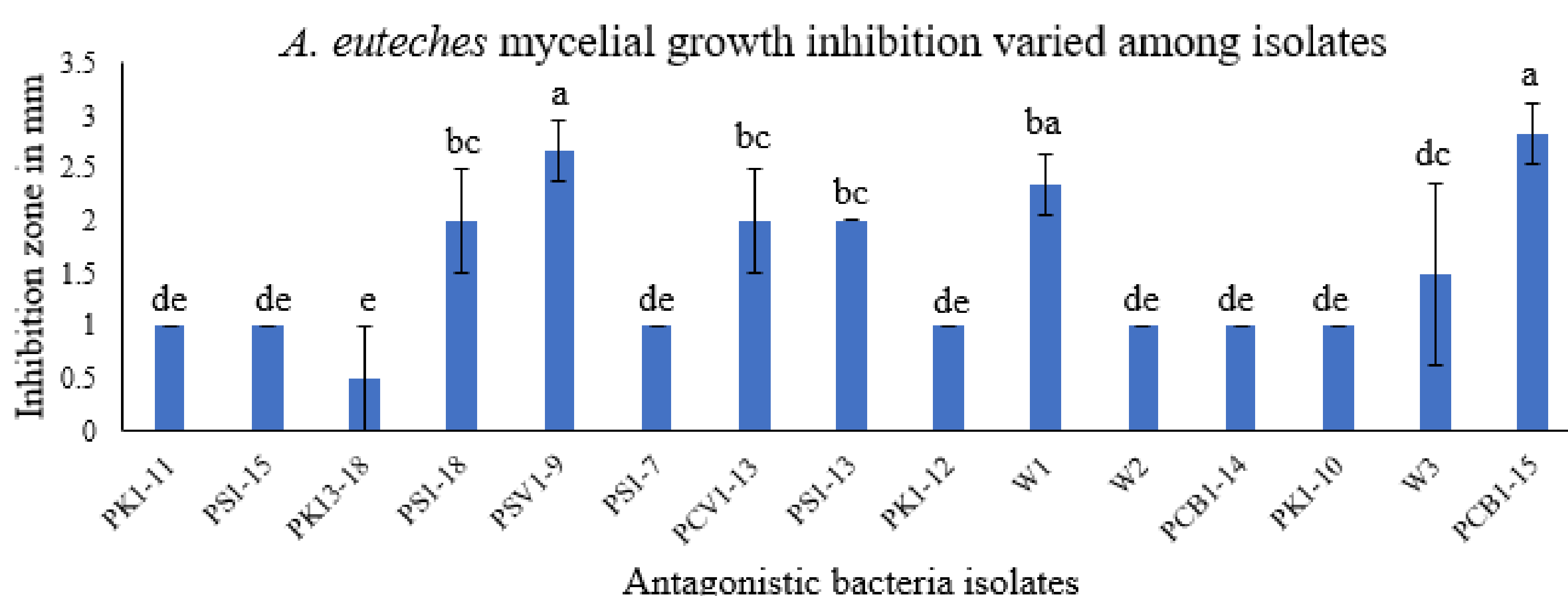
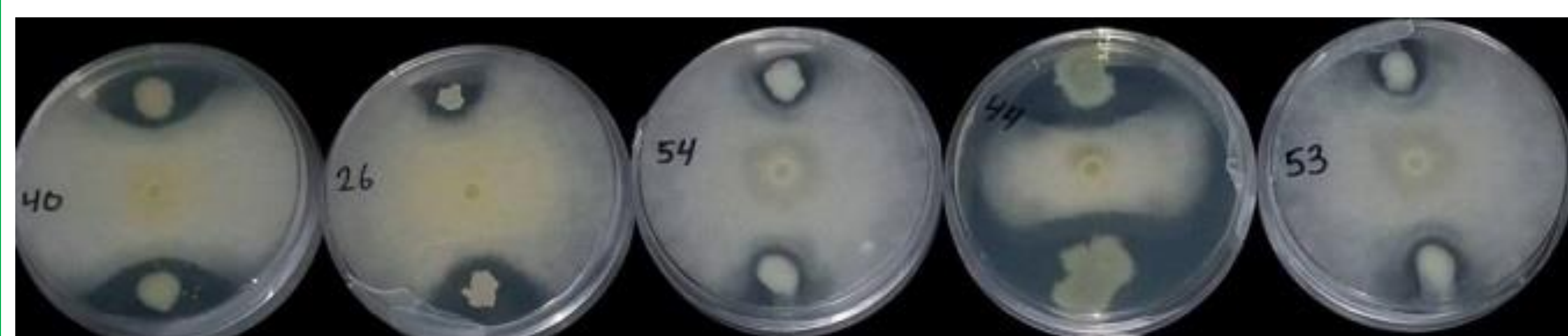


The assay plate was prepared by spreading soil dilution and crashed *A. euteiches* mycelia over TSA.

Bacteria antagonistic against *A. euteiches* showing inhibition zone.

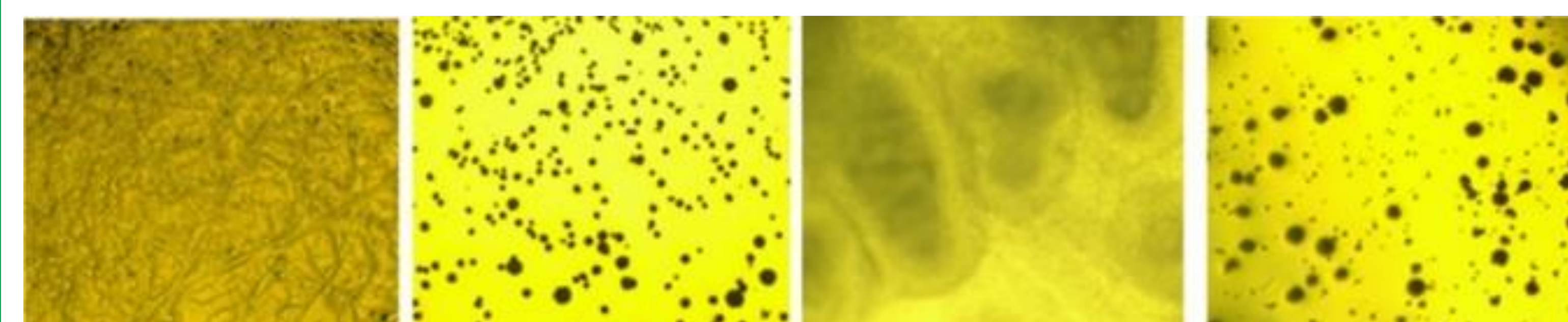
Mycelial Inhibition assay

Antagonistic bacteria were inoculated on a potato dextrose agar (PDA) plate and a plug with *A. euteiches* was placed at the center.



Zoospore germination inhibition assay

Broth cultures of the antagonistic bacteria and *A. euteiches* zoospore were spread over PDA plates. Some isolates completely inhibited zoospore germination.



Control

PCB1-15

PCB1-13

W

The control shows Aphanomyces zoospore germination and mycelia, whereas the other three fields show complete inhibition of zoospore germination by antagonistic bacteria on PDA plates.

Protocol and Results

Isolate PCV1-13 inhibited Aphanomyces root rot disease in pea.



Aphanomyces zoospore only (+ Control)

PCV1-13 + Aphanomyces zoospore

PCV1-13

- Control

+ Control

PCV1-13 + Aphanomyces zoospore

PCV1-13

- Control



Initial symptoms of root rot disease; discoloration, a light tan color, in the indicated sections of the root system; level = 1.

Discoloration of most of the root system; level = 2.

No symptoms; roots healthy and white.

In this pot experiment, antagonistic bacteria and Aphanomyces zoospores were inoculated at 1×10^8 CFU mL⁻¹ and 0.5×10^4 zoospore mL⁻¹, respectively. The plants were harvested after four weeks of planting.

Conclusions

- *A. euteiches* lifecycle can be interrupted using rhizosphere bacteria.
- Antagonistic potential varies among the rhizosphere bacteria.
- There is a potential for biological control of *A. euteiches* using rhizosphere bacteria as bio-inoculants.
- Further identification and efficacy testing are underway.

References

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