

## THE SUSCEPTIBILITY OF DIFFERENT SUNFLOWER HYBRIDS TO *Diaporthe (phomopsis) Helianthi* ESTIMATED ON THE BASIS OF INOCULATIONS

T. Csengeri

Research Institute for Vegetable Oil and Detergent Industry, H-1106 Budapest, Maglódi út 6, Hungary

### SUMMARY

Different sunflower hybrids were inoculated in a three-year experiment with the fungus *Diaporthe helianthi*. Based on the intensity of the infection, the hybrid NSH-45 proved to be significantly less susceptible than the other tested hybrids in all three years.

According to the results obtained in 1989, the hybrids NSH-43, NSH-47, NSH-55, NSH-85 were tolerant too.

The results of the three-year experiment suggest that in the areas of Hungary with a heavy *Diaporthe* infection pressure, the Yugoslav resistant hybrid NSH-45 should be grown.

### INTRODUCTION

*Diaporthe helianthi* (anamorph stage: *Phomopsis helianthi*) (1) was first detected in Hungary in 1981 in the south, south-eastern part of the country, but by now the fungus has spread almost in the whole country, causing serious reductions in seed yield in spite of repeated treatments with fungicides. Growing resistant sunflower hybrids seems to be the only means of proper protection (4, 5, 9).

Thirty-eight sunflower hybrids were tested in a three-year experiment (1987, 1988, 1989) to assess their resistance by means of inoculation in field conditions (3, 6, 7).

### MATERIALS AND METHOD

Location of the experiment: Experiment Station of Plant Protection Institute, Hungarian Academy of Sciences.

Sunflower hybrids tested are given in Table 1.

### INOCULATION

At least 50 plants of each cultivar were wounded and inoculated while non-inoculated wounded plants served as control.

Time of inoculation: at the beginning of flowering.

Inoculation method: *Diaporthe* mycelium was grown in Petri dishes on a medium containing potato dextrose agar and malt extract; 10 mm - diameter disks were cut from

the edge of 10-day old colonies and placed on the stem (medium part of the stem). Each stem was slightly cut before the inoculation. The mycelium disks were covered with wet cotton wool and aluminium foil (to maintain sufficient humidity for the infection to occur). After two or three weeks, when the symptoms appeared, we began to evaluate the rate of infection. The lesions were measured every 7 days (2, 8).

Table 1

1987 (13 hybrids)	1988 (16 hybrids)	1989 (36 hybrids)	
Barbara	Barbara	Barbara	NSH-3
Viki	Viki	Viki	NSH-6
IBH-166	IBH-166	IBH-166	NSH-33
IH-173	IH-173	IH-173	NSH-43
NK-265	NK-265	NK-265	NSH-47
J <sub>x</sub> -550	J <sub>x</sub> -550	J <sub>x</sub> -550	NSH-52
Citosol-4	Citosol-4	Citosol-4	NSH-55
HNK-81	HNK-81	HNK-81	NSH-68
Topflor	Topflor	Topflor	NSH-85
NSH-26-RM	NSH-26-RM	NSH-26-RM	NSH-15
NSH-27	NSH-27	NSH-27	HB-1
NSH-45	NSH-45	NSH-45	SH-55
Remil	-	-	XF-4615
-	Blumix	Blumix	XF-78
-	Florakisz	Florakisz	E-4125
-	S-277	S-277	E-54012
-	S-280	-	E-41227
-	-	S-281	Euroflor
-	-	S-2151	Emil

Watering: once a day after the inoculation until the symptoms appeared (10 mm).

Evaluation: each plant was rated on a scale from 0 to 4.

0 = nil

1 = lesion restricted to inoculation site, outer cortical tissues, stem hard

2 = stem slightly caved at inoculation site, lesion half around, localized tissue necrosis inside the stem

3 = lesion around the stem with definite caving, partial necrosis of the pith

4 = full necrosis of pith, often broken stem

## RESULTS

Considerable differences were observed with regard to canker size and extent of necroses in and on the stem.

The percentage of successful inoculations was: 95-96%.

The non-inoculated wounded plants (control plants) were healthy, did not manifest pathologic changes.

The results are summarized in Table 2:

Table 2 Susceptibility of different sunflower hybrids to *Diaporthe helianthi*

Resistant hybrids (1)	Tolerant hybrids (2)	Susceptible hybrids (3)	Very susceptible hybrids (4)
NSH-45	NSH-43*	Jx-550	Blumix
	NSH-47*	NK-265	Florakisz
	NSH-55*	IH-173	IBH-166
	NSH-68*	NSH-27	Viki
	NSH-85*	Citosol-4	S-277
		NSH-15*	S-280*
		Topflor	S-281*
		HNK-81	S-2151*
		NSH-52*	NSH-26-RM
		HB-1*	NSH-3*
		SH-55*	NSH-6*
		XF-4615*	NSH-33*
		XF-78*	Emil*
		E-4125*	Barbara
		E-54012*	Remil*
		E-41227	
		Euroflor*	

(\* only one-year results)

The results obtained in this study prove that there exist notable differences among the tested sunflower hybrids in respect to the susceptibility to *Diaporthe helianthi*.

- In all these years NSH-45 proved to be the most resistant. The necrotic process was limited to the epidermis, the inoculation site did not exceed 5 cm 30 days after the inoculation, spot margin and the pith remained healthy. Not a single stem was broken.
- In group 2: tissue necrosis localized inside the stem, but necrotic spots exceed 15 cm in 30 days; 5% of the stems were broken.
- In group 3: half of the plants wilted in 30 days. The necrotic spots were larger than 30 cm, on and in the stems. At the end of the evaluation, 30% of the stems were broken.
- In group 4: almost all plants wilted in 30 days, full necrosis of the pith and more than 50% of broken stems characterized this group.

## DISCUSSION

We concluded that the applied inoculation method is suitable for evaluating the reaction of sunflower hybrids to *Diaporthe helianthi*, but we suggest that irrigation (10 mm/day) is practised after the inoculation.

## REFERENCES

1. Aćimović M., Štraser N., 1981: *Phomopsis* sp. a new parasite in sunflower, *Helia* 4: 43-58.
2. Bertrand D., Tourvieille D., 1987: *Phomopsis tournefortii*: Tests de selection. Inform. Techn. CETIOM n. 98, p. 12-18.

3. Herr L. J., Lipps P. E., Walters B. L., 1983: Diaporthe stem canker of sunflower. Plant Dis. 67: 911-913.
4. Mihaljčević M., Muntanola-Cvetković M., Petrov M., 1982: Further studies on the sunflower disease caused by *Diaporthe helianthi* and possibilities of breeding for resistance. X. International Sunflower Conference, Australia
5. Škorić D., 1985: Sunflower breeding for resistance to *Diaporthe helianthi*. Helia 8, p. 21-24.
6. Tourvieille D., Vear F., Pelletier C., 1988: Use of mycelium tests in breeding sunflower resistant to *Phomopsis*. XII. International Sunflower Conference, Novi Sad, Yugoslavia
7. Tourvieille D., Pelletier C., 1988: Jugement de la resistance du tournesol au *Phomopsis* sous en filet avec humectation controlée. Inf. Téch. CETIOM, p. 103.
8. Viranyi F., Sendula T., Horvath Z., Nemeth F., 1988: A rapid test for evaluating resistance to sunflower stem canker caused by *Diaporthe helianthi*. XII. International Sunflower Conference, Novi Sad, Yugoslavia
9. Vörös J., Léránth J., Vajna L., 1983: Overwintering of *Diaporthe helianthi*, a new destructive pathogen of sunflower in Hungary. Acta Phytopathologica Academiae Scientiarum Hungaricae 18, p. 303-305.

**SENSIBILITE DE DIFFERENTS HYBRIDES DE TOURNESOL A *Diaporthe (Phomopsis) helianthi* FONDEE SUR DES INOCULATIONS ARTIFICIELLES.**

Csengeri, T.

Differents hybrides de tournesol ont été inoculés artificiellement pendant trois années consécutives avec *Diaporthe helianthi*. D'après l'échelle de notation adoptée, l'hybride NSH-45 s'est révélé le moins sensible des hybrides testés au cours de ces trois années.

D'après les résultats obtenus en 1989, NSH-43, NSH-47, NSH-55, NSH-68 et NSH-85 sont également tolérants.

Les résultats de ces trois années d'expérimentation indiquent que dans les zones fortement infectées par *Diaporthe helianthi*, l'hybride yougoslave NSH-45 devrait être cultivé en Hongrie.

**LA SUSCEPTIBILIDAD DE DIFERENTES HIBRIDOS DE GIRASOL A *Diaporthe (Phomopsis) helianthi* EN BASE A INOCULACIONES ARTIFICIALES.**

Csengeri, T.

Se inocularon artificialmente diversos híbridos de girasol con el hongo *Diaporthe helianthi* en un experimento de tres años. En base a la intensidad de las infecciones, el híbrido NSH-45 resultó significativamente menos susceptible que los otros híbridos ensayados en los tres años.

Según los resultados de 1989, los híbridos NSH-43, NSH-47, NSH-55, NSH-68 y NSH-85 fueron tolerantes también.

Los resultados de los tres años de experimentos sugieren que en las áreas de Hungría con una fuerte presión de infección por *Diaporthe*, debería utilizarse el híbrido resistente yougoslavo NSH-45.