PLEOSPORA HERBARUM PERS. FOUND ON SUNFLOWERS IN YUGOSLAVIA

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Abstract

Pleospora herbarum, isolated from polygonal pale-brown spots, has not been known before to sunflowers in Yugoslavia.

On PDA, the fungus forms medium rank brown mycelia and conidia typical for Alternaria genus.

In the course of spring, the fungus forms irregularly globular brownish-black perithecia on overwintered parts of sunflower stem.

The incubation after inoculation with a conidial suspension, in the greenhouse, lasts for 3-5 days.

Introduction

Pleospora herbarum is classified in the group of decidedly polyphagous fungi. It attacks over 50 plant species from different genera and families. The majority of sunflower pathologists do not mention Pl.herbarum as a parasite of the sunflower. Fucikorsky (1976) mentions Pleospora richtophensis as a sunflower parasite in Mexico.

In last three years, the fungus was found regularly on sunflowers in Yugoslavia (Ačimović, 1984).

In this paper we shall review the main characters of that new parasite of the sunflower.

Material and Method

The investigation was conducted at the experimental field of the Institute of Field and Vegetable Crops in Novi Sad. Disease symptoms were observed in experimental plots in the growing seasons of 1982, 1983, and 1984.

Infected sunflower leaves and stems were collected for isolation of pure culture of the fungus. All laboratory analyses were performed using PDA.

The collected sunflower parts were left to overwinter naturally. All changes in the development of the fungus were under observation for three years.

Results

Disease symptoms are manifested on leaves and stems. Those are small or large irregularly shaped or ellipsoidal spots. The central part of the spot is light-brown while the peripheral part is dark-brown. A grayish-black film covers the spots.

The developmental cycle of the fungus has two phases: parasitic, during the growing season, when there develops the conidial stage known in the literature as Stemphylium botryosum Wall., and saprophytic, during the spring of the next year, when the perithecial stage develops on infected harvest residues. The perithecial stage is known as Pleospora herbarum Pers.

Developmental, morphological, and biological characters of the fungus were followed on PDA, at about 25°C. The fungus spreads rapidly, covering a 9 cm wide Petri dish in seven days. The mycelial film is medium rank, its color depending on age-grayish--brown at the beginning and grayish-black later on.

In pure culture, the fungus forms the mycelium and conidia.

The mycelia are septate. Their membrane changes in color and thickness. The hyphae are mostly hyaline. Young mycelia are pale-brown, old ones dark-brown. The former have a thinner membrane and septa than the latter. Their diameter is 2-6 micra, 4 on the average. The length of cells between the septa is 7-21 micra, 14 on the average.

The conidia consist of several cells. They are polymorphous, with longitudinal and transversal septa, usually 1-2 of the former and 1-8 of the latter. They are rounded at the top and elongated at the bottom, and attached to the conidiophore. Their color varies from light-brown to brown, depending on age. Their length is 11-50 micra, 23 on the average, and the width is 7-19 micra, 11 on the average.

The perithecia form in spring, on infected pieces of sunflower stem that overwintered in field. The perithecia develop in the infected tissue. They are large, black, and irregularly globular, visible by naked eye (Figure 1).

Their length is 263-567 micra, 458 on the average, and the width is 201-471 micra, 350 on the average.

Asci develop in the perithecium. They are cyplindrical, with a hyaline membrane. Their length is 89-269 micra, 161 on the average, and the width is 22-33 micra, 28 on the average.

Each ascus forms eight many-celled ascospores, septated by 1-3 longitudial and 3-7 transversal septa, light-brown in color. Their shape reminds of a mulberry fruit (Figure 2). Their length is 19--47 micra, 34 on the average, and the width is 11-19 micra, 15 on the average.

Fig. 1 - Pl.herbarum. Black corpuscles - perithecia on overwintered sunflower stem.

Fig. 2 - Pl.herbarum. Mature perithecia and asci with ascospores

Some biological characters

We studies the germination of conidia and ascospores and the incubation period of the fungus.

The germination of conidia was carried out in a drop of distilled water at 25°C, in a laboratory thermostat.

The germination was quick - 10% of the conidia germinated after half and hour, 50% after five hours. Although the number of germinated conidia regularly exceeded 50%, the limit of 90% was not reached even after 24 hours.

Since the conidia are many-celled, they produced several hyphae, but no more than 5-6, the actual number depending on the number of cells comprising the conidium.

The germination of ascospores followed the procedure applied for the conidia, the germination was equally quick - first hyphae appeared in half an hour. Their number steadily increased, the maximum number of ascospores germinated in 24 hours exceeding 90%. Each ascospore produced at least 4-5 hyphae (Figure 3).

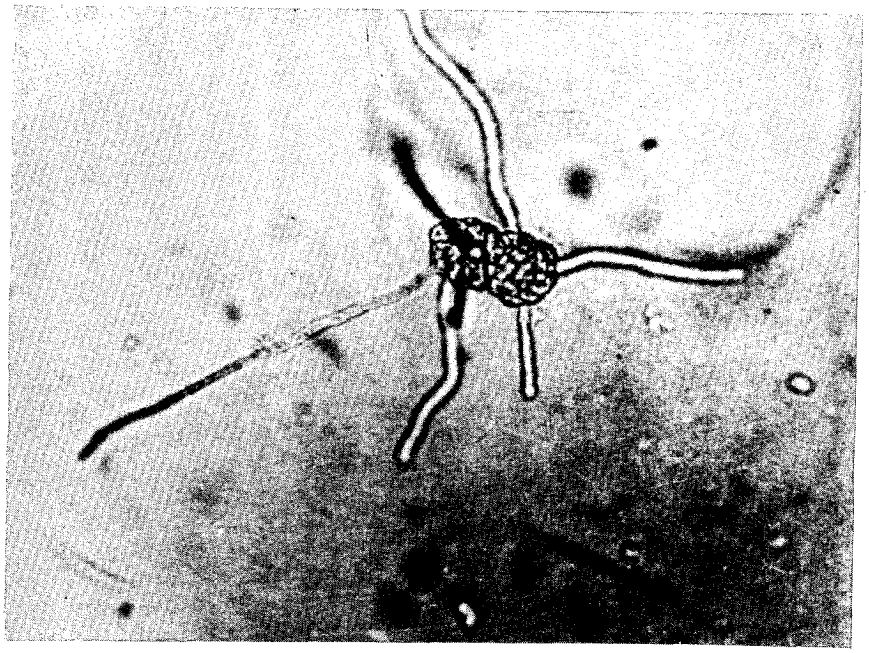

Fig. 3 - Pl.herbarum. Ascospore germinating in a drop of water

Incubation. Greenhouse - grown plants were inoculated 45 days after emergence with a suspension of conidia in distilled water. The inoculated plants were then kept at high humidity for 48 hours and inspected each day. Pale-brown spots started to appear on leaves and stems 3 to 5 days after the inoculation.

Discussion

The fungus Pleospora herbarum has not been recognized as a pathogen on sunflowers. It has been found to inhabit on sunflowers in Yugoslavia only a few years ago. We described the symptoms of the disease and the main morphological and biological characters of the fungus. It deserves to keep track of its distribution and importance for sunflower production as well as to develop measures of its eventual control.

Conclusion

Pleospora herbarum, isolated from polygonal pale-brown spots, has not been known before to sunflowers in Yugoslavia.

On PDA, the fungus forms medium rank brown mycelia and conidia typical for Alternaria genus.

In the course of spring, the fungus forms irregularly globular brownish-black perithecia on overwintered parts of sunflower stem.

The incubation after inoculation with a conidial suspension, in the greenhouse, lasts for 3-5 days.

The size of the conidia is (11-50 x 7-19) (23-11) micra, of the perithecia (263-567 x 201-471) (458-350) micra, of the asci (89--269 x 22-33) (161-28) micra, and of the ascospores (19-47 x 11 --19)(34-15) micra.

References

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