REACTION OF SUNFLOWER STEMS TO INOCULATION WITH SCLEROTINIA SCLEROTIORUM ISOLATED FROM SUNFLOWER AND ABUTILON THEOPHRASTI

Karolina VRANDECIC[1] – Tomislav DUVNJAK[2] – Drazenka JURKOVIC[1] – Ante MIJIC[2]

[1]Faculty of Agriculture in Osijek, Trg sv. Trojstva 3, 31000 Osijek, Croatia
[2]Agricultural Institute, Juzno predgradje 17, 31000 Osijek, Croatia

Introduction

Sunflower white rot caused by *Sclerotinia sclerotiorum* (Lib.) de Bary is one of the principal sunflower diseases. It is a facultative parasite and has been found on over 400 plant species (Bolland and Hall, 1994). The effect of the pathogen on crop yield depends on the phenophase of plant developement in which the infection took place and on environmental conditions. Infection of root, basal stem and head commonly results in great yield loss as well as in a decrease in oil quality, increasing quantity of free fatty acids (Masirevic and Gulya, 1992). Weed plants are alternative hosts for many fungal parasites and have an important role as source of inoculum in epidemiology of cultivated plant deseases. In eastern Croatia *S. sclerotiorum* has been recorded on *Abutilon theophrasti* Med., *Ambrosia artemisiifolia* L. and *Xanthium strumarium* L. (Jurkovic and Culek, 1997).

Use of resistant hybrids is environmentally the most beneficial methods of diseases control (Arabi and Jawhar, 2004) and have not impact on the environment (Husti, 2006). Research on resistance of sunflower lines and hybrids to *S. sclerotiorum* can be evaluated in natural and artificial infection. Evaluation of resistance in natural conditions of infecton is cheaper and technically least demanding. The fact that distribution of pathogens within a field is uneven should not be neglected. Especially evaluation can be difficult if conditions for a successful infection have not been satisfied (humidity, temperature and adequate amount of inoculum). The tolerance of sunflower lines and hybrids in the field or in controlled conditions is being researched through different methods of artificial infection (Rönicke et al., 2005, Duvnjak et al., 2006) which allows good tolerance evaluation.The aim of our research was: to compare the virulence of isolate from sunflower and *A. theophrasti*, to compare the two methods of infection and evaluate the difference in tolerance of sunflower hybrids.

Material and methods

The experiment was conducted on the fields of the Institute of agriculture in Osijek during a period of three years (2002 – 2004). Stem inoculation was carried out by *S. sclerotiorum* sclerotia and mycelium isolated from sunflower and *A. theophrasti*. Evaluated was the tolerance of five sunflower hybrids (OS-H-101, Olio, OS-H-301, OS-H-206 and Fakir) which were created at the Institute of agriculture in Osijek. Each sunflower hybrid was planted in 6 rows (row length 5 meters). The experiment was organized according to the RCBS system in four replications.

Mycelium inoculation

S. sclerotiorum mycelium used for sunflower stem inoculation was isolated from sclerotia originating from sunflower and *A. theophrasti* plants. Sclerotia were washed under

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rinsed twice in distilled water, air dried and left on PDA in thermostat at 25±1ºC with 12h light/dark regime. For inoculation four day old *S. sclerotiorum* culture was used.
Artificial inoculation of sunflower plants was done according to the method by Jurkovic and Culek, (1997). For inoculation PDA pieces of 5x5 mm mycelium were used. Stem inoculation was performed in butonisation phenophase (R2 stage Schnieter and Miller, 1981). Inoculation site was covered with moistened cotton wool and wrapped in aluminium foil, to prevent drying out of inoculum. For control plants instead of *S. sclerotiorum* mycelium pure pieces of PDA were used.
Sclerotia inoculation
Sclerotia used for inoculation of stems were picked up from naturally infected sunflower and *A. theophrasti* plants. Inoculation was conducted according to Vasic et al., (2004). Piece of sclerotia of approx. 5 mm in diameter were placed into holes made on stems. Inoculation site was covered with moistened cotton wool and wrapped in aluminium foil. No sclerotia were put into holes on control plants. Longitudinal lesion length on stems was measured 15 days after inoculation.

Results and discussions
Average lesion lenght on inoculated sunflower plants measured 15 days after inoculation in the year 2002 (Table 1) was between 2.25 cm (mycelium inoculum isolated from sunflower) and 7.37 cm (sclerotia inoculum isolated from *A. theophrasti*). There was no difference in virulence between isolate fom sunflower and *A. theophrasti* plants (Table 4). Significantly longer lesions (P≤ 0.95) were found after inoculation of sunflower with sclerotia.

Table 1. Mean value of lesion size (cm) on sunflower stem depending on hybrid, methods and source of infection in 2002 year

Hybrid	Sunflower mycelium	Abutilon mycelium	Sunflower sclerotia	Abutilon sclerotia
OS-H-101	4.21 A	4.08 A	5.65 A	5.72 A
OLIO	3.04 AB	3.74 A	6.92 A	6.28 A
OS-H-301	2.87 AB	4.13 A	6.60 A	6.56 A
OS-H-206	2.48 B	3.05 AB	5.67 A	5.94 A
FAKIR	2.25 B	2.28 B	5.68 A	7.37 A

[A, B]– different letters mark statistically significant difference according to Duncan's Multiple Range Test at the level P≤ 0.95

During 2004 the smallest lesions (2.76 cm) were recorded on hybrid OS-H-101 regardless of inoculation method or origin of inoculum (Table 2). The longest lesions were found on hybrid OS-H-301 (6.48 cm).
Significantly higher tolerance to *S. sclerotiorum* regardless of year and type of inoculation was determined for hybrid OS-H-101 (Table 3). Results of the experiment show that isolates of *S. sclerotiorum* isolated from *A. theophrasti* plants can be equally or more virulent to sunflower than isolates originated from cultivated plant. After artificial sclerotia infection longer lesions develope and the possibility of unsuccessful infection is