

SUSCEPTIBILITY OF SELECTED CULTIVARS AND LINES OF WINTER  
RAPESEED TO DOWNY MILDEW

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SUMMARY. During the years 1983-85 there were studied the susceptibility of various cultivars and lines of winter rapeseed to downy mildew under field and greenhouse conditions. None of these cultivars and lines appear to have any degree of resistance to downy mildew. However they do exhibit significant difference in their degree of susceptibility. Under field conditions, the most infected were Górczański, Bechma, Linakasta, whereas the least infected were BOH 183, BOH 284, Jupiter. Under greenhouse conditions, the most susceptible were Górczański, Lingot, Jupiter, while the least susceptible were BOH 183, BOH 283, Jet Neuf.

INTRODUCTION

An increase in area of winter rape cultivation and the change from high to low erucic cultivars and glucosinolates have made it necessary to pay closer attention to the diseases attacking the plant. The most frequent and commonest rape disease in Poland is downy mildew (*Peronospora parasitica* Pers. ex. Fr.). In the world literature, we can find fairly many papers dealing with the effect of the incidence of this pathogen on brassicas, however are relatively few papers discussing its on rape. Besides, some authors have been of the opinion that downy mildew is the disease which has a non-significant effect on yield, while others stress the necessity of making more precise research (Downy and Dolton 1961, Rawlinson and Muthyalu 1979, Brokenshire and Prasanna 1984, Hornig 1985).

In Poland, the pathogen occurs commonly but there has been elaborated no detailed paper dealing with its presence on rape. According to the author's earlier observations, agrotechnical methods have a small effect on its incidence and severity. The fungicides containing metalaxyl reduce, relatively easily, the development of the pathogen but these fungicides hardly reduce the presence of other pathogens such as *Botrytis*, *Alternaria*, *Sclerotinia*, *Phoma* which can occur with a high severity as well.

Thus, the author has decided to make an analysis of the infection of various cultivars and lines of rape to state whether there are considerable differences among them and whether this fact might be helpful and useful for breeding new cultivars of a higher resistance to *Peronospora parasitica*.

#### MATERIAL AND METHODS

Over the period 1983-86, there were made observations of the infection of various cultivars and lines of winter rape infected in a natural way under field conditions and under greenhouse conditions with artificial infection. The field observations were made at the Regional Research Station for Plants Evaluation Chrzastowo, near Bydgoszcz, in four replications on plots of 3 x 10m. On each plot there were estimated 50 plants with an analysis of all mature leaves. The percent of infected leaves and infection degree were studied. The infection degree was determined using the scale 0-5 where 0 denoted healthy, 5 - the highest degree /Sadowski 1987/.

Greenhouse experiments were performed at the Technical Agricultural University in Bydgoszcz. In spring, there were sown surface sterilized rape seeds in the pot. The experiment was performed in four replications, each pot contained 10 plants. The cotyledones and leaves were rubbed slightly to remove some of the wax from their surface then inoculated by atomising with a suspension containing about  $10^5$  spores/ml of *P. parasitica*. The suspension was prepared according to the method described by Greenhalgh and Dickinson /1975/. During the infection the seedlings

had cotyledons and two leaves.

After spraying the seedlings were kept in plastic chambers, in darkness for 16 h, at a temperature ca 16°C and humidity ca 100%. Then they were kept in the greenhouse for 7 days at 16-21°C. After that period the seedlings were again under the conditions of very high humidity for 16 h and than estimated. The infection rate of cotyledons and percent of infected leaves was estimated. For determining the infection rate of cotyledons the five-degree scale was used (Natti et al. /1967/).

#### RESULTS AND DISCUSSION

Although there were noticed a great number of infected cultivars and lines of rape, the list of results included only those which were observed for, at least, two years.

Table 1

The infection of cultivars and lines under examination over the period 1983-84 and 1984-85

1983-84			1984-85		
Cultivar-line	% L	DI	Cultivar-line	% L	DI
Jupiter	21	0.3	Jupiter	22	0.6
BKH	26	0.5	BOH 293	20	0.8
MAH 181	26	0.5	BOH 183	23	0.8
Lirabu	28	0.6	MAH 181	26	1.0
Skrzeszowicki	30	0.6	Jet Neuf	37	1.0
PUR 182	30	0.6	Coral	28	1.2
Jet Neuf	34	0.6	Korins	30	1.2
Herkules	34	0.6	POB 182	32	1.2
Librador	35	0.7	Skrzeszowicki	33	1.2
POB 182	35	0.7	Librador	37	1.2
MAH 281	43	0.7	Belinda	29	1.3
Quinta	36	0.8	Beryl	29	1.3
WV 343	47	0.8	Liglander	37	1.5
Perle	47	0.8	Górczański	40	1.7
Górczański	49	1.0	Mariusz	41	1.7
LSD /P=0.05/	19.2	0.28		16.5	0.32

% L - % of leaves infected; DI - disease index, see text

From among 15 cultivars and lines which were studied in the years 1983-84 the cultivar Jupiter was infected the least, whereas Górczański - the most. In the years 1984-85 the least infected was again Jupiter and lines BOH 283 and BOH 183, the most - Marinus and Górczański /Table 1/.

In the years 1985-86 the cultivars Marinus and Lirakotta were infected the most, whereas Jupiter, Jet Neuf and lines BOH 283, BOH 183 - the least /Table 2/.

Table 2

The infection of the cultivars and lines under examination over the period 1985-86

Cultivar-line	% L	DI	Cultivar-line	% L	DI
Jupiter	20	0.6	Tandem	23	0.9
Jet Neuf	25	0.7	Liropa	24	0.9
BOH 283	20	0.7	Korina	27	0.9
BOH 183	21	0.7	Lindora	22	1.0
BOH 484	19	0.9	Ridana	24	1.0
Gundula	21	0.9	Beryl	27	1.0
Doral	21	0.9	WW 956	27	1.1
Belinda	22	0.9	Marinus	25	1.2
Vamara	22	0.9	Lirakotta	29	1.2
LSD /P=0.05/				12.5	0.19
% L - % of leaves infected; DI - disease index, see text					

In greenhouse experiments the least infected were BOH 183, Jet Neuf, BOH 283, Start and PUR 182, the most - Górczański, Lingot, Jupiter, Quinta, Janpol, Marinus, Perle, Liglandor, Skrzyszowicki. There was not confirmed a low susceptibility of the cultivar Marinus under the field conditions and natural infection. Under greenhouse conditions Marinus belonged to the group of plants infected the most /Table 3/.

On the basis of the results obtained we may state that under field conditions, differentiation of the infection of the lines and cultivars was not considerable. Significant differences were obtained under greenhouse conditions.

with artificial infection.

Table 3

The infection of the cultivars and lines under greenhouse conditions, May 1985

Cultivar-line	% L	CI	Cultivar-line	% L	CI
BOH 183	0	1.5	Ligora	11	3.5
Jet Neuf	0	1.6	MAH 181	3	3.9
BOH 283	2	1.9	Korina	0	4.0
Start	2	2.1	BKH 180	0	4.0
PUR 182	0	2.2	Skrzeszowicki	9	4.1
Belinda	0	3.1	Liglandor	0	4.2
WW 843	0	3.1	Perle	15	4.2
Lirabu	0	3.3	Marinus	3	4.3
Herkules	0	3.3	Janpol	20	4.5
Doral	5	3.3	Quinta	7	4.6
POB 182	5	3.3	Jupiter	18	4.7
Librador	16	3.4	Lingot	33	4.8
Tomek	0	3.5	Górczański	35	4.8
LSD /P=0.05/				1.1	

% L - % of leaves infected; CI - index of cotyledons infection, see text

Distinct differences in the infection of 14 cultivars under field conditions during five years were obtained by Dixon /1975/ and he suggests that in the rape cultivars of differentiated susceptibility there are sources of resistance to *Peronospora parasitica*. A differentiation of infection was also the case in Rawlinson and Muthyalu's research /1979/. Natti /1958/ and Natti et al. /1967/ report a considerable differentiation of broccoli cultivars susceptibility. However D'Ercole /1972/ during his observation did not notice any clear differences in infection of 30 cultivars of cauliflower under field conditions.

## REFERENCES

- Brokenshire T. and K.P.R. Prasanna, 1984. Diseases of winter oilseed rape in SE Scotland. In: Crop Protection in Northern Britain. Dundee, Scottish Crop Research Institute, Edinburgh, 216-221.
- D'Ercole N., 1972. Suscettibilità varietale del Cavolfiore alla Peronospora. *Informatore Fitopatologico*, Bologna 14: 12-13.
- Dixon C.R., 1975. The reaction of some oil rape cultivars to some fungal pathogens. *Proceeding 8th British Insecticide and Fungicide Conference*, Brighton 503-506.
- Downy R.K. and J.L. Bolton, 1961. Production of Rape in Western Canada. *Publication of Department of Agriculture, Canada 1021: 1-19.*
- Hornig H., 1985. Pflanzenschutzmassnahmen nach Einführung der OO-Rapssorten. *GCJRC Bulletin, Agronomy Comitee*, 2: 50-51.
- Natti J.J., 1958. Resistance of broccoli and other crucifers to downy mildew. *Plant Disease Reporter*, 5: 656-662.
- Natti J.J. and M.H. Dickson and J.D. Atkin, 1967. Resistance of Brassica oleracea varieties to downy mildew. *Phytopathology*, 57: 144-147.
- Rawlinson C.J. and G. Muthyalu, 1979. Diseases of winter oilseed rape: occurrence effects and control. *Journal of Agricultural Science, Cambridge* 93: 593-606.
- Sadowski Cz., 1987. Występowanie i próby zwalczania mączniaka rzekomego kapustnych /Peronospora brassicae Gaum./ na rzepaku. Wyniki badań nad rzepakiem ozimym za rok 1985. *Zeszyty Problemowe, Instytut Hodowli i Aklimatyzacji Roślin, Radzików - in press.*