ABSTRACT OF HABILITATION THESIS

Poznań University of Life Sciences, Poznań, Poland

EPIDEMIOLOGY OF LIGHT LEAF SPOT OF BRASSICACEOUS PLANTS (*PYRENOPEZIZA BRASSICAE*)

EPIDEMIOLOGIA CYLINDROSPORIOZY ROŚLIN KAPUSTOWATYCH (*PYRENOPEZIZA BRASSICAE*)

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Key words: light leaf spot, etiology, molecular detection, winter oilseed rape

Vegetables belonging to *Brassicaceae* family and oilseed rape are cultivated in several countries for food and for industry. Fungal diseases of these plants are severe in many regions. Some of them, including light leaf spot (*Pyrenopeziza brassicae*) occur on majority of brassicaceous species. The fungus causing the disease can be transmitted between these species, so it is of great interest to find out different aspects of the disease epidemiology. Until now, the influence of environmental conditions on plant infection by *P. brassicae* conidia was investigated. Little is known about conditions favourable for infection caused by ascospores. Taking into consideration the climatic differences between the UK, where light leaf spot has been a problem of brassicas for many years, and Poland it was purposeful to compare conditions for infection of oilseed rape and other brassicas caused by spores of Polish and UK isolates of *P. brassicae*. The characteristics of fungus population was also performed and it was checked whether there were in Poland two *P. brassicae* mating types MAT1-1 and MAT1-2 and whether the sexual reproduction was possible. The occurrence of isolates resistant to fungicides was also tested. The additional aim of the research was to compare the susceptibility of different brassicaceous species to *P. brassicae* and the assessment of different methods of fungus detection in plants.

It was found that *P. brassicae* is able to expand its range of occurrence in regions, where temperatures in spring and summer are moderate and varied between 8°C to 24°C (optimum 16°C). Ascospores and conidia can appear in different terms, however, the temperatures for germination were similar for both kinds of spores. There were no significant differences in germination conditions between Polish and UK conidia and ascospores. To trigger off oilseed rape infection the necessary

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number of spores was 28 times less for ascospores than for conidia. It seems that for initiating light leaf spot epidemics a relatively small number of ascospores is necessary, whilst for secondary splash with droplets the necessary number of conidia should be many more. Temperature and wetness duration for initiation of infection by conidia or ascospores was similar. Both types of spores are able to infect leaves between 8°C and 20°C, with an optimum at 16°C. The minimal period of wetness duration was 10 h at 8°C and 6 h at 12, 16 and 20°C. The incubation period was about one day shorter for conidia than ascospores. The abundance of conidial production by *P. brassicae* depended on temperature. The number of acervuli on leaves and conidia formed in these, which are mainly responsible for secondary spread, was over five times less at 20°C than at 8, 12 and 16°C (papers 2, 3, 4).

PCR with species specific primers was the fastest and the most sensitive way to detect *P. brassicae* in infected brassicas, even two months before the occurrence of light leaf spot symptoms in leaves sampled from field experiments. The detection sensitivity of *P. brassicae* DNA extracted from culture was greater using the PCR primer pair PbITSF/PbITSR than using primers Pb1/Pb2. *Pyrenopeziza brassicae* was detected by PCR (PbITS primers) in leaves from controlled-environment experiments immediately and up to 14 days after inoculation (papers 6, 7). The detection – for the first time in Poland – of two *P. brassicae* mating types MAT1-1 and MAT1-2 and also the production of the fungus apothecia on leaf petioles, showed that in Poland sexual reproduction of *P. brassicae* on dead debris of different brassicas is possible. Ascospores formed in apothecia can be the main initial source of inoculum. It seems that on winter oilseed rape in Poland ascospores initiate the light leaf spot epidemics in autumn similarly to the UK conditions (paper 4).

Light leaf spot did not occur on radish – *Raphanus sativus* var. *radicula* and *R. sativus* var. *sativus*, only. The other brassicas – kale, cauliflower, white cabbage, Chinese cabbage, broccoli, kohlrabi, Brussels sprouts and turnip could be infected by *P. brassicae*. The results of the experiments indicate that vegetable brassicas cultivated in autumn can play an important role in the *P. brassicae* life cycle in Poland. During vegetation season on majority of these species acervuli may be formed after infection with conidia originating from different brassica crops (paper 8).

In Wielkopolska region with intensive winter oilseed rape cultivation no *P. brassicae* isolates resistant to azoxystrobin, carbendazim, tebuconazole or metconazole were found. However, the occurrence of isolates resistant to carbendazim in the UK population, where chemical control of light leaf spot has been common for a longer time than in Poland indicates, that such isolates might appear in Poland in the future (paper 9). Susceptibility of winter oilseed rape cultivars to *P. brassicae* should, beyond other factors, be taken into consideration in chemical control of this disease. The most efficient in chemical protection of susceptible to light leaf spot winter oilseed rape cv. 'Marita' was fungicide spraying in autumn, whilst there were no differences between treatments efficacy in autumn and in spring for a resistant oilseed rape cv. 'Silvia' (papers 1, 5).

Research papers constituting the habilitation thesis

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