

EPIPHYTOTIC DISEASE OF SUNFLOWER STEM CANCER IN ARGENTINA

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ABSTRACT

The canker on sunflower stem was diagnosed in America, Europe and Australia (Marisevic & Gulya, 1992; Thompson *et al.*, 2011). Although it was detected in Argentina the disease was sporadic (1985) while in Uruguay, from 2003, has been found as a serious disease (Huguet 2006, Stewart 2005). In the 2015 and 2016 growing seasons high-incidence outbreaks of the disease have been important in the Northwestern of La Pampa Province, Southern of Córdoba Province and Northeastern of Buenos Aires Province. The symptoms on sunflower stems presented pale brown cankers developed around petioles insertions. The leaf blades in connection with cankers shown V-shaped necrosis. The leaves laterally disposed above the canker presented intervein necrosis. On the bases of capitula brown rotten areas were observed affecting receptacles and even achenes (discoloured seeds). The receptacles presented necrosed bracts, expanded V-shaped necrosis pointing to and even involving the peduncles. The degree of susceptibility was recorded on 36 commercial sunflower hybrids under naturally conditions. The incidence of stem canker ranged from 1.25 % to 33.75 %. In some cases sunflower fields presented rot incidence of 100 % on capitula (R8 phenological stage). Yield losses are still under evaluation. From the symptoms described on sunflower stems and capitula several fungal isolates were obtained according to the methodology described by Muntañola *et al.* (1981, 1985). Isolates were morphologically determined as *Phomopsis* cf. *helianthi* Munt.-Cvetk., Mihaljč. & M. Petrov. *Nova Hedwigia* 34: 433 (1981). Molecular studies in connection with isolates from stems (and capitula) are being carried out by Dr. Sue Thompson (DEEDI, Australia). Koch's postulates were completed on healthy sunflower plants. The isolates have presented pycnidia semi-immersed, dark brown, separate or confluent, subglobose to ampulliform, 480-630 x 440-530 µm, with exuding pale yellow drop-like slime. Conidiogenous cells were cylindrical, gradually tapering into necks, hyalines, 9.6- 15.4 x 1.4-1.9 µm. Alpha conidia were not observed. Beta conidia were filiform, sigmoid, hamate, 17-32 x 0.96 µm. *Phomopsis* cf. *helianthi* was also isolated from stem's cankers on the common weed *Helianthus petiolaris* Nutt. Other isolates are under evaluation on other weeds in order to detect potential pathogen hosts. The results obtained could reflect an expanding outbreak of the sunflower stem canker in Argentina.

Keywords: sunflower, phomopsis, diseases, stem canker, hybrids

INTRODUCTION

The canker on sunflower stem was diagnosed in America, Europe and Australia (Marisevic & Gulya, 1992; Thompson *et al.*, 2011). Although it was detected in Argentina the disease was sporadic (1985) while in Uruguay, from 2003, has been found as a serious disease (Huguet 2006, Stewart 2005). In the 2015 and 2016 growing seasons high-incidence outbreaks of the disease have been important in the Northwestern of La Pampa Province, Southern of Córdoba Province and

Northeastern of Buenos Aires Province. Symptoms were observed on leaves, stems and capitulas. There are no antecedents of epiphytotic disease of sunflower stem canker in this region. The objectives of study were to describe the symptoms in plants and determine a causal agent of disease, determine alternative hosts of sunflower stem canker, and characterize the health behavior in sunflower hybrids in this region.

MATERIALS AND METHODS

In northern of La Pampa Province (S 35° 34' 43.4" W 63° 41' 19.75"), 36 sunflower hybrids in 3 trials grouped according to their characteristics were seeded: a) resistant to imidazolinone (IMI resistant, 18 hybrids) b) Normal and high oleic (10 normal hybrids and 2 high oleic hybrids), c) Confectioner (6 hybrid). The plots consisted of three rows with row spacing of 0.52 m and 9 m long. A density of 57,000 plants ha⁻¹ was used in test a and b. In trial c, density was 40,000 plants ha⁻¹ with equal row spacing. All cultivars were planted at 23/10/2015 in zero tillage on soybean predecessor, in a sandy loam soil. In each trial design it was done in randomized blocks with 4 repetitions.

Health behavior was evaluated on each experimental unit in 20 plants under natural infection. The incidence of plants with canker on the stem in the phenological state of R7 (Schneider and Miller 1981) was determined.

From the symptoms on sunflower stems and capitula several fungal isolates were obtained. Fungal material was isolated and established in pure culture on Malt Extract Agar prepared according to Booth (1971) (Muntañola-Cvetković et al., 1981, 1985) using Malt Extract Oxoid LP 0039; pH = 6 before sterilization without any hydroxide addition. Vancomycin (250 ppm) was incorporated into the isolating media in order to suppress bacterial development. Incubation was carried out at 26-28 °C under 16 h UV light (345-400 nm)/8 h obscurity cycles. Sporulation starts after ten incubation days. Measures were taken from two weeks cultures picking up pycnidia holding pale yellow slime (5 pycnidia, 10 conidiogenous cells, 10 conidia). Specimens were mounted on cotton blue 0.1 % w/v in lactic acid 85 % w/w and Shear's mounting fluid.

RESULT AND DISCUSSION

The symptoms on sunflower stems presented pale brown cankers developed around petioles insertions. The leaf blades in connection with cankers shown V-shaped necrosis. The leaves laterally disposed above the canker presented intervein necrosis. On the bases of capitula brown rotten areas were observed affecting receptacles and even achenes (discoloured seeds). The receptacles presented necrosed bracts, expanded V-shaped necrosis pointing to and even involving the peduncles.

The incidence of stem canker ranged from 1.25 to 33.75 % for sunflower IMI resistant hybrids. The normal and high oleic hybrids ranged from 6.25 to 33.75 %, while confectioner hybrids have presented incidence from 13.75 to 30 %.

In some cases sunflower fields of farmers presented rot incidence of 100 % on capitula (R8 phenological stage). Yield losses are still under evaluation.

From the symptoms described on sunflower stems and capitula several fungal isolates were obtained according to the methodology described by Muntañola et al. (1981, 1985). Isolates were morphologically determined as *Phomopsis* cf. *helianthi* Munt.-Cvetk., Mihaljč. & M. Petrov. *Nova Hedwigia* 34: 433 (1981). Molecular studies in connection with isolates from stems (and capitula) are being carried out by Dr. Sue Thompson (DEEDI, Australia). Koch's postulates were completed on healthy sunflower plants. The isolates have presented pycnidia semi-immersed, dark brown, separate or confluent, subglobose to ampulliform, 480-630 x 440-530 µm, with exuding pale yellow drop-like slime. Conidiogenous cells were cylindrical, gradually tapering into necks, hyalines, 9.6- 15.4 x 1.4-1.9 µm. Alpha conidia were not observed. Beta conidia were filiform,

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Other isolates are under evaluation on other weeds in order to detect potential pathogen hosts.

The results obtained could reflect an expanding outbreak of the sunflower stem canker in Argentina.

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