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## Identification of Root Morphological Traits Response in Soybean (*Glycine max* L.) After Inoculated with *Phytophthora* Root Rot

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### [Introduction]

Fungi are the most crucial soil-borne disease pathogens responsible for several diseases on agronomic important crops. One of the most iconic *Phytophthora* species is *Phytophthora sojae*, responsible for root rot in soybean. *Phytophthora* root rot (PRR) can infect soybean plants in any growth stage and causes seed rot, pre- and post-emergence, damping-off, root and stem rot. The objective of this research was to identify the root responses to *Phytophthora* root rot of two different soybean cultivars, Cheongja and Daechan.

### [Materials and methods]

Seeds were sown and a single plant was grown in the polyvinyl chloride (PVC) tube [16.5 cm (diameter) x 50 cm (height)] placed in a greenhouse and inoculated with the fungi cultured into the soybean stem at V2 growth stage. This experiment consisted of 2 different treatments, control and treatment (fungi inoculation). Roots were harvested 8 days after inoculation and the 2 dimensions (2D) root images were collected by a scanner using washed-root samples. The obtained root images were analyzed by an image analysis software (WinRHIZO pro, Regent Instruments Inc. Canada).

### [Results and discussion]

The root morphological traits such as total root length (TRL), surface area (SA), tip number (TN) and fork number (FN) revealed a non-significant difference between treatments. However the results showed statistical differences among treatment and cultivar x treatment interactions for average diameter (AD). The RV showed a notable difference among cultivars and cultivar\*treatment interaction. Cheongja and Daechan showed 37% and 1% lower TRL, 68% and 48% lower FN in inoculated plants, compared to control plants respectively. Cheongja cultivar showed 37% higher SA in control plants as compared to the inoculated plants. In contrast, Daechan showed 6% lower SA. Cheongja showed 25% higher AD in inoculated plants as compared to control plants, while Daechan was significantly lower AD (54%) for control plants compared to inoculated plants. In conclusion, the effect of the PRR on soybean showed decreased root morphological traits such as TRL and FN for both cultivars, SA and RV showed reduction for Cheongja whereas slightly increased for Daechan. As a result of this study, more extensive research on *P. sojae*-caused soybean root rot in cultivars Cheongja and Daechan is needed.

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