

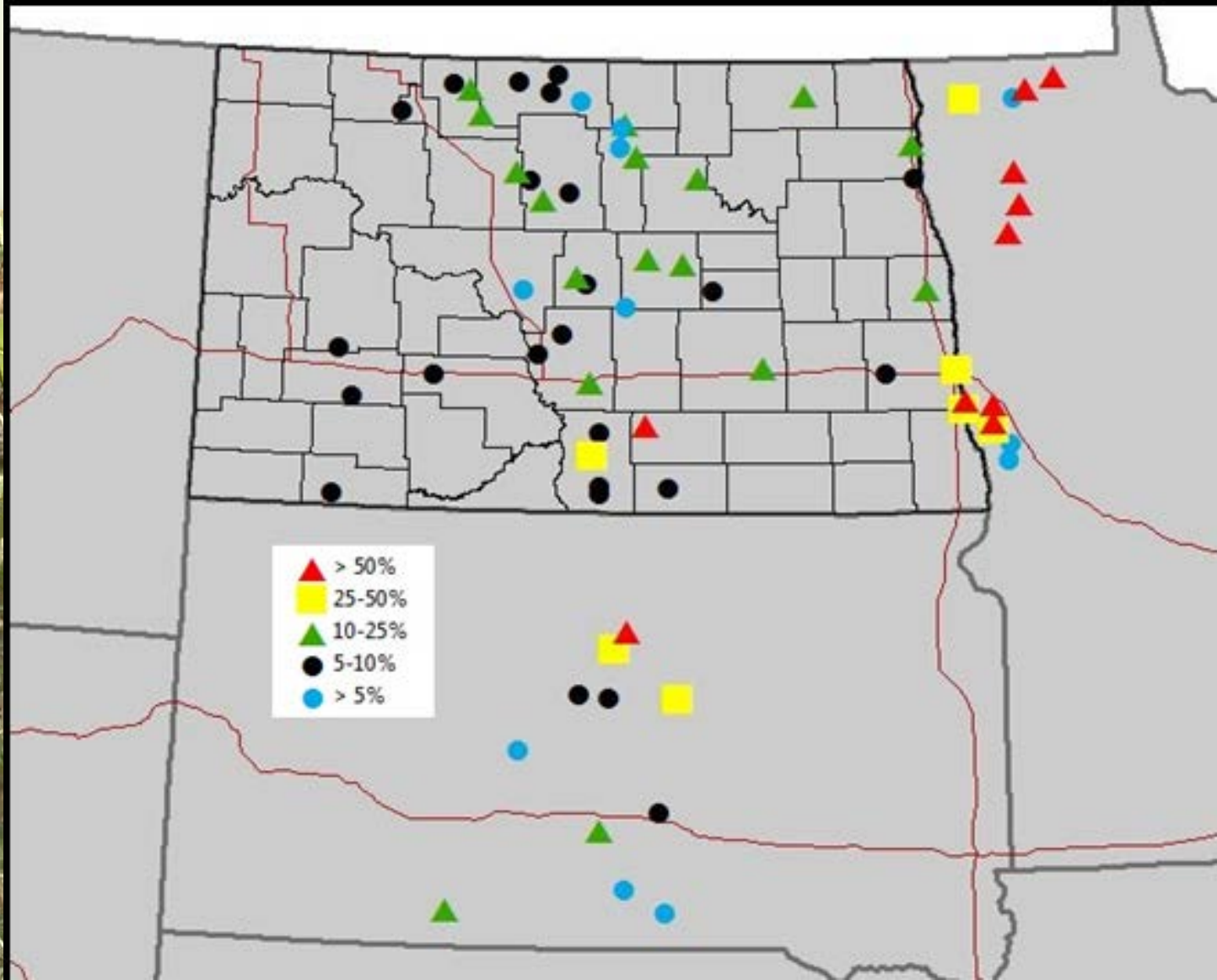
# Predicting Phomopsis stem canker



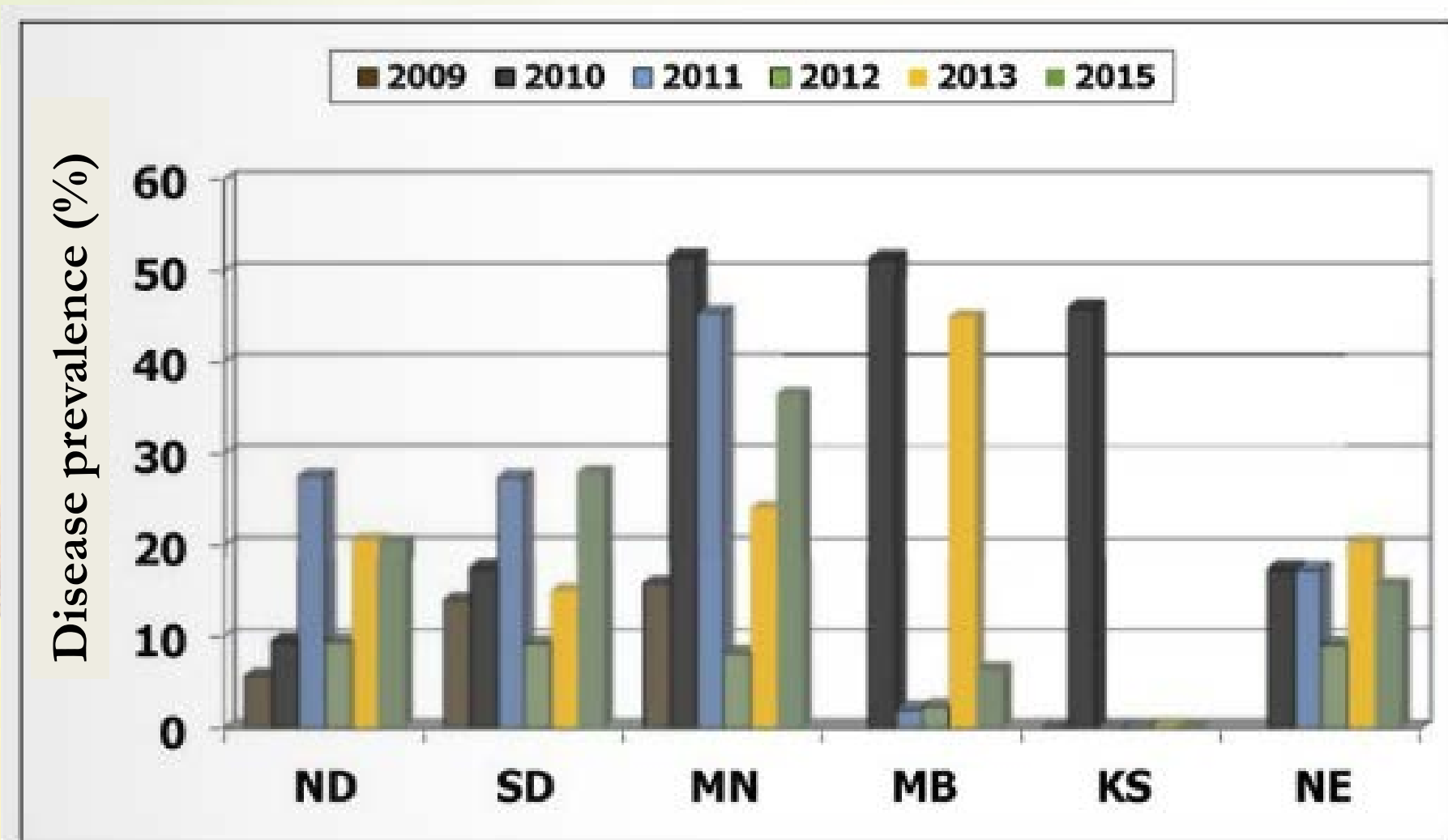
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# 2010



# 2015



(Hans Kandel and Tom Gulya, 2016 National Sunflower Association survey)

# 2017

- *Phomopsis helianthi*, *P. gulyae* and *P. stewartii* cause disease in the U.S.

(Mathew et al. 2015; Olson et al. 2017).

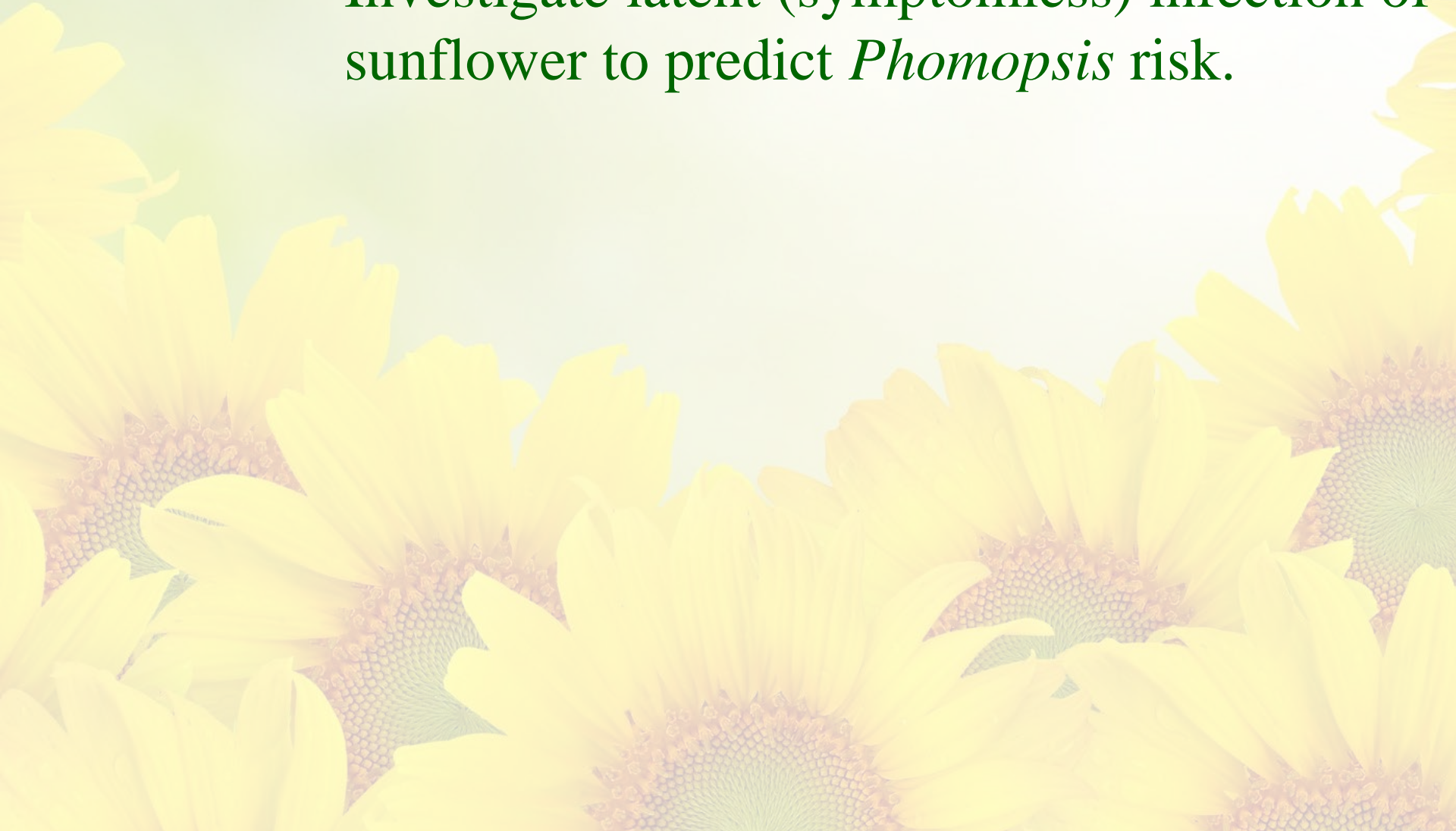
- Managing *Phomopsis* stem canker is a challenge.

# Our thoughts...

- *Phomopsis* can persist in apparently healthy soybean seedlings and grape berries (Ellis et al. 1974; Erincik et al. 2002; Prasartsee et al. 1975; Smith and Backman 1989).
- On sunflower, maybe, challenges in disease management are related to latent infection of *Phomopsis*.

# Research objective

- Investigate latent (symptomless) infection of sunflower to predict *Phomopsis* risk.



# Research trial

- A susceptible hybrid (CHS) was planted across a field in Brookings, SD.
- Two plants were randomly sampled biweekly at different growth stages.
- Disease severity rated biweekly (Mathew et al. 2015)

## Sunflower



### **Growth stages (Berglund 2007)**

V2/V3 (two to three true leaves)

V6/V7 (six to seven true leaves)

R1/R2 (bud forms/ elongates)

R5/R6 (Beginning of flowering)

R7 (back of the head turns a pale yellow color)

R8 (back of the head is yellow but the bracts remain green)

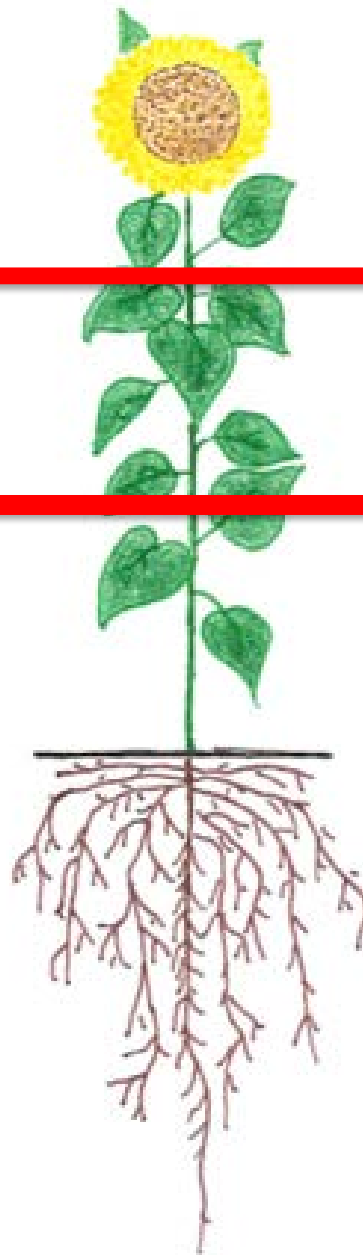
R9 (bracts become yellow and brown; physiological maturity)



Top

Middle

Bottom



Head

Leaf

Petiole

Stem

Root

# Research trial

- DNA extracted from each plant organ at different growth stages.
- DNA subjected to quantitative PCR specific for *P. helianthi* (Olson et al. 2016)
- Samples with  $C_t$  values  $< 36$  were determined to have quantifiable levels of DNA.

# Symptoms

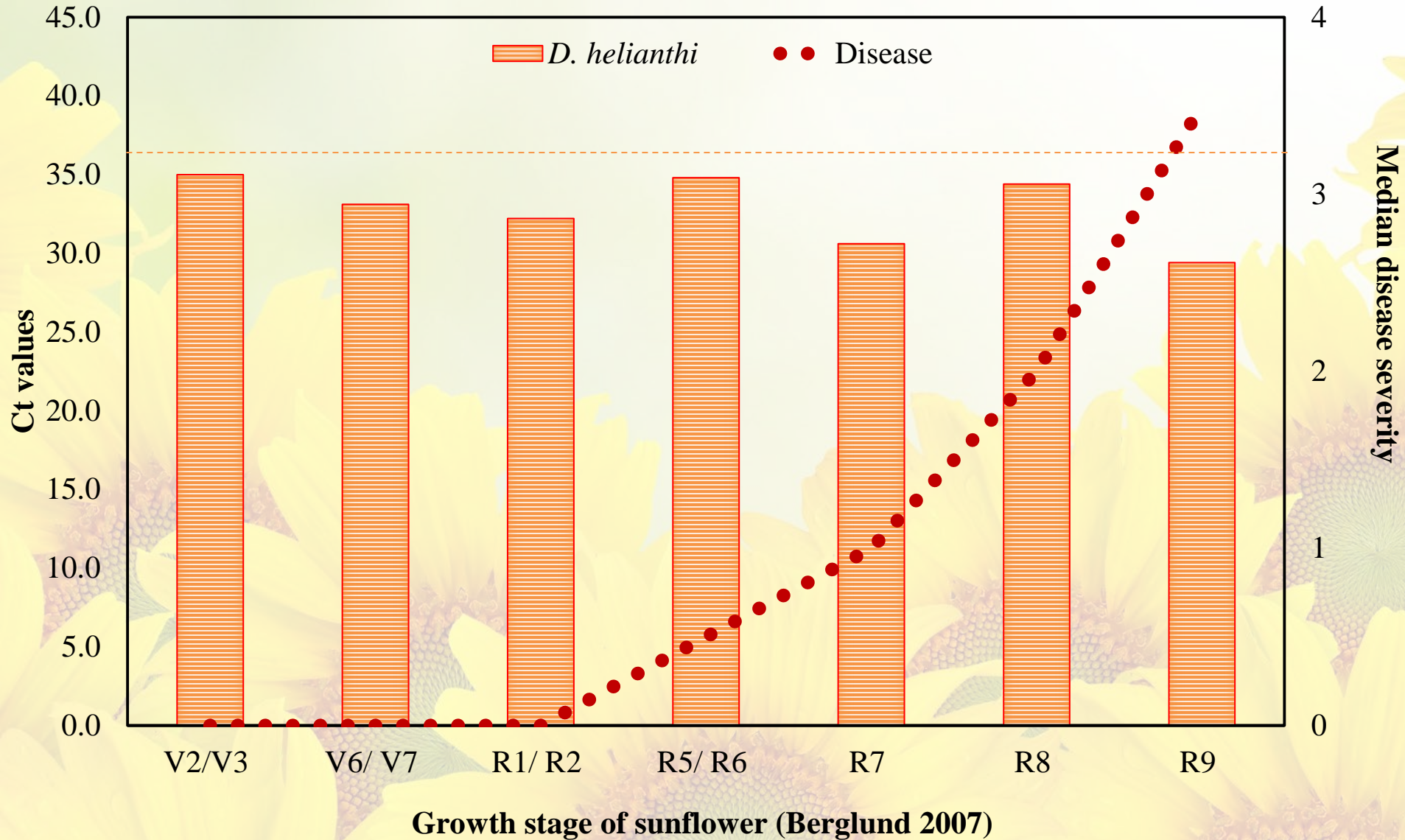


**R1 = bud initiation stage**

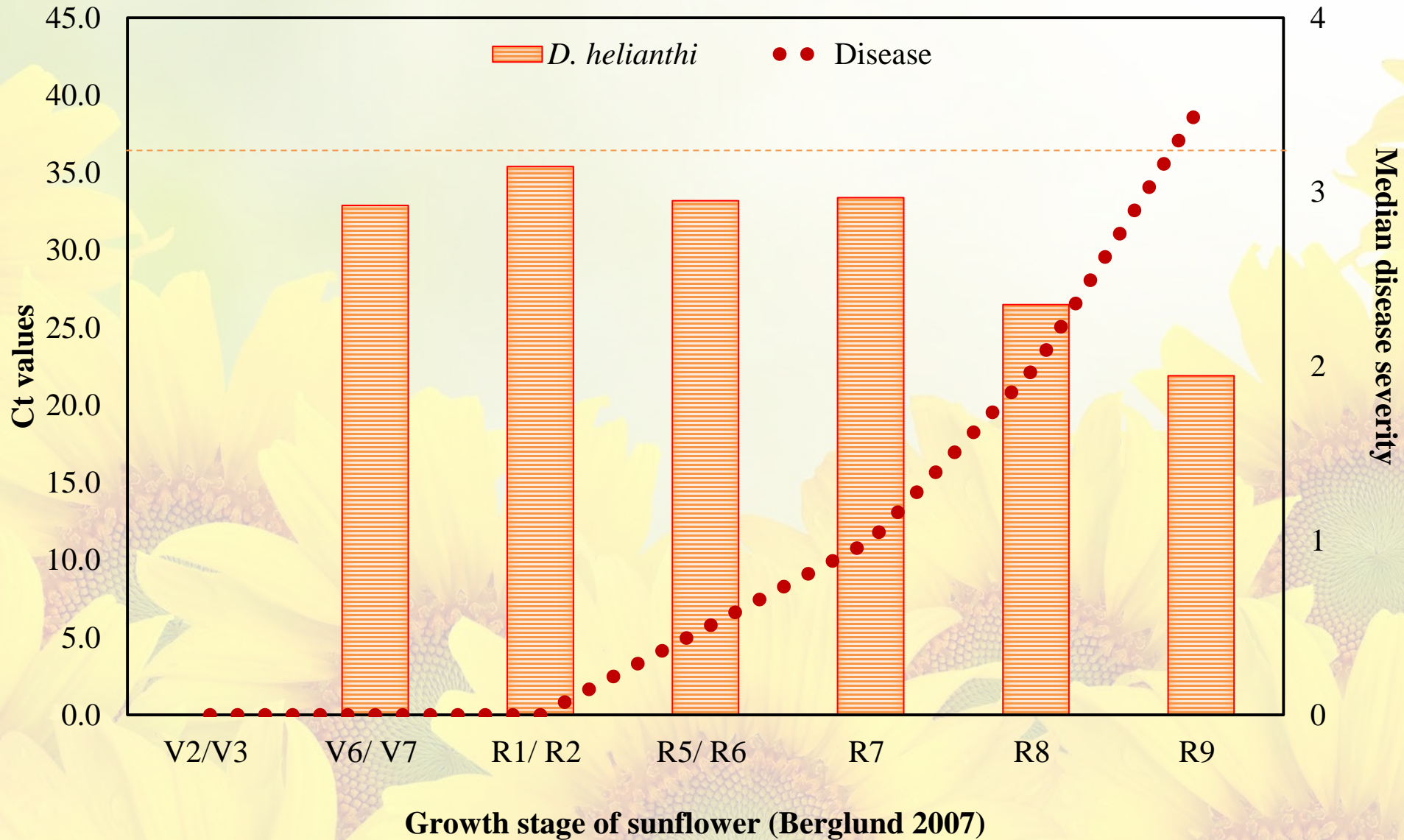


**R5 = flowering stage**

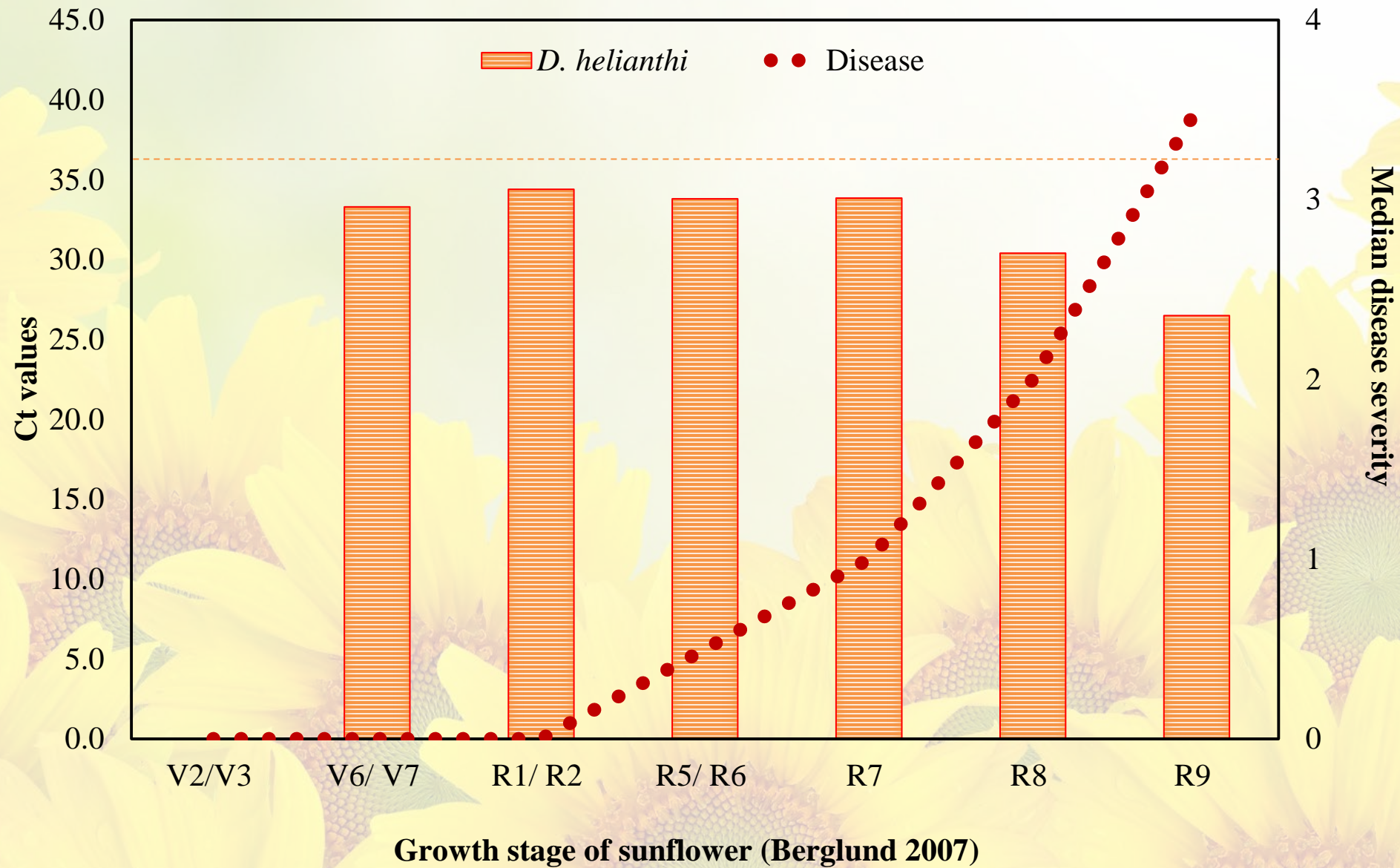
# Root



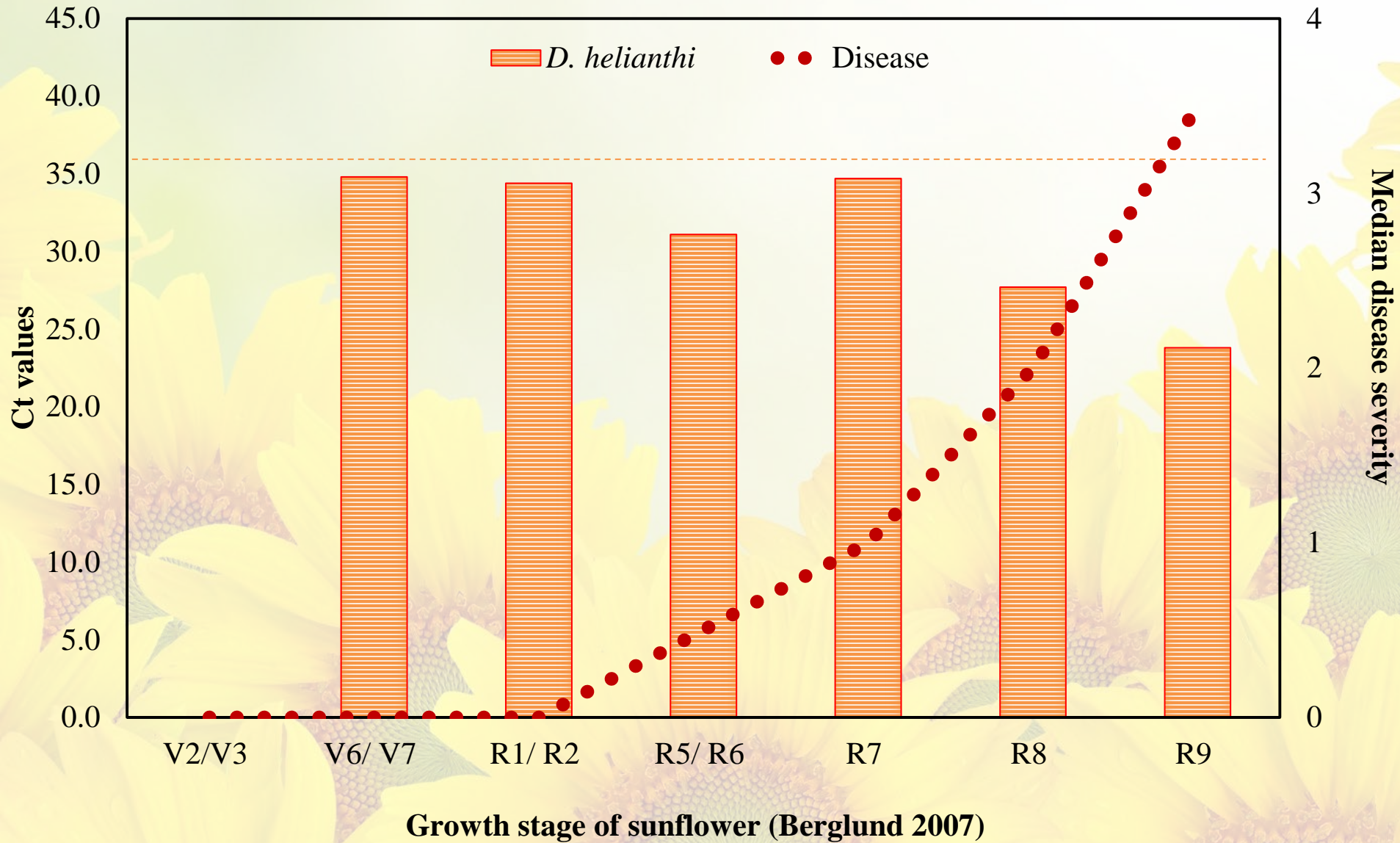
# Stem



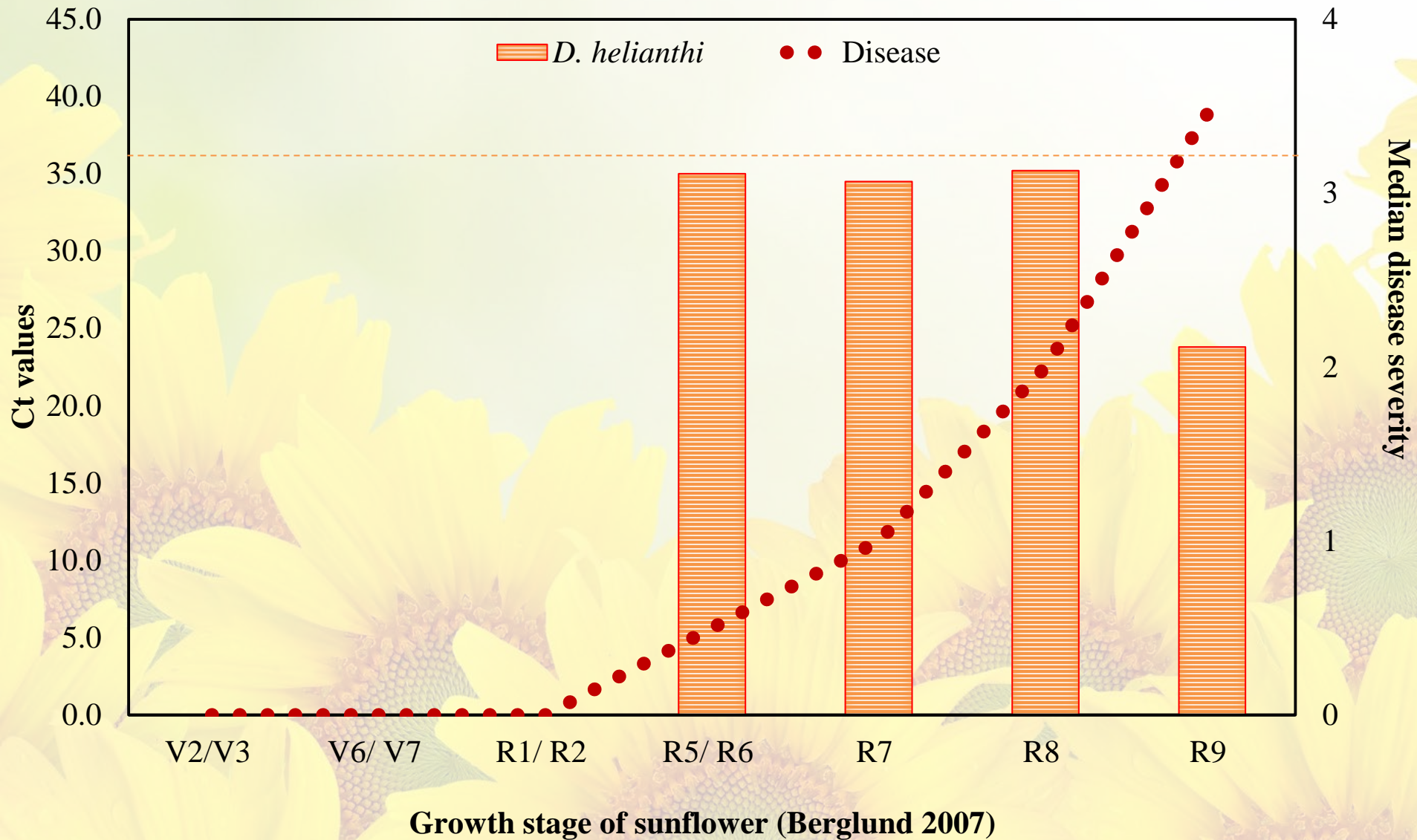
# Petiole



# Leaf



# Head





# Summary

- The qPCR confirmed the presence of *Phomopsis helianthi* in “symptomless” sunflower at the vegetative growth stages.
- This indicates that *Phomopsis* infection of sunflower may be *latent*.

# Summary

- There is a possibility that plant organs infected with latent *Phomopsis* can be an inoculum source (Tongsri et al. 2016).
- However, we have no evidence that latent infections can cause disease symptoms in the field.



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