

**OCCURRENCE OF *SCLEROTINIA SCLEROTIORUM* ROT IN SUNFLOWER
FIELDS SOWED AFTER HARVESTING OF SUMMER CROPS, IN THE STATE OF
PARANA, BRAZIL.**

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Summary: The occurrence of the fungus *Sclerotinia sclerotiorum* (Lib.) de Bary was evaluated in 43 sunflower (*Helianthus annuus* L.) fields sowed from January to April in different regions of the State of Paraná and north of the State of Santa Catarina, Brazil. Fields were randomly surveyed and the disease was evaluated for head and stem rot symptoms. In the north region of Paraná, the incidence of *S. sclerotiorum* causing head rot was less than 6.0%, except in two fields sowed in April (13.8% and 16.8% of diseased heads). The western region showed low incidence of head or stem rot. The highest incidence of head rot was found in the southwest of Paraná (17.6% to 100.0%). The head rot was not evaluated in the south region of Paraná and north of Santa Catarina, because plants were killed by frost at flowering time. The low incidence of *S. sclerotiorum*, observed in the north and western regions of Paraná, suggests the possibility of sunflower cultivation after the harvesting of summer crops with early maturing genotypes, once the weather during fall-winter is not associated to low temperatures and rainfall. The cultivation of sunflower after harvesting the summer crops in southwest and southern regions of Paraná and north of Santa Catarina is not recommended.

Introduction

In the State of Paraná, Brazil, farmers are interested in sowing sunflower (*Helianthus annuus* L.) after harvesting the summer crops. During this time, the weather conditions, such as high humidity and temperature are favorable to the development of head and stem rot, caused by the fungus *Sclerotinia sclerotiorum* (Lib.) de Bary. This fungus is considered the most important pathogen for sunflower and is spread in all producing regions. The head rot can cause achenes or head fall, resulting in yield loss. Indeed, the fungus can remain for years in the soil as sclerotia, representing a continuous source of inoculum and a threat for sunflower production (Zimmer & Hoes, 1978; Masirevic & Gulya, 1992).

S. sclerotiorum cause symptoms in different organs of the sunflower plant. Rot in the median portion of the stem is characterized by a soft light-brown soaked lesion, covered by white mycelium. A mass of sclerotia is observed inside the stem and plants can break at this point. Symptoms of head rot are brown soaked lesions in the dorsal side of the head, with white mycelium covering the tissues. Only vascular tissues remain intact. Sclerotia are found inside the rotten head, that becomes disintegrated, with the vascular tissues exposed. Mass of achenes and sclerotia fall on the soil (Zimmer & Hoes, 1978; Masirevic & Gulya, 1992).

Temperature around 20°C and high relative humidity (at least 70%) are optimal for head infection (Zimmer & Hoes, 1978; Masirevic & Gulya, 1992). *S. sclerotiorum* has a great number of host plants, including 75 families, 278 genus, 408 species and 48 subspecies or varieties, most of all herbaceous plants of the Dicotyledonea subclass (Boland & Hall, 1994).

Sclerotinia head rot was one of the limiting factors for sunflower crop in the State of Paraná, Brazil, in the 1980s, when the crop was sowed from January to March. In 1981, the sunflower area in the state, mostly in the west region, reached 58000 ha. The yield, which was 1800 kg/ha in the previous year, was reduced to 480 kg/ha, due to the high humidity at the end of the cycle that favored the occurrence of *S. sclerotiorum* (Dall'Agnol et al., 1994).

Disease control is difficult due to sclerotia that remain viable for a long time in soil, lack of effective chemical control and high susceptibility of sunflower genotypes (Pereyra & Escande, 1994). Control is based on an integrated management program, including cultural practices, like crop rotation, healthy seeds and planting date unfavorable to the pathogen (Leite, 1997).

Little information is available about the occurrence of *Sclerotinia* head rot in different regions of Brazil, specially when sunflower is grown under weather condition adequate for disease development. The survey of the natural occurrence of this disease in the fields, can help to identify the regions potential for growing sunflower at the evaluated planting dates.

The objective of this paper was evaluate the occurrence of *S. sclerotiorum* in sunflower fields sowed from January to April, in different regions of the State of Paraná and north of the State of Santa Catarina, Brazil, to analyse the possibility of growing sunflower after harvesting of the summer crops.

Materials and methods

The incidence of *S. sclerotiorum* was evaluated in 43 sunflower fields, sowed from January to April, in 1996, 1997 and 1998. In the State of Paraná, the survey included fields in the north, west, southwest and south regions. Two fields were surveyed in the State of Santa Catarina. Fields were randomly surveyed and the disease was evaluated for head and stem rot symptoms. When disease was found, diseased plants were sampled, at four positions in the field. In each point, the number of plants showing head or stem symptoms were evaluated in

10 m rows, in order to calculate the percentage of diseased plants. The growth stage was also recorded, according to Schneiter & Miller (1981).

Results and discussion

Head and stem rot were observed in 53.5% and 20.9% of the 43 sampled fields in the States of Paraná and Santa Catarina, confirming that *S. sclerotiorum* is widespread, similarly to other sunflower production areas of the world (Zimmer & Hoes, 1978).

In the northern region of Paraná, the incidence of *S. sclerotiorum* was evaluated in 21 fields, sowed from February to April, in 1996, 1997 and 1998 (Table 1). The fungus was observed causing head rot, in less than 6.0% of the plants, except in two fields sowed in April 1997 and April 1998, which showed 13.8% and 16.8% of diseased heads, respectively. The incidence of stem rot was low, except in the field sowed in April 1998, where 19.3% of the plants were affected.

Five fields of the western region showed low incidence of head or stem rot (maximum of 4.9%) (Table 1).

The highest incidence of head and stem rot was found in the southwestern region of Paraná. Among the 11 evaluated fields, five showed 17.6% to 100.0% of plants with head rot disease at R9 stage (Table 1).

The head rot was not evaluated in the southern region of Paraná and north of Santa Catarina (Table 1), because plants were killed by frost at flowering time. The evaluated fields were sown in March and April. This sowing date is not recommended for growing sunflower, because of the possibility of frosts in this region. Sunflower is specially susceptible to cold and freezing temperatures during the R4 and R5 (anthesis) stages and can withstand low temperatures only when pollination is completed and seed filling is under way (Blamey et al., 1997).

The low incidence of *S. sclerotiorum* (less than 5.0% of plants with head rot), observed in the northern and western regions of Paraná, suggests the possibility of sunflower cultivation after harvesting the summer crops. However, the average temperature in the state, from May to July, frequently, is above 20°C (IAPAR, 1994). This can favor the occurrence of the disease, when days are rainy. This was observed in the field sowed in April 1998. The cultivation should be limited to early maturing genotypes (cycle of 100 days) and places where the weather during fall-winter does not associate low temperatures to rainfall.

The southwestern region of Paraná was highly favorable to the occurrence of *S. sclerotiorum*, resulting in complete production loss in some fields. Indeed, head rot resulted in mass of achenes and sclerotia fallen on the soil. These sclerotia can remain viable in the soil for years and act as inoculum source of the fungus for other susceptible crops, like soybean, rapeseed and bean (Bolland & Hall, 1994).

The cultivation of sunflower after harvesting the summer crops in southwestern and southern regions of Paraná and north of Santa Catarina is not recommended.

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Table 1. Incidence of *S. sclerotiorum* in sunflower fields sowed from January to April, in 1996, 1997 and 1998, in the States of Paraná and Santa Catarina.

Region	Evaluated fields	Stem rot		Head rot	
		Affected fields	Incidence (%)	Affected fields	Incidence (%)
North Paraná	21	3	0.2-19.3 (R9)	14	0.03-16.8 (R9)
West Paraná	5	1	0.2	4	0.2-4.9 (R8)
Southwest Paraná	11	1	11.0 (R9)	5	17.6-100.0 (harvesting)
South Paraná and North Santa Catarina	6	4	0.2 (R3)	Frost	
Total	43	9 (20.9% fields)		23 (53.5% fields)	

() growth stage when evaluation was done (Schneiter & Miller, 1981).