

## CONTROL OF FUNGAL DISEASES IN WINTER OIL SEED RAPE

K.BONIN, E.FRĄTCZAK

Institute of Plant Protection, Poznań, Poland

Plant Breeding and Acclimatization Experiment Station, Bą-  
ków, Poland

## ABSTRACT

Experiments showed that two spring treatments using fungicides were effective in the control of oilseed rape fungal diseases. In small plot trials tests were carried out to determine the incidence and importance of downy mildew/ *Peronospora brassicae*/, stem rot/ *Sclerotinia sclerotiorum*/, stem canker/ *Phoma lingam*/, dark pod spot / *Alternaria* spp./ and grey mould/ *Botrytis cinerea*/. The following active ingredients were tested: prochloraz, carbendazim, iprodione, vinclozolin, procymidone, metalaxyl and copper oxychloride. The yield and 1000 seed weight were measured and estimated.

## INTRODUCTION

Observations made by plant protection service in Poland at the beginning of the eighties showed increasing infection of winter oilseed rape with fungal diseases. The fungus *P.lingam* caused important damage . In badly affected cases there was up to 50% crop failure. *S.sclerotiorum*, *Alternaria* spp., *B.cinerea* and *P.brassicae* also damaged rapeseed cultures.

The data concerning disease control with fungicides/ Barnes & Williams 1983, Evans & Gladders 1981, Cox et al. 1981, Gladders 1978, Goetz 1979, Hampel et al. 1981, Mes-  
seliere 1981/ underline the effectiveness of chemical methods. This encouraged us to start with similar experiments in Poland.

## MATERIALS AND METHODS

Experiments were carried out in randomized blocks with 4 replicates in Bąków/ near Opole/. The plot size was 20 m<sup>2</sup>. Oilseed rape plants cv.BKH 485/ '00'/ were naturally infested in field conditions. They were treated using

knapsack sprayer/ 500 l of water/ha /.

Fungicide applications

The first treatment - was performed when inflorescence rose above the level of the rosette/ 23 April, G.S. 3.2/ / Harper & Berkenkamp, 1975/.

The second treatment - was performed when lower pods started to fill/ 20 May, G.S. 4.3/.

The following products were evaluated:

<u>Active ingredients</u>	<u>Dose per hectare</u>
iprodione	0.750 kg
iprodione + carbendazim	/0.525 + 0.262/ kg
metalaxyl + copper oxychloride	/0.200 + 1.600/ kg
prochloraz	0.675 l.
prochloraz + carbendazim	/0.450 + 0.120/ l.
procymidone	0.750 kg
vinclozolin	0.750 kg

Disease sampling - the following samples were taken:

leaves - 25 out of each plot were collected at random and they were examined for the presence of downy mildew/ *P.brassicae*/

stems - 50 consecutive stems in the middle row of each plot were assessed for the presence of stem canker / *P.lingam*/ and the incidence of stem rot/ *S.sclerotiorum*/ among the 250 consecutive stems in the two middle rows of every plot was ascertained

Pods - 100 pods per plot were sampled at random and the extent of damage by black pod spot/ *Alternaria* spp./ and grey mould/ *B.cinerea*/ was determined.

Leaves were collected when lower pods started to fill/21 May, G.S. 4.3/. Stems and pods were collected at G.S. 5.3 - the seeds in the lower pods were starting to become mottled green-brown.

The extent of *P.brassicae* was determined using the scale:

0 - no infection

1 - up to 3 sources of fungus growth on a leaf

2 - more than 3 sources of fungus growth on a leaf, less than 25% of leaf area infested

3 - more than 25% of leaf area infested.

Alternaria spp. were assessed using the following scale:

0 - no infection

1 - up to 3 spots on a pod

2 - more than 3 spots on a pod, less than 25% of pod area infested

3 - more than 25% of pod area affected.

Disease noxiousness was calculated and expressed as a mean disease index M.D.I. using the formula:

$$\text{M.D.I.} = \frac{b+2c+3d}{a+b+c+d} \quad \begin{array}{l} a, b, c, d, - \text{ number of leaves/pods in} \\ \text{each degree of disease respectively} \end{array}$$

The incidence of diseases was shown as a mean percent of damaged leaves, stems and pods.

10000 seeds out of each plot were counted/ using a seed counter/, weighed and expressed as a mean 1000 seed weight. The yield was weighed and calculated in tonnes per hectare. The results of the observations were estimated by analysis of variance and by comparing the means by the t-Student test.

#### RESULTS

P.brassicae/ downy mildew/ occurred in the field throughout the season. It appeared on leaves in the autumn and continued to affect the plants till harvest. The fungus occurred even on pods.

The effectiveness of fungicides in the control of disease on leaves is shown in Table 1. The pathogen was effectively controlled using a product containing metalaxyl + copper oxychloride. It reduced the severity of the disease M.D.I. from 1.95 in untreated to 0.51 in treated plots.

TABLE 1

Incidence and importance of P.brassicae on rape leaves

Treatment	% Leaves infected	M.D.I./ 0-3/
Untreated	98	1.95
vinclorolin	100	1.94
metalaxyl + copper oxychloride	45 <sup>xxxx</sup>	0.51

xxxx- significantly different from untreated at P=0.001

*S.sclerotiorum*/ stem rot/ damaged only 2.5% of stems in untreated plots. However, infested plants were completely destroyed 3 weeks before harvest and no yield was obtained. The experiments showed effective control of disease using iprodione+carbendazim, vinclozolin and procymidone/ Tab.2/

TABLE 2

Incidence of *S.sclerotiorum* and *P.lingam* on rape stems

Treatment	% Stems infected	
	<i>S.sclerotiorum</i>	<i>P.lingam</i>
Untreated	2.5	38.0
prochloraz + carbendazim	2.9	20.5 <sup>x</sup>
prochloraz	1.4	37.5
iprodione + carbendazim	0.7 <sup>xx</sup>	24.0
iprodione	1.7	29.5
vinclozolin	0.8 <sup>x</sup>	22.5
procymidone	0.9 <sup>x</sup>	19.5 <sup>x</sup>
metalaxyl + copper oxychloride	3.4	36.5

xx - significantly different from untreated at P=0.05

x - " - " - " - " - " - P=0.10

The first symptoms of *P.lingam*/ stem canker/ were observed about 20th of June and stems were slightly cankered 3 weeks before harvest/ small blotches, lesions encircling less than half the stem/. The application of procymidone and prochloraz + carbendazim reduced disease incidence on stem bases/ Table 2/.

Infections of *Alternaria* spp./ dark pod spot/ were generally slight. M.D.I. was equal to 0.28 and 26% of pods were affected with the disease/ Table 3/. In plots treated with iprodione and procymidone the incidence and extent of disease were lowest of all.

*B.cinerea*/ grey mould/ occurred on pods due to damage caused by *Dasyneura brassicae* and *Ceutorhynchus assimilis*. About 4.7% of pods were affected by this fungus. Treatments with prochloraz, procymidone, vinclozolin and iprodione reduced disease occurrence/ Table 3/.

Under small plot trial conditions, the yield was rela-

tively low/ Table 4/. The highest yield increase was observed in plots treated with metalaxyl + copper oxychloride. Higher 1000 seed weight was stated after treatment using iprodione, vinclozolin, procymidone and prochloraz + carbendazim.

TABLE 3

Incidence of *Alternaria* spp. and *B.cinerea* on rape pods

Treatment	<i>Alternaria</i> spp.		<i>B.cinerea</i>
	M.D.I./0-3/	%Pods infected	
Untreated	0.28	26.25	4.75
prochloraz + carbendazim	0.15	15.00 <sup>xx</sup>	4.50
prochloraz	0.16	15.75 <sup>xx</sup>	0.50 <sup>xxx</sup>
iprodione + carbendazim	0.13	12.75 <sup>xx</sup>	2.75
iprodione	0.08	8.25 <sup>xx</sup>	2.25
vinclozolin	0.18	17.75	2.50
procymidone	0.09	8.75 <sup>xx</sup>	2.50
metalaxyl + copper oxychloride	0.23	22.50	2.75

xxx - significantly different from untreated at P=0.01

xx - " - " - " - " - " - P=0.05

TABLE 4

Yield and 1000 seed weight

Treatment	Yield t/ha	1000 seed weight g
Untreated	2.49	4.67
prochloraz + carbendazim	2.50	4.71
prochloraz	2.67	4.66
iprodione + carbendazim	2.51	4.62
iprodione	2.42	4.73
vinclozolin	2.45	4.72
procymidone	2.50	4.71
metalaxyl + copper oxychloride	2.71	4.66

## DISCUSSION

Effective control of stem rot, dark leaf/pod spot and grey mould in oilseed rape crops has already been reported

/ Barnes & Williams 1983, Evans & Gladders 1981, Cox et al. 1981, Hampel et al. 1981, Marshall & Harris 1984, Messeliere 1981/. This has been confirmed by the results obtained in Poland after procymidone, iprodione, vinclozolin and prochloraz treatments.

Yield increase worth noticing/ 0.22 t/ha / was observed in plots treated with metalaxyl + copper oxychloride. However this treatment was found to exert effective control only over downy mildew. The low increase in 1000 seed weight obtained in 4 cases was not followed by a better yield.

In 1986 stem canker appeared on stems/ from soil level up to 20 cm above/ relatively late, i.e. about 20th of June/ a month after the last treatments/. Samples were taken nearly 6 weeks after the last sprays. Although damage caused by fungus was not significant, differences between fungicide treatments were visible. Incidence of *P. lingam* was reduced in plots with procymidone and prochloraz + carbendazim. Analyses made at harvest showed no connection between yield and disease incidence 3 weeks before harvest. These results need further experiment.

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