

**Microbial Preparations for Control  
and Prevention of Fungal Disease on Canola**

**Control of *Sclerotinia sclerotiorum* and  
*Leptosphaeria maculans* (*Phoma Lingam*)**

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The active ingredient of biopreparation *Polyversum* is fungi-like organism *Pythium oligandrum*. The *Pythium oligandrum* colonizes the rhizosphere of treated plants. Because of its strong mycoparasitism and competitive abilities, suppress the growth and antagonistic effects of many soil-borne pathogenic fungi causing damping off and rots of roots and plants bottoms. The *Polyversum* also controls those canola diseases:

**Alternaria black spot** (*Alternaria brassicae*)

**Blackleg of canola** (*Leptosphaeria maculans*)

**Sclerotinia Stem Rot** (*Sclerotinia sclerotiorum*)

**Gray Mold** (*Botrytis cinerea*)

*Pythium oligandrum* also induces defense reaction in the plant, through stimulation of the phytohormones, which are involved in the resistance mechanisms of the plant against diseases. *Pythium oligandrum* does not produce any antibiotics and therefore is considered a true plant growth promoter for the induction of plant resistance. *Pythium oligandrum* has also significant growth stimulation effects which results into increased yield.

**The effectiveness from trials done in the Czech Republic by accredited trial stations**

In the listed tabs are summarized results from 10 trials from 5 trial stations in the run of three years. For maintaining data were chosen observing of 4 general diseases for winter canola and in lesser extent for summer canola.

Selected Diseases: *Alternaria brassicae*

*Botrytis cinerea*

*Leptosphaeria maculans* (*Phoma lingam*)

*Sclerotinia sclerotiorum*

Since, that was quite impossible to get as reference preparation other corresponding biological preparation registered for proposed way of use, were picked as referential chemical based preparations most widely used against the scale of pathogens in working conditions in the Czech Republic.

Selected chemical based referential preparations:

**Fungicides:**

Caramba - metconazole - spray dose 1.5 l/ha respective 1.2 l/ha

Horizon - tebuconazole - spray dose 1.5 l/ha

Rovral - iprodione - spray dose 1.5 l/ha

Vitavax 200 FF - carboxim, thiram - seed dressing 4 l/t of seed

**Growth stimulators**

Atonik - 2-methoxy-natrium 5-nitrofenol - spray 0.6 l/ha

In the trials were used following ways of application of Polyversum:

Rate:

Dressing seeds 2kg/t

One spray 100 g/ha dissolved in 300-400 l of water

Two sprays 2 x 100 g/ha dissolved in 300-400 l of water

Three sprays 3 x 100 g/ha dissolved in 300-400 l of water

Researchers also tested sprays, when was Polyversum dissolved in liquid nitrogen fertilizer DAM 390.

The preparation POLYVERSUM demonstrated efficiency against all above-mentioned diseases in various scales. The efficiency of tested preparation is in congruency with the efficiency of chemical preparations. When Polyversum had lesser efficiency in special conditions, chemical fungicides did not work either.

*Alternarias* were observed in 9 trials, and in all cases the results of Polyversum were comparable with chemical standard.

*Botrytis* was observed only in 5 trials and in 4 cases the results were comparable with chemical standards.

*Leptosphaeria maculans* was observed in all of 12 trials. In 11 cases the results were comparable with standard chemical treatment in the same trial.

*Sclerotinia* was observed in 11 trials. In all cases the results of tested preparation were compared with chemical standards.

Phytotoxicity of tested preparation did not express in any variant of all trials, so the preparation can be considered as fully safe for treated plants.

**On a basis of results of the submitted evaluations, two diseases of canola : *Leptosphaeria maculans* and *Sclerotinia sclerotiorum* were chosen for the application for approving of Polyversum..**

***Leptosphaeria maculans* - Evaluation**

Entire data about trials

**Legend to tab "*Leptosphaeria maculans*"**

Application of POLYVERSUM





## Comments:

Testing of preparation POLYVERSUM was done in 10 trials a preparation was compared with fungicides Rovral, Caramba, Horizon, Vitavax 200 FF. Mentioned preparations were applied to winter and summer canola in combination with plant growth stimulator Atonik as states in tabs.

Polyversum was applied 48 times.

In 30 cases was reached better evaluation than by reference fungicide treatment.

In 7 cases was efficiency of Polyversum higher than 50 %, but lower than efficiency of chemical preparations.

In 11 cases were results of tested biopreparation worst than chemical standard.

The preparation was applied in one, two or three terms growth stages of canola.

First treatment in stages (BBCH) 18 -25

Second treatment in stages (BBCH) 30 - 38

Third treatment in stages (BBCH) 45 60

Application is fully in correspondence with recommendation of manufacturers of referential fungicidal standards. (BBCH 11-32 and 32- 60)

Infection ascends in time of observations from low to medium pressure.

Gained values are seemingly non-homogenous. That is reason why a correlation coefficient between group treated with chemical fungicides and between group treated with Polyversum was calculated. The value of this coefficient being 0.886, the correlation between both groups was very tight.

(Tab value for a 0.005 16 terms is 0.6622). Low values in both groups were caused by other events than for tested preparation. This fact confirmed contradictory phenomena. High efficiency in both assessed files in the same locality. These phenomena - high or low efficiency- were identically influenced either by force of infection, climatic conditions in specific locality or condition of the crop.

In the case of occurrence and development of pathogen, both groups showed high efficiency.

Above results show that efficiency of preparation Polyversum is comparable with chemical standards- this is documented by statistical cogency and is influenced by instantaneous condition of environment as well as artificial fungicides.

The best method of application seems to be two or three sprays.

First treatment in stages (BBCH) 25 30

Second treatment in stages (BBCH) 35 45

Third treatment in stages (BBCH) 45 - 55

The application with liquid fertilizer DAM 390 is possible.

For practical application is suitable to modify application window as is showed:





Values written in GREEN are lower than the referenced chemical.

Values written in BLUE are lower than the referenced chemical, but with efficiency increased by 50%

Values written in PURPLE indicate the efficiency of the referenced preparation.

### **Commentary:**

A preparation of POLYVERSUM was tested and compared in 9 trials with preparations of the chemical fungicides Rovral, Caramba, Horizon and Vitavax 200 FF.

All of the preparations were applied to winter and summer canola in combination with the plant growth stimulator Atonik as stated in the tabs.

Applications of POLYVERSUM were applied 30 times:

in 23 cases, POLYVERSUM tested better than the chemical treatments;

in 2 cases, the efficiency of POLYVERSUM was higher than 50% of, but lower than the efficiency of the chemical treatments; in 6 cases POLYVERSUM tested lower than the chemical standard.

Applications of each of the preparations were carried out in the following growth stages of the crops:

BBCH 18-25, for summer canola; or BBCH 30-52, for winter canola.

Application was in full compliance with the each of the manufacturers recommended fungicidal standards (BCH 18-25 and 30-52). Infection ascends in time of observation from low to medium pressure.

Observed values are seemingly non-homogenous. For this reason, the correlation coefficient between groups treated with chemical fungicides and groups treated with POLYVERSUM are calculated separately. The coefficient for POLYVERSUM for 10 terms is 0.7143 and its correlation with the chemical treatment is very tight (Tab value for a 0.025 - 10 terms is 0.6319).

Low values in both groups are caused by events other than differences in the preparations themselves, confirming contradictory phenomena -high efficiency in both assessed files in the same locality. These phenomena - high or low efficiency are identically influenced either by force of infection, climatic conditions in a specific locality or condition of the crop. In cases of occurrence and development of pathogen, both groups show high efficiency.

From the above results, the efficiency of the preparation POLYVERSUM is comparable with chemical standards - as documented by statistical cogency - and is influenced by the instantaneous state and condition of the environment to the same extent as artificial fungicides

The best method of application appears to be two or three sprays:

First treatment in stages (BBCH) 24 - 30

Second treatment in stages (BBCH) 35 -45

Third treatment in stages (BBCH) 45 - 55

Application with liquid fertilizer DAM 390 is acceptable.

For practical application, the application window may be modified as shown:

Treatment	Growth stage of canola
1	BBCH 15 - 30
2	BBCH 15 - 30
3	BBCH 15 - 30

## Statistical comparison efficiency of Polyversum and standards.

Calculation of correlation between medians of Polyversum treatments and chemical standards

Sclerotinia sclerotiorum			
Year	Locality	Efficiency %	
		Median Polyversum	Chemical Treatment
2001 winter can.	Domanínek	53,14	38,55
2001 winter can.	Kujavy	13,18	10,63
2001 winter can.	Krásné Údolí	53,08	55,09
2002 winter can.	Nechranice	47,85	16,41
2002 winter can.	Opava	37,97	5,56
2002 winter can.	Krásné Údolí	43,45	28,45
2002 winter can.	Domanínek	47,21	39,59
2004 winter can.	Krásné Údolí	35,87	36,37
2001 winter can.	Nechranice	33,10	10,27
2002 summer can	Domanínek	23,00	18,35
2001 summer can	Krásné Údolí	45,69	55,87
	Sclerotinia	r = 0,7143	tab 0,025/10 = 0,6319 0,05/10 = 0,5493 0,05/10 = 0,7155

Leptosphaeria maculans (Phoma)			
Year	Locality	Efficiency %	
		Median Polyversum	Chemical Treatment
2001 winter c.	Domanínek	25,29	19,53
2001 winter c.	Kujavy	16,87	10,00
2001 winter c.	Krásné Údolí	48,48	38,01
	Strong infestation	60,29	62,15
	Medium infestation	62,11	70,50
2002 winter c.	Nechranice	60,73	56,12
2002 winter c.	Opava root collar	10,79	14,20
	Whole plant	8,20	3,23
2002 winter c.	Krásné Údolí 1st	20,01	10,02
	2nd	54,42	71,77
2002 winter c.	Domanínek	13,23	19,13
2004 winter c.	Krásné Údolí	15,72	14,45
		19,78	19,13
		4,36	3,74
2004 summer c.	Nechranice	58,24	68,87
2001 summer c.	Domanínek	30,00	20,00
2001 summer c.	Kujavy	17,13	20,90
2001 summer c.	Krásné Údolí	59,88	61,79
	2nd	51,95	48,33
	sum	55,35	53,93
	Phoma	r = 0,8975	tab 0,005/16 = 0,8622 0,01/13 = 0,59

0,01/16 = 0,59

Treatments:

Seed Treatment:

Seed can be dressed in dressing machines. The dose is; 2 g. per kg. of seed

**Treatments:**

Three sprays are recommended for winter canola : the first treatment is recommended in autumn, 14 days after plant emergence ; the second treatment is recommended in the spring, when the temperature is over 10 C° ; the third treatment should follow 2 - 3 weeks later. Two sprays are recommended for summer canola.

The first spray is recommended in the month following plant emergence; the second treatment should follow 2-3 weeks later.

The spray volume is 100g. of Polyversum per hectare (10,000 m<sup>2</sup>) in minimum amount of 400L water.

Mix Tank Recommendations: Mix dose for sprayer tank with water in small vessel (15 L bucket); stir well.

Then fill mixing tank one-half full of water, pass content of mixing vessel through fine sieve into tank and add remaining water to sprayer. The preparation can be mixed, then sprayed together with liquid fertilizers, herbicides and insecticides.

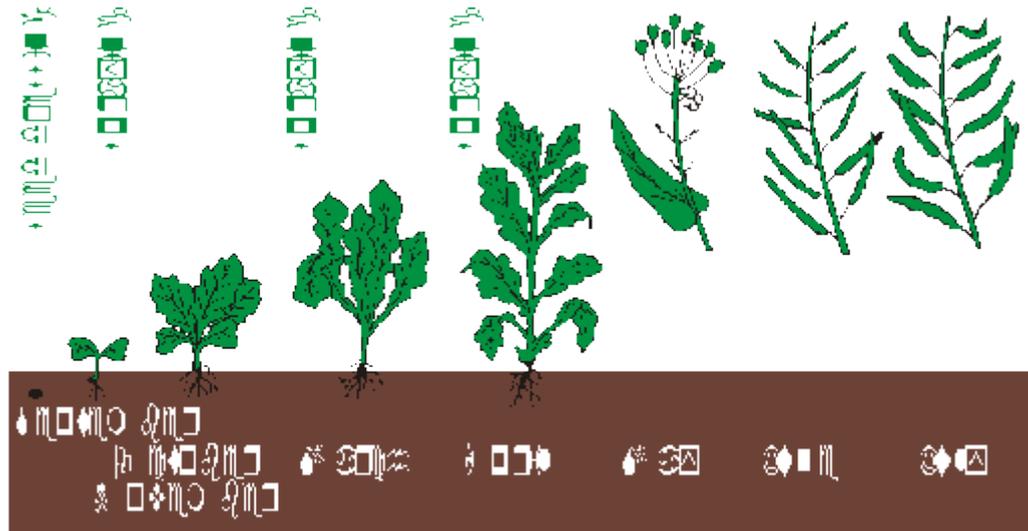
Because in both cases (*Leptosphaeria maculans*, *Sclerotinia sclerotiorum*) the efficiency of Polyversum exceeded on average the efficiency of chemical standards, we can discuss Polyversum as comparable to the referential preparations.

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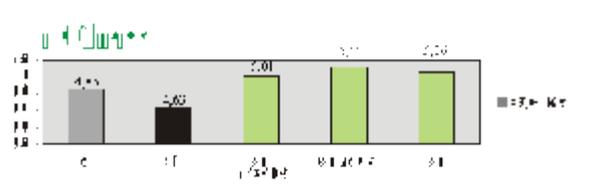
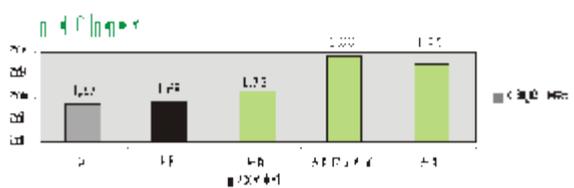
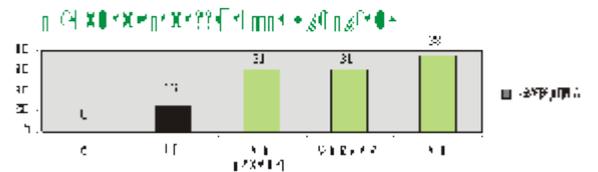
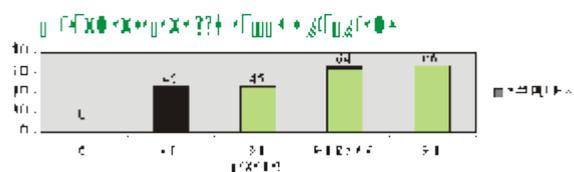
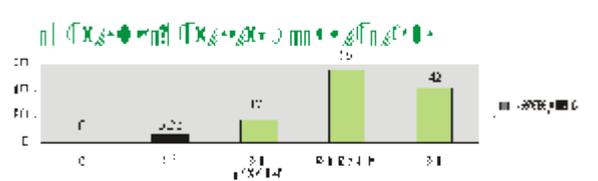
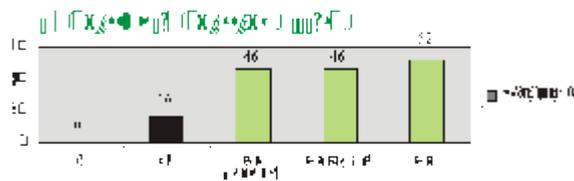
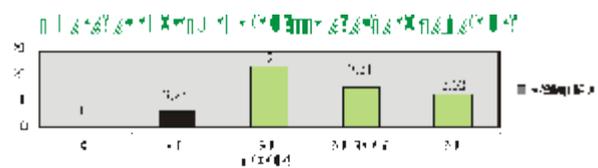
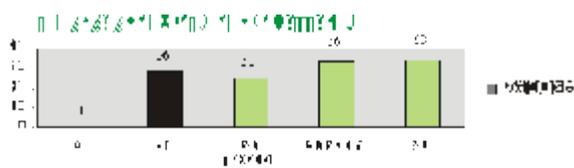
Variants	Type	Used preparations
K	Non-treated control	
CH	Referential preparations	9.4.2002 - 2-methoxy-5-nitrofenol 0,6 l/ha + metconazole 1,2 l/ha + water 400 l/ha
		23.4.2002 - 2-methoxy-5-nitrofenol 0,6 l/ha + water 400 l/ha
P 2	testing	9.4.2002 - Polyversum 100 g/ha + water 400 l/ha 6.4.2002 - Polyversum 100 g/ha + water 400 l/ha
P 2 + DAM	testing	9.4.2002 - Polyversum 100 g/ha + water 400 l/ha
		16.4.2002 - Polyversum 100 g/ha + 20 l of liquid fertilizer DAM/ha
		9.4.2002 - Polyversum 100 g/ha + water 400 l/ha
P 3	testing	16.4.2002 - Polyversum 100 g/ha + water 400 l/ha
		23.4.2002 - Polyversum 100 g/ha + water 400 l/ha

Winter canola variety Zorro  
 Trial station Nechanice, district Hradec Králové

Variants	Type	Used preparations
K	Non-treated control	
CH	Referential preparations	17.4.2002 - 2-methoxy- 5-nitrofenol Na 0,6 l/ha - metconazole 1,5 l/ha + water 400 l/ha
P 2	testing	17.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha
		30.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha
P 2 + DAM	testing	17.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha
		30.4.2002 - Polyversum 0,1 kg/ha + 120 l of liquid fertilizer DAM/ha
P 3	testing	17.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha
		24.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha
		30.4.2002 - Polyversum 0,1 kg/ha + water 400 l/ha



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