

WHITE ROT IN SUNFLOWERS - FORM OF STEM DISEASE

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Abstract

More intensive infections of sunflower leaves by the fungus Sclerotinia libertiana Fuck. were observed in 1974, 1975 and 1976. The place of infection is the leaf part close to the leaf stem; from there, the infection spreads onto the stem. The ninth and tenth pair of leaves are most frequent to be infected; the infection takes place between the stages of budding and flowering. The fungus does not infect either the bottom leaves or the leaves above the tenth pair.

In field conditions, differences in the resistance of lines and hybrids range from 0 to 87%. The lines RHA-265 and cms₉ as well as some lines from the Woodland gene pool are susceptible. The line cms HA-60 is completely resistant to the form of the disease which attacks the stem.

An F₁ cross of a resistant and a susceptible line shows resistance while an F₁ cross of two susceptible lines is also susceptible. It may be thus assumed that the resistance to this form of the disease is controlled by dominant genes.

White rot (Sclerotinia libertiana Fuck.) is highly destructive and widely distributed sunflower disease. It most frequently attacks the top part of the root and sunflower heads although it may also attack the other plant parts. Putt (1958) stated that the infection usually takes place on the bottom part of the plant while Larmarque (1976) discussed the primary importance of the infection of sunflower heads.

Both forms of the disease may be found in Yugoslavia; they sometimes attack over 50% of the plants. The attack on the medium part of the stem has also been observed in some years; the number of infected plants, however, seldom exceeded 2-3%.

Recently, the infection of the medium part of the stem has become an important disease form on some new sunflower lines and hybrids.

Materials and Method

Genetically different lines and their F₁ crosses were tested under conditions of infection in field in 1974, 1975 and 1976:

- The American lines RHA-265 and cms HA-60,
- The line cms₉, developed at the Institute of Field and vegetable Crops in Novi Sad, and
- The lines of S₄ generation developed in Novi Sad from the Woodland gene pool.

In 1974 RHA-265 was tested in a breeding plot. The crosses of cms HA-60 X RHA-265 and cms₉ X RHA-265 were tested in 1975 in a network of large-plot trials in 12 locations. In 1976, F₁ crosses of the line cms₉ and different lines from the Woodland gene pool were tested in the trials of combining ability which were conducted in the abovementioned breeding plot.

Results and Discussion

The first intensive occurrence of the infection of sunflower stems was observed in 1974 on the line RHA-265. Out of 4500 plants in the breeding plot, 30.9% were infected. The other two forms of the disease, the infection of the bottom part of the stem and the infection of the head, did not occur in the plot.

The infection of the ninth and tenth pair of leaves took place between the stages of budding and flowering. The fungus penetrated the leaves near the leaf stem into the plant stem to cause typical symptoms of white rot and total destruction of infected plants. The symptoms (wilt, tissue rot, occurrence of sclerotia) can easily be detected after the fungus reaches the stem; this is why we use the term "form of stem disease" although the fungus penetrates the plant exclusively through the leaves. The infection did not occur on either the bottom leaves or the leaves above the tenth pair. Such a specific site of infection is characteristic for susceptible genotypes only.

The infection through the leaves was also observed in the hybrid cms₉ x RHA-265. In 1975, 25% of the plants in the network of large-plot trials were infected; in one locality, 75% of the plants were infected. In these trials, the hybrid cms HA-60 x RHA-265 was resistant.

The evaluation of the F₁ crosses of cms₉ and the lines from the Woodland gene pool is given in Table 1. It may be seen that the differences in the percentages of infected plants were large -- they ranged from 0 to 87%.

The line cms HA-60 is completely resistant to the infection through leaves; the line cms₉ is susceptible. In the F₁ cross of cms HA-60 x RHA-265, the resistance of the line cms HA-60 was dominant. The cross of the two susceptible lines, cms₉ x RHA-265, was also susceptible. All susceptible lines from the Woodland gene pool yielded susceptible hybrids when crossed with cms₉. These hybrids were infected through leaves.

The results obtained so far indicate that the susceptibility to white rot is controlled by recessive genes.

TABLE 1. Percentage of plants infected by Sclerotinia libertiana, the form of stem infection, in 1976.

No.	Crossing	Percentage of Infected Plants
1.	cms ₉ x WP1-1	31.0
2.	" x WP1-13	1.4
3.	" x WP1-28	0
4.	" x WP1-38	0
5.	" x WP1-48	87.3
6.	" x WP1-59	30.3
7.	" x WP1-90	0
8.	" x WP1-91	52.1
9.	" x WP1-97	0
10.	" x WP1-98	0
11.	" x WP1-103	45.5
12.	" x WP1-119	0
13.	" x WP1-123	73.4

Literature Cited

- LARMARQUE, C., 1976. Elements de biologie du *Sclerotinia sclerotiorum* sur torunesol en France. Informations Techniques C.E.T.I.O.M. 49:21-25.
- PUTT, E.D., 1958. Note on differences in susceptibility to *Sclerotinia* wilt in sunflowers. Canadian Journal of Plant Science 38:380-381.