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Pathogenicity of *Pythium sylvaticum*

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In recent studies concerning the occurrence of *Pythium* species in agricultural soil, many isolates from almost every soil sample appeared to belong to *Pythium sylvaticum* Campbell & Hendrix. Van der Plaats-Niterink (1968) already reported this fungus in various soils from different parts of the Netherlands. Domsch et al. (1968) found *P. sylvaticum* in soil in Northern Germany, Campbell and Hendrix (1967a, b) and Papa et al. (1967) in the USA, where also Nemec and Sanders (1970) have observed it in necrotic roots of strawberry plants. It is likely that this fungus occurs in other countries as well, but it may not be recognized there. It was not until 1967 that Campbell and Hendrix (1967 a) found *P. sylvaticum* to be heterothallic. Oogonia and antheridia which are necessary for identification are usually found only when two compatible strains are placed together on an agar medium.

Little is known about possible pathogenicity of this species. Filer (1967) found that *P. sylvaticum* can infect seedlings of sweetgum, Mulder (1969) found the same for apple seedlings and Gams and Domsch (1969) for seedlings of wheat, pea and rape.

To obtain more information on the pathogenicity of the fungus, a preliminary series of tests was carried out in vitro, using seedlings of various commercial plants. Inoculations were made as described by Vanterpool and Truscott (1932). Young seedlings were placed on a wet piece of filterpaper in small Erlenmeyer flasks together with three maize flour agar disks (⌀ 0.5 cm) with the fungus culture. After 5 days growth of roots and shoots was measured.

The tests included seedlings of wheat, flax, pea, radish, lettuce, carrot and cucumber. Clear differences in pathogenicity between the male and female strain of *P. sylvaticum* were not noted.

The results are given in Table 1.

Shoot growth of wheat and pea was determined by measuring the shoot from the seed to the top, and for the other seedlings the length of the hypocotyl was taken up to the base of the cotyledons. Root growth of wheat was calculated by adding the lengths of separate rootlets but for other seedlings only the length of the main root was recorded.

The damage is mainly restricted to the roots of seedlings; shoot length is generally much less affected. The presence of leafspots on the cotyledons of radish was remarkable. It was easy to re-isolate *P. sylvaticum* from those spots. In wheat, lettuce

Table 1. Relative shoot, and root, length of seedlings, 5 days after inoculation with *P. sylvaticum*

Plants	Mean shoot length in % of control	Mean root length in % of control
wheat (*Triticum vulgare*)	78	30
flax (*Linum usitatissimum*)	93	42
pea (*Pisum sativum*)	87	80
radish (*Raphanus sativus*)	70	31
lettuce (*Lactuca sativa*)	47	29
carrot (*Daucus carota*)	37	33
cucumber (*Cucumis sativus*)	40	35

Tabel 1. Relatieve scheut- en wortellengte van kiemplanten, 5 dagen na inoculatie met P. sylvaticum.

and cucumber the whole seed and the rootlet formed in the in meantime, were sometimes found to rot. Rot is common in carrot. This may be compared with pre-emergence damping-off in the field.

The symptoms on the infected roots vary according to the plant used. They include even discoloration, stunted growth, and lesions all over the roots or browning root tips.

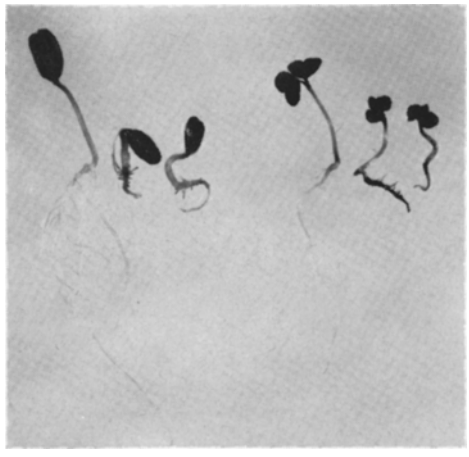

Fig. 1. The effect of *P. sylvaticum* to seedlings of cucumber (left) and radish (right). From each, one untreated control and two infected plants are shown.
Fig. 1. *Het effect van* P. sylvaticum *op kiemplanten van komkommer (links) en radijs (rechts). Van elk worden één onbehandelde en twee aangetaste planten getoond.*

Growth reduction and stunting of the roots may be caused, in part, by toxins secreted by the fungus, as was indicated in a separate test with flax seedlings. Autoclaved culture filtrate of the fungus was applied to a liquid medium on which the flax seedlings were grown. After 6 days considerable reductions in root length (60–90%) were measured and the roots showed a remarkably stunted growth.

Although it is not quite clear how much damage *P. sylvaticum* causes under field conditions, some influence can be expected. Adding this to its widespread occurrence, we conclude that the fungus may play a role in losses of crops due to impairment of the root system or even damping-off.

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Samenvatting

Pathogeniteit van Pythium sylvaticum

Pathogeniteit van *P. sylvaticum* voor 7 verschillende land- en tuinbouwgewassen kon in vitro duidelijk worden aangetoond. De groei van de wortel werd hierbij in het algemeen veel meer beïnvloed dan de ontwikkeling van de bovengrondse delen (Tabel 1). In enkele gevallen rotte zelfs het gehele zaad weg. Verschijnselen bij vlas wijzen er op dat door de schimmel afgescheiden toxinen een rol spelen in het ziekteproces.

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