

# INFECTION OF SUNFLOWER LEAVES BY ASCOSPORES OF *SCLEROTINIA SCLEROTIUM*

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## INTRODUCTION

White rot (*Sclerotinia sclerotiorum*) is a major sunflower disease that can develop at any part of the plant — roots, stalk, and head, depending on the form of the pathogen attack. The attack on the top part of the root results from a direct infection by sclerotia, while the other two types result from ascospore infections (Lamarque, 1976).

As stalk rot infections have a quite high incidence in Yugoslavia, they practically limit the growing of sunflower susceptible genotypes. Infection is performed through leaves and the infected plants perish before producing seeds.

## MATERIALS AND METHODS

Field observations on sunflower resistance to white rot under conditions of natural infection were carried out during the period of 1974—1978. The following susceptible and resistant genotypes were selected and tested:

1. Inbreds RHA-265, cms HS-60 and cms<sub>9</sub>, and their F<sub>1</sub> combinations.
2. Different inbreds originating from Woodland gene pool and their F<sub>1</sub> combinations with cms<sub>9</sub>.
3. VNIIMK 8931 and Peredovik as check cultivars.

Disease incidence was noted in a breeding nursery that included small and large-plot trials as well as in commercial fields with different sunflower cultivars.

## RESULTS AND DISCUSSION

High percentage of stalks infected by white rot have been observed among susceptible genotypes. Leaves are always the initial site of infection; the rot spreads from them on the

stalk and may extend up and/or down, destroying the plant (Figure 1 a).

A number of inbred lines and hybrid combinations have shown a complete resistance to *S. sclerotiorum*. VNIIMK 8931 and Peredovik have been infected at a rate of 2—3% at the most. Therefore, the high infection percentage of certain sunflower genotypes is rather the result of their susceptibility than a consequence of changes in the fungus pathogenicity.

A specific infection site on the leaves of susceptible genotypes enables us to study in detail the mode of infection. *Sclerotinia* is incapable of causing infection if an ascospore falls on a sound plant tissue. If the tissue is damaged, the infection takes place easily (Kukin, 1968).

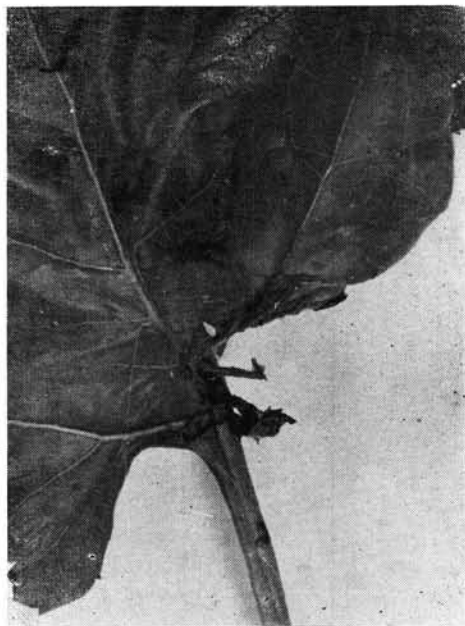
The results of earlier tests showed that the sunflower plant is not able to stop the pathological process, i.e. the resistance depends on whether the fungus will penetrate the plant or not (Čuk, 1976).

The only logical conclusion on the basis of these results is that the leaves of susceptible sunflower genotypes must have been damaged prior to the infection. The examination of the leaves of susceptible genotypes showed that the leaves were considerably damaged at the sites of future infection. This is the case with the susceptible line RHA-265 and the F<sub>1</sub> hybrid cms<sub>9</sub> × RHA-265 which presented clear damaged leaves (Figure 1 b). On the other hand, the line cms HA-60 and the F<sub>1</sub> hybrid cms HA-60 × RHA-265 showed complete resistance to the infection through leaves, having always sound leaves.

The next subject of our study was the cause of leaf damage. Damages may be inflicted by other diseases or may result from mechanical impacts. The cause of leaf damage in 1978 was the attack of *Botrytis cinerea* (gray rot) at earlier stages of plant development. *B. cinerea* may occur in the growth cone, depending on

climatic conditions. The disease stops by itself soon, but the leaf damages become a suitable site for the ascospore infection of *S. sclerotiorum*.

a



b



Fig. 1 — Infection of a susceptible sunflower genotype by *Sclerotinia sclerotiorum* ascospores:

a — infection site on the leaf; b — disease symptoms on the stalk.

The presence of the two pathogens on sunflower susceptible genotypes indicates a direct relationship between gray and white rot. *B. cinerea* is the primary disease which damages sunflower leaves, conditioning and enabling the occurrence of white rot.

## CONCLUSIONS

The ascospores of the fungus *S. sclerotiorum* infect the damaged tissues of sunflower plants. Leaves are the typical site of infection for some sunflower genotypes. The leaves of susceptible genotypes are easily damaged, usually by the attack of *B. cinerea* in earlier stages of development. A direct relationship between the occurrence of gray and white rot has already been confirmed. The susceptible lines RHA-265 and cms<sub>9</sub>, as well as (cms<sub>9</sub> × RHA-265)F<sub>1</sub>, have damaged leaves. On the other hand, the line cms HA-60 and (cms HA-60 × RHA-265)F<sub>1</sub> do not have damaged leaves and show a complete resistance to this form of *Sclerotinia* attack.

## REFERENCES

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## L'INFECTION PAR LES ASCOSPORES DE *SCLEROTINIA SCLEROTIORUM* DES FEUILLES DE TOURNESOL

### Résumé

Les ascospores de *Sclerotinia sclerotiorum* infectent les tissus endommagés des plantes de tournesol. Chez de nombreux génotypes sensibles de tournesol, les feuilles constituent l'endroit typique d'infection, étant aisément endommagées à la suite des attaques de *Botrytis cinerea* dans les premiers stades de développement.

Une relation directe entre l'apparition de la pourriture grise et de la pourriture blanche est déjà confirmée. Les lignées sensibles RHA-265 et cms<sub>9</sub>, ainsi que l'hybride F<sub>1</sub> cms<sub>9</sub> × RHA-265 ont le feuillage endommagé, pendant que la lignée cms HA-60 et l'hybride F<sub>1</sub> cms HA-60 × RHA-265 n'ont pas les feuilles détériorées et manifestent une résistance complète vis-à-vis de l'attaque de cette forme de *Sclerotinia*.

## INFECCION CON ASCOSPORAS DE *SCLEROTINIA SCLEROTIORUM* DE LAS HOJAS DE GIRASOL

### Resúmen

Las ascosporas del hongo *Sclerotinia sclerotiorum* infectan los tejidos atacados de las plantas de girasol. Las hojas son el lugar típico de infección en el caso de muchos genotipos sensibles de girasol, siendo éstas fácilmente atacadas, de costumbre debido al ataque de *Botrytis cinerea* en los primeros estados de desarrollo.

Una relación directa entre la incidencia de la podredumbre gris (carbonosa) y la de la podredumbre blanca ya se ha confirmado. Las líneas sensibles RHA-265 y CMS<sub>9</sub>, así como el híbrido F<sub>1</sub> cms<sub>9</sub> × RHA-265 muestran hojas atacadas. Por otro lado, la línea cms HA-60 y el híbrido F<sub>1</sub> cms HA-60 × RHA-265 no tienen hojas deterioradas, manifestando una resistencia completa al ataque de esta forma de *Sclerotinia*.