

DIAPORTHE PHASEOLORUM FROM SOYBEAN CAN CAUSE STEM CANKER ON SUNFLOWER THROUGH WOUNDS IN GREENHOUSE PLANTS.

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ABSTRACT

Diaporthe phaseolorum (Cke. & Ell.) Sacc. from soybean [Glycine max (L.) Merr.] can cause stem canker on sunflower (Helianthus annuus L.) through artificial wounds in greenhouse plants. Sunflower hybrid cultivar 'JT894A' and inbred line 'S37-388' developed stem cankers ranging from 2 to 5 cm long in 4 weeks after the stems were inoculated with D. phaseolorum var. caulivora Athow & Caldwell (stem canker) and D. phaseolorum var. sojae Wehm. (pod and stem blight). These symptoms were similar to those produced in sunflower by D. helianthi Munt.-Cvet. et al. (Phomopsis helianthi Munt.-Cvet. et al.) from sunflower. This is the first report of the pathogenicity of soybean isolates of D. phaseolorum var. caulivora and sojae on sunflower.

INTRODUCTION

Diaporthe/Phomopsis disease has been found on cultivated sunflower (Helianthus annuus L.) in Minnesota (2), North Dakota (2), Ohio (3), and Texas (9), USA; and also in Yugoslavia (1,4) and other sunflower growing countries (2,8). There is more than one biotype or species of Diaporthe/Phomopsis that attacks cultivated sunflower (1,5,10).

Soybeans [Glycine max (L.) Merr.] have been rotated with sunflowers in some areas on the Texas High Plains. Two varieties of D. phaseolorum (Cke. & Ell.) Sacc. attack soybeans and cause significant losses (7). D. phaseolorum var. caulivora Athow & Caldwell causes stem canker and

D. phaseolorum var. sojae Wehm. causes pod and stem blight in soybean (7). Whether these two pathogens can also cause disease in sunflower is unknown.

Since 1979, Diaporthe/Phomopsis disease of sunflower has become serious in Yugoslavia. One of the hypotheses to explain the origin of the Diaporthe/Phomopsis disease was that the pathogen evolved from soybeans since D. phaseolorum has been known for many years to occur on soybean (1). Yang and Gulya (10) examined seven isolates of Diaporthe/Phomopsis from sunflower and indicated that the seven isolates belonged to five groups. Some of the isolates may belong to D. phaseolorum or intermediate species between D. helianthi and D. phaseolorum.

This paper reports the results of greenhouse inoculations of sunflower plants with three isolates of D. phaseolorum from soybean and two isolates of D. helianthi (P. helianthi) from sunflower.

MATERIALS AND METHODS

The virulence on sunflower of two soybean isolates of D. phaseolorum var. caulivora (Dpc, isolated by B. L. Keeling, USDA-ARS, Stoneville, Miss., and ATCC 28464) and one soybean isolate of D. phaseolorum var. sojae (ATCC 28463) was compared with that of two sunflower isolates of D. helianthi Munt.-Cvet. et al./P. helianthi Munt.-Cvet. et al. (Dh/Ph-Yang, isolated by S. M. Yang, from a section of sunflower stem sent by M. Muntanola-Cvetkovic from Yugoslavia; and ATCC 52472) using a wounding inoculation technique (9).

The isolates were grown on potato-dextrose agar (PDA) in petri dishes or on toothpick tips on PDA at room temperature ($20 \pm 2^\circ\text{C}$). PDA was prepared by suspending 40 g of DIFCO PDA and 4 g of DIFCO agar in 1 l distilled water and autoclaving at 121°C for 30 min. Toothpick tips (1- to 2-cm long sections) were boiled 10 min. in each of three changes of distilled water and then autoclaved in distilled water in petri dishes at 121°C for 50 min. Twenty to 30 sterilized toothpick tips were placed in 3-day old cultures on PDA and kept there until the toothpicks were overgrown with mycelium.

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Table 1. Length of cankers (cm) on sunflower stems at 4 weeks after artificial inoculation with soybean isolates of *Diaporthe phaseolorum* var. *caulivora* (Dpc) and *D. phaseolorum* var. *sojae* (Dps) and sunflower isolates of *D. helianthi*/*Phomopsis helianthi* (Dh/Ph)^{1/}

Diaporthe isolates	Sunflower cultivar TT894A		Sunflower inbred line S37-388					
	Test I ^{2/}		Test I ^{2/}					
	Avg.	Range	Avg.	Range				
					cm			
Dpc-B. Keeling	1.99	(0.5-3.6)	3.15	(2.0-4.8)	1.89	(0.7-2.6)	3.26	(1.6-4.2)
Dpc-ATCC 28464	2.00	(0.7-4.0)	2.17	(0.5-3.3)	2.02	(1.0-3.0)	2.05	(0.6-4.8)
Dps-ATCC 28463	4.55	(2.8-6.2)	5.01	(3.0-7.1)	4.26	(2.3-5.4)	5.04	(2.5-8.0)
Dh/Ph-Yang	5.00	(3.4-8.7)	6.38	(3.1-9.8)	5.20	(2.2-9.3)	6.44	(4.2-10.2)
Dh/Ph-ATCC 52472	6.21	(3.5-8.8)	6.91	(4.0-11.7)	6.40	(3.2-10.9)	7.09	(3.5-11.0)
Control	.23	(0.1-0.4)	.22	(0.1-0.5)	.20	(0.1-0.5)	.21	(0.1-0.5)
WD-B ^{3/} 1sd (k=100)	1.00		1.27		1.11		1.23	

^{1/} Sunflower plants were inoculated with agar pieces with mycelium taken from 3- or 4-day old cultures.

^{2/} Length of cankers (cm) is an average of 10 plants in each test (I and II). Numbers in parentheses indicate the minimum and maximum lengths of cankers among the 10 plants.

^{3/} Waller and Duncan 1sd.

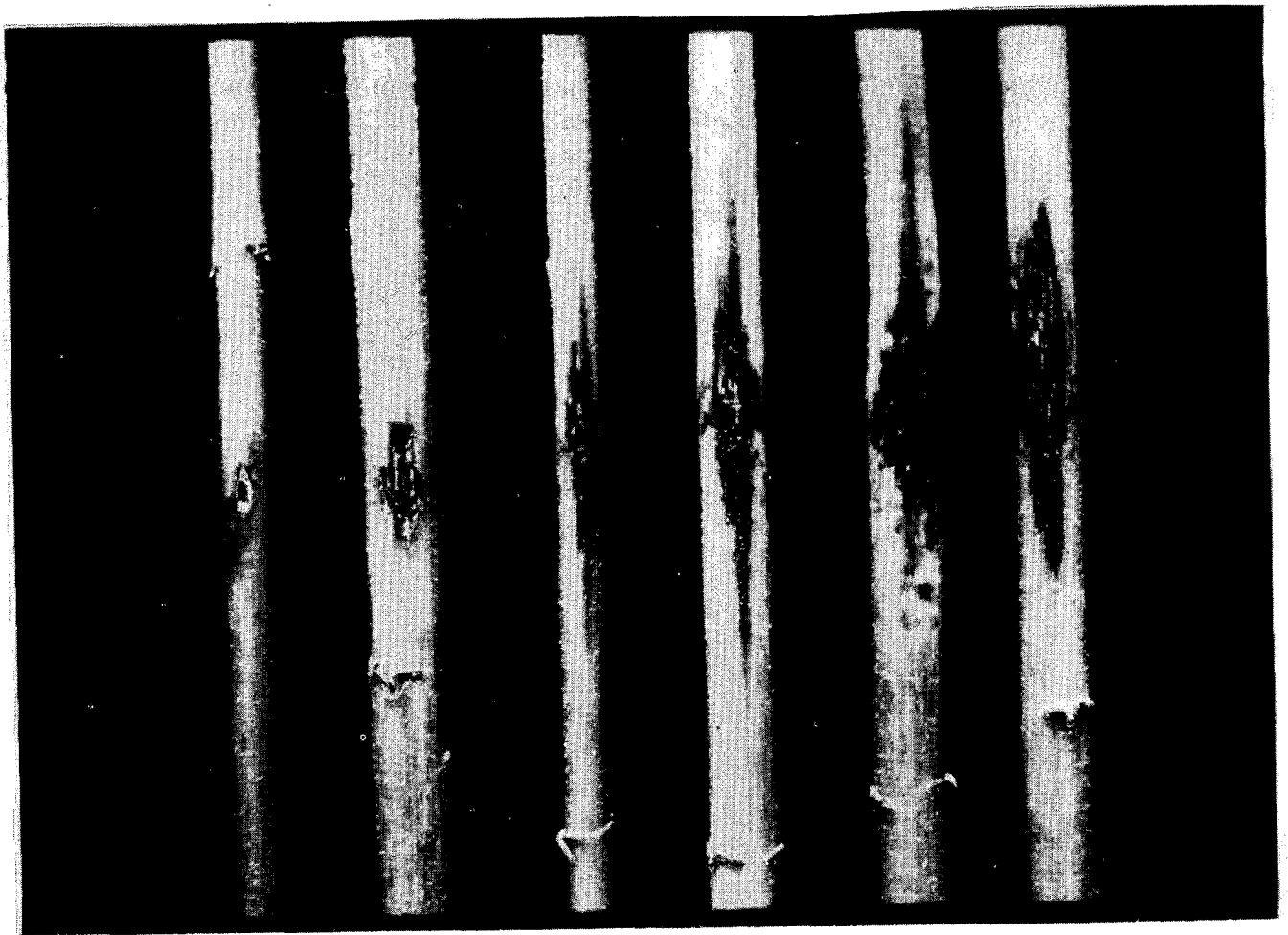


FIG. 1. Dark brown cankers on sunflower stems in the greenhouse 4 weeks after wound inoculation with isolates of Diaporthe/Phomopsis species from soybean and sunflower. From left to right: Control, inoculated with PDA only; Dpc (D. phaseolorum var. caulivora from soybean); ATCC 28464 (D. phaseolorum var. caulivora from soybean); ATCC 28464 (D. phaseolorum var. sojae from soybean); Dh/Ph-Yang (P. helianthi from sunflower); and ATCC 52472 (D. helianthi from sunflower).