

Occurrence, symptomatology, significance and early diagnosis of oilseed rape wilt caused by *Verticillium dahliae* Kleb. in the Federal Republic of Germany

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Summary

The symptoms of attacks of *Verticillium dahliae* on oilseed rape are described for different growth stages of the host. Data on the incidence of the pathogen in different regions of Germany are given. In a field trial there was a yield loss of 10% with 24% of plants showing symptoms of attack. A serological test (ELISA) has been evaluated with regard to its suitability for early diagnosis of *V. dahliae* on rape.

Occurrence

Verticillium dahliae has first been reported on rape in Sweden (Kroeker 1970) and then in Northern Germany in regions with a long history of rape cropping. In Germany in a survey in 1989 (Table 1) the highest incidences were found in these regions. In one case (Coburg) however, an important attack was recorded in a field which had not grown rape in the nine years before.

Disease Symptoms

In the field specific symptoms of *V. dahliae* attack on oilseed rape appear very late in the life cycle of the host. At the stage of flowering single plants may show yellowing and later bronzing on one side of the leaves. In case of intense attacks the plants ripen prematurely. On the stem and the lateral branches are seen chlorotic and later brownish streaks during the stage of pod formation. In case of intense attack the plants ripen prematurely. Near to ripening plants infected by *V. dahliae* can be pulled up very easily because they have lost most of their lateral roots. At the time of harvest microsclerotia develop on and inside the stems and roots. In contrast, plants attacked by *Phoma lingam* bear pycnidia which are bigger than microsclerotia and never found inside the plant. The plants are not easily pulled up, at most they will break at the root collar.

In the greenhouse it is possible to obtain symptoms of *V. dahliae* attacks on eight to ten week old plants. On leaves occur epinasty, loss in turgor of the lamina, yellowing, wilting and darkening of the veins. Heavily infected plants loose their leaves prematurely and are stunted.

Table 1: Incidence and severity of *Verticillium dahliae* on oilseed rape in the Federal Republic of Germany in 1989

| Location | State | Severity |
|--------------------|-------|----------|
| Hohenlieth | SH | +++ |
| Wulfshagen | SH | ++ |
| Futterkamp | SH | +++ |
| Lensahn | SH | +++++ |
| Bojendorf/Fehmarn | SH | ++++ |
| Altjellingsdorf/F. | SH | ++++ |
| Paderborn | NRW | + |
| Salzkotten | NRW | - |
| Diemelstadt | NRW | + |
| Soest | NRW | + |
| Wertheim | BW | - |
| Würzburg | BY | + |
| Coburg | BY | +++ |
| Tübingen | BW | +)) |
| München | BY | +)) |

- : no plants with macroscopic symptoms of *V.dahliae* attack at harvest
 + : some ...
 +++++: more than 50% of the plants ...
 *) : data from suspect samples of a few plants

Impact on yield

In a field trial carried out in two locations infected rape straw was used for artificial infection of the plots. The straw was spread before sowing. The incidence of the disease was evaluated at harvest counting plants bearing microsclerotia. With more than 20% of attacked plants a yield reduction of 10% was found (Table 2).

In naturally infected fields in northern Germany the pathogen can cause yield losses from 20 to 30% with 70 to 100% of attacked plants.

From 25 single- and double low varieties tested none appeared to be completely resistant to *V. dahliae* but there were slight differences in their susceptibility.

Table 2: Disease intensity of *Verticillium dahliae* and yield loss in oilseed rape

| Location | inoculation ¹ | % plants with symptoms | % yield |
|------------|--------------------------|------------------------|-------------------|
| Soest | no | (6) ⁺ | 100 |
| Soest | yes | 24 ^{***} | 91 ^{***} |
| Hohenlieth | no | 7 | 100 |
| Hohenlieth | yes | 24 ^{***} | 89 ^{***} |

- 1: artificial infection of plots using infected rape straw
 +: probably due to contamination of uninoculated plots with debris from infected plots
 ***: significant differences at $P_{0,1}$

Early diagnosis

A commercial ELISA for *V. dahliae* was tested for cross reactivity and sensitivity on rape. Cross reactions with the most common pathogens of rape were all negative. The test gave positive reactions with strains of *V. dahliae* of different geographical and botanical origin.

In leaves of artificially infected greenhouse plants the pathogen could be detected after six to eight weeks.

The detection limit for mycelium and spores of plate grown *V. dahliae* was about 10ng/well in extraction buffer or in sap of healthy leaves. With root sap there was a considerable loss in sensitivity. In this case positive reactions were obtained with μg amounts of fungal fresh matter.

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Literature

Kroeker, G. 1970: Wilt of rape and turnip rape in Sweden caused by *Verticillium*. Abstract: Rev. Plant. Pathology 49, 262.