

Effects of different fungicides against Stem Canker (*Phoma lingam*) in winter oilseed rape (*Brassica napus* L.)

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Introduction

Stem Canker (*Phoma lingam*) is one of the most important diseases in winter oilseed rape in Europe. Next to cultivar selection (resistant or tolerant varieties) and plant cultivation, the use of fungicides is the most important method to protect oilseed rape against this disease (Paul, 2003). It was the aim of this study to test some new fungicides for oilseed rape for their effect against *Phoma lingam* compared to an untreated control.

Material and Method

For the experiments the winter oilseed rape cv. Elektra was used in BBCH 14-15. The inoculations were carried out with a previously tested aggressive isolate of *Phoma lingam* from oilseed rape from Lundsgaard (North Germany).

Method:

The experiments were carried out in climate chambers. Winter oilseed rape (cv. Elektra) was grown until the 4th-5th leaf stage (BBCH 14-15) in trays with 51 single pots and then treated with the different fungicides and active ingredients either as a protective (0, 48 and 96 h before inoculation with *Phoma lingam*) or a curative (0 h after inoculation *Phoma lingam*) application. For each variant and treatment 51 plants were used. For the inoculation all leaves but the 4th and 5th true leaf were removed from the plants and the remaining leaves pinched with a needle (one hole per leaf side).

For inoculation 21 day old cultures on V8 were used. The spore suspension of *Phoma lingam* was adjusted to 1×10^6 spores/ml. For each tray 15 ml spore suspension was quantitative sprayed on the plants for inoculation. The plants were covered with plastic covers and cultivated at constant 20 °C and 14/10 h light/dark. Twenty one days after inoculation the plants were assessed for disease symptoms using the assessment scheme shown in Table 1. After further 21 days the hypocotyls were also assessed for disease symptoms using the scheme given in Table 1.

Table 1: Assessment scheme for *Phoma lingam* on inoculated leaves of winter oilseed rape (Koch et al. 1991, adapted)

assessment scale	Symptom description
1	no symptoms around the needle prick
2	little blackening around the pricked wound, lesion diameter up to 1,5 mm
3	dark, necrotic lesions diameter 1,5 to 3 mm
4	dark, necrotic lesions diameter 3 to 6 mm
5	dark, necrotic lesions, covering about 50 % of the leaf
6	dark, necrotic lesions, covering about 50-75 % of the leaf
7	dark, necrotic lesions, covering more than 75 % of the leaf
8	dark, necrotic lesions, covering more than 75 % of the leaf and formation of pyknidia
9	total leaf necrotic

Table 2: Assessment scheme for *Phoma lingam* on the hypocotyls after leaf inoculation

assessment scale	Symptom description
1	no symptom visible (hypocotyl "healthy")
3	slight symptoms, only little discoloration at the hypocotyl
5	moderate symptoms, discoloration around the hypocotyl
7	strong symptoms, discoloration and constrictions around the hypocotyl
9	plant dead

Results

All fungicides gave good control of *Phoma lingam*. The control effects were dependent on the time intervals between treatment and inoculation. Very good results were achieved when the fungicides were used protectively (see **Fig. 1** and **Fig. 2**). In the treated plants the assessment rate was approximately 1 scale lower than the untreated control. This effect was even clearer in the hypocotyls where the ratings were up to 3.5 scales lower than the untreated control.

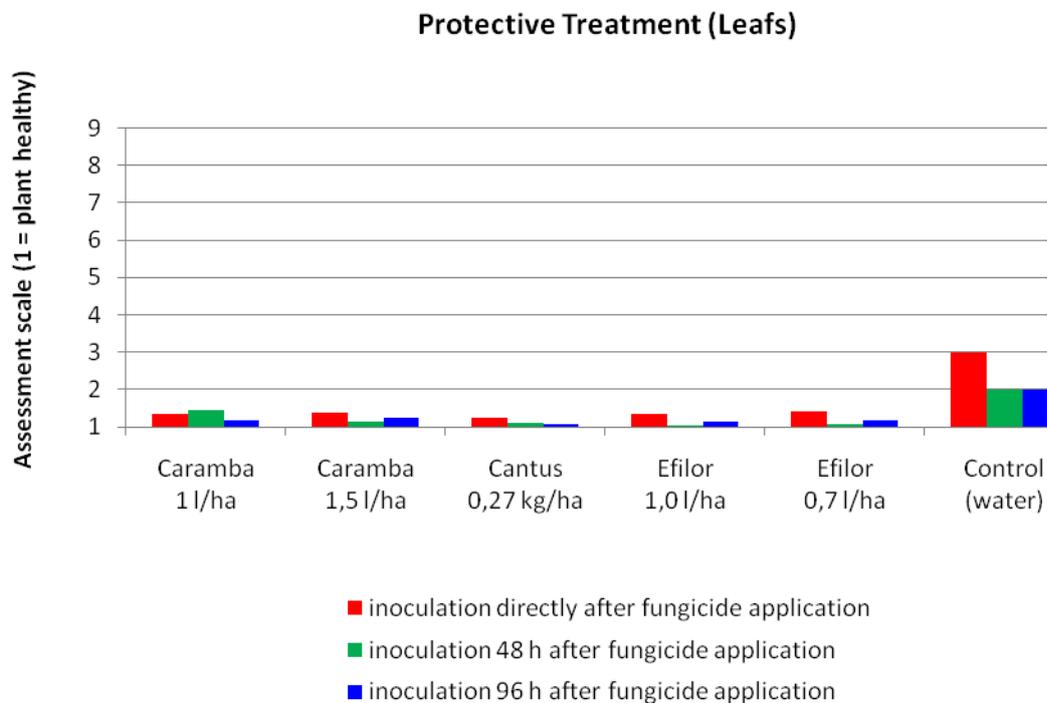


Fig. 1: Effects of protective fungicide treatments against **leaf symptoms** of *Phoma lingam* on winter oilseed rape

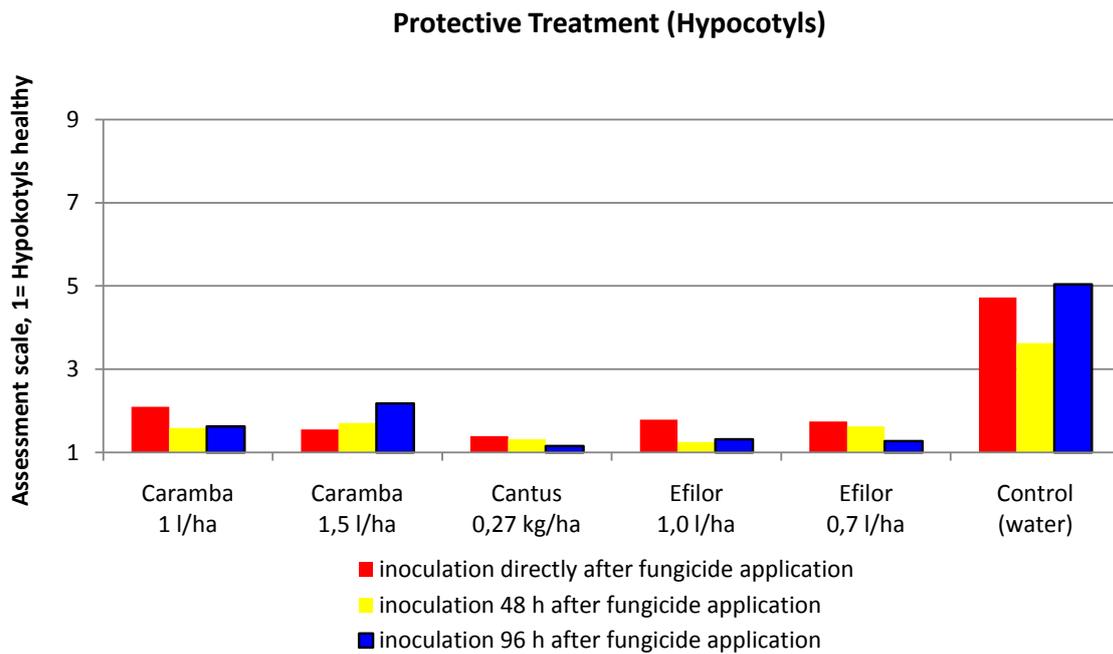


Fig. 2: Effects of protective fungicide treatment against *Phoma lingam* 21 days after inoculation on **hypocotyls** of winter oilseed rape (spray inoculation of leaves after prick wound)

The curative treatment showed also good control effects (see Fig. 3 and Fig. 4). Here the assessment rates for the leaves were up to 1.5 scales lower than the untreated control. The hypocotyls of the treated plants of Var. 1, 2, 4 and 5 showed similar results to the control.

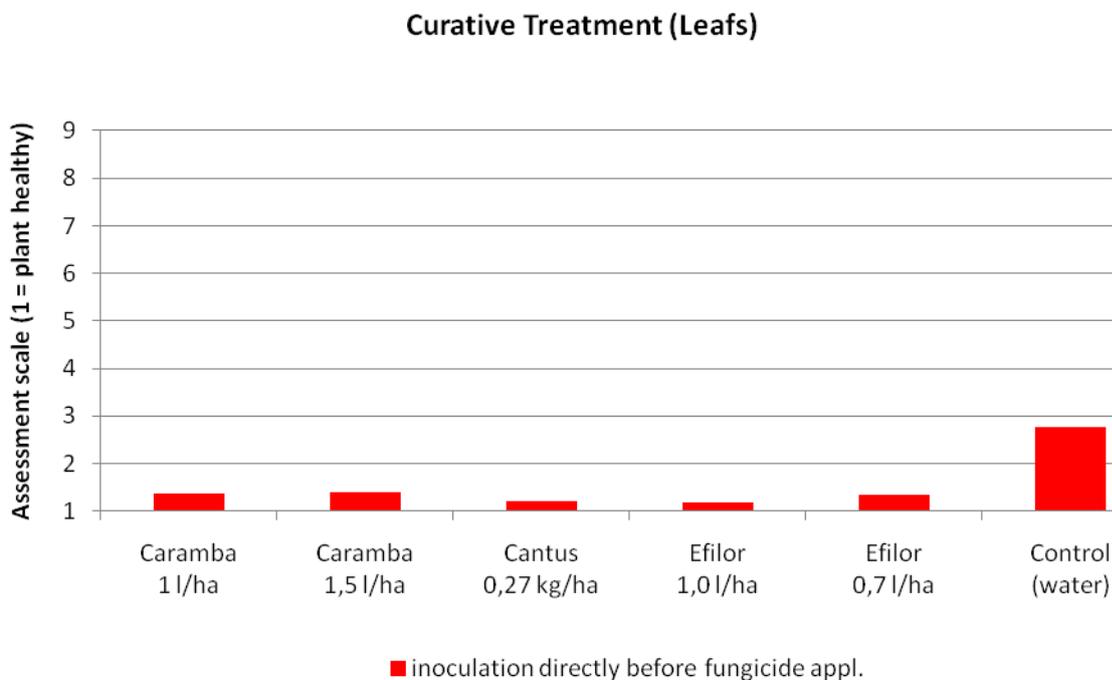


Fig. 3: Effects of curative fungicide treatment against **leaf symptoms** 21 days after inoculation with *Phoma lingam* on winter oilseed rape

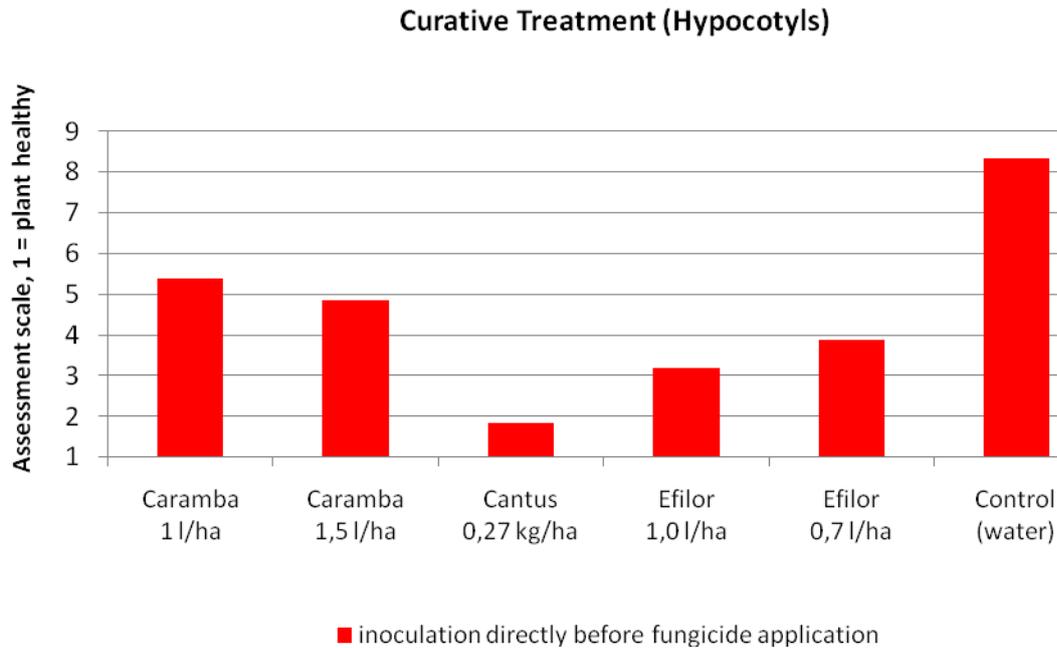


Fig. 4: Effects of curative fungicide treatment against *Phoma lingam* 21 days after inoculation on **hypocotyls** of winter oilseed rape

Summary

The experiments show that all oilseed rape fungicides used gave very good protection against *Phoma lingam*. In the curative leaf treatments the best results were achieved when the treatment was applied directly after inoculation. The curative treatment applied directly on the first visible symptoms gave also good control. However experiments on further treatment intervals should be carried out to get information about the lasting effects, as was done in the investigations of the protective treatments. There was also a clear difference in infection of leaves and hypocotyls in the curative treatment. Further investigations are planned to proof the *Phoma*-control of the fungicides especially with higher assessment rates.

References

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 Koch, E., Song, K., Osborn, T.C., Williams, P.H., 1991: Relationship between pathogenicity and phylogeny based on Restriction Fragment Length Polymorphism in *Leptosphaeria maculans*. *Molecular Plant-Microbe Interactions* 4 (4): 341-349