

IDENTIFICATION OF *PHOMOPSIS GULYAE* ON WEED HOSTS

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Introduction

Phomopsis stem canker is one of the major diseases of sunflower (*Helianthus annuus* L.) in the United States (Mathew et al. 2015). In the United States, the prevalence of Phomopsis stem canker in the Northern Great Plains has increased 16-fold in between 2001 and 2012 (Mathew et al. 2015). *Diaporthe gulyae* (syn. *Phomopsis gulyae*) is a causal pathogen of Phomopsis stem canker and alternative weed hosts of the pathogen are suspected to play a role in disease development (Thompson et al. 2015). In 2016, *D. gulyae* was isolated from asymptomatic Kochia (*Kochia scoparia* L.) and Lambsquarters (*Chenopodium album*) plants sampled from a commercial sunflower field in Hyde County, South Dakota. The identity of *D. gulyae* was confirmed by morphology and phylogenetic analyses of the translation elongation factor 1-alpha (EF1- α) gene region. The objective of this study was to determine if the *D. gulyae* isolates recovered from Kochia and Lambsquarters are pathogenic to sunflower.

Materials and Methods

The experiment was performed in a completely randomized design with three treatments (*D. gulyae* isolates from sunflower, Kochia and Lambsquarter) and six plants (replication) per treatment. Inoculations were performed in the greenhouse on six-week-old plants of a sunflower confection inbred 'HA 288' using the stem-wound method (Mathew et al. 2015). A mycelial plug was used as the source of inoculum. After inoculation, all plants were subjected to misting for 3 days (3 sec every 5 min) and 3 nights (3 sec every 30 min). The greenhouse conditions were set at 26°C and >85% relative humidity at all times. At 4 days, 7 days, 10 days and 14 days after inoculation, disease severity was evaluated using a 0 to 5 rating scale from Mathew et al. (2015). To complete Koch's postulates, *D. gulyae* was isolated from the inoculated plants and the pathogen identity was confirmed by qPCR (Kontz et al. 2016). No symptoms were observed on the non-inoculated plants and the pathogen was not isolated (*data not shown*).

Results

- Results from our study show that the *D. gulyae* isolates from Kochia and Lambsquarters were pathogenic to sunflower (Table 1 and Fig. 2).
- The results also suggest that these weed species may serve as a source of inoculum for *D. gulyae* under field conditions.

Table 1. Disease severity ratings of six-week-old plants of a sunflower confection inbred ‘HA 288’ after inoculation with *D. gulyae* isolates from sunflower, Kochia and Lambsquarters.

<i>D. gulyae</i> isolates	Host recovered from	Host inoculated into	Disease severity rating (Median)*			
			4 days	7 days	10 days	14 days
SF-DIA-09	Sunflower	Sunflower	2.0	2.5	2.5	3.0
KOC-DIA-36	Kochia	Sunflower	2.0	3.5	4.0	4.5
LAM-DIA-37	Lambsquarters	Sunflower	3.0	4.5	5.0	5.0

*Disease severity rating scale of 0 to 5 was adopted from Mathew et al. (2015), where; 0 = no discoloration; 1 = low level discoloration at site of inoculation; 2 = slight discoloration or lesion 1 to 2 mm in length; 3 = necrotic lesions 2 to 5 mm in length, some colored stem streaking, leaf wilting and twisting; 4 = lesions 5 to 10 mm in length, significant necrosis and dark colored stem streaking, leaf and plant wilting, twisting, stunting, and some lodging; 5 = lesions exceeding 10 mm in length, severe leaf necrosis, lodging or plant death.

References

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