

***Verticillium Dahliae* :**

an Investigation of Root Injuries in Winter-Oilseed-Crops in Sweden

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In certain years, root injuries have been a problem in winter oil seed crops. An investigation was carried out during 1983, in order to investigate the present situation and causes of these root injuries. The investigation consisted of field studies, laboratory work and greenhouse experiments. The work was carried out in the provinces of Skane, Ostergötland and Uppland. The investigation included fields with both conventional and direct drilling. Samples from the fields were collected at three different times, 1) in the month of April, soon after the start of the growth period, 2) at the beginning of flowering and 3) shortly before harvest. In April plants were collected from 92 fields. 27 of these fields were selected for further studies. In each field 25 x 4 plants were examined. Plants from the first two collected periods were assessed for injuries and abnormalities in the hypocotyls and roots. The samples collected before harvest were examined for presence of microsclerotia (*Verticillium dahliae*) at two different times, i.e. directly in the field and after the plants had been kept at low temperature for 2-3 weeks. Ten randomly selected plants from each field were tested on different agar media, for presence of both fungal and bacterial infection.

In this investigation two types of symptoms in the plants were found. In the province of Uppland symptoms of root rot were found, which were probably caused by excess water in the field. In the provinces of Skane and Ostergötland some plants were discoloured in the hypocotyls and roots.

The results from the agar test showed that 82% of the plants with this discolouration in hypocotyls and roots were infected by *Verticillium dahliae*. Spring oil seed rape plants in a greenhouse experiment were inoculated with isolates of *Verticillium dahliae* in order to investigate if the discolouration was caused by the fungus. The results showed that only plants inoculated with *Verticillium dahliae* had discolouration in hypocotyls and roots. Loss of leaves was another symptom caused by *Verticillium*

dahliae, which were observed in the experiment. The distance between the soil and the first leaf was 24-27 cm for infected plants, compared to 11-15 cm for healthy plants. Another observation of interest from the agar test was that *Phoma spp.* could be isolated from the hypocotyls and roots in 20-30% of the plants. The importance of this infection has not been further determined.

The results from the field studies indicate that *Verticillium dahliae* infects the plants already in the autumn and the number of infected plants increased during the growing season. A factor that seems to affect the extent of infection is the sowing-date. At the first survey fields which were sown at an early date had more infected plants, compared to those sown later.

The most important factor for the extent of the attack appears to be the amount of inoculum in the soil and to control the disease with crop rotation demands many years without susceptible crops and weeds. This investigation showed that fields, where oil seed crops have not been grown for 8-10 years, were strongly affected by *Verticillium dahliae*. The drilling-technique does not seem to be of any importance for the disease incidence. There was a wide variation in the number of infected plants between different fields and districts at the third survey (0-99% infected plants). The reason for this variation can be the earlier crop rotation with maintenance of inoculum in the soil.

This study showed that the extent of the attack of *Verticillium dahliae* will be underestimated if the assessment is done directly in the field, compared to assessment after the plants have been kept 2-3 weeks in low temperature. Consequently the fungus continued to grow in infected plants after harvest and developed microsclerotia.

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