

## Effectiveness of Olejan 85 EC against chrysanthemum and willow rust

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For the protection of chrysanthemum against *Puccinia horiana*, Olejan 85 EC (85 % rapeseed oil) was used at concentrations of 0.5 and 2 % and sprayed 4 times every 7 days. After four treatments Olejan 85 EC was found to have inhibited the development of *Puccinia horiana* from 1.4 to 3.6 times depending on the concentration and had caused sporadic, up to almost 37 % browning and decomposition of telia.

Protecting willow against *Melampsora epitea*, Olejan 85 EC was used at concentrations of 0.5 and 2 % and sprayed 2 times every 7 days. After two treatments Olejan 85 EC was found to have inhibited the development of *M. epitea* from 2.6 to 13.7 times and had caused from 10 to 62 % browning and decomposition of uredinia. Olejan 85 EC was significantly more effective reducing leaf infection than Sapol 190 EC. Taking into consideration the percentage of dried-up uredinia per leaf, Olejan 85 EC had also shown significantly higher efficacy in comparison with fungicide Sapol 190 EC. At neither of the concentrations used Olejan 85 EC was phytotoxic to the treated plants.

**Key words:** control, *Melampsora epitea*, Olejan 85 EC, *Puccinia horiana*, rust.

**Introduction.** Olejan 85 EC (85 % rapeseed oil) has been recommended as an adjuvant intended for use in combination with working solutions of some plant protection products. Atpolan 80 EC and Olejan 85 EC at a concentration of 0.3 % used as additions to working solutions make it possible to reduce the dose of the emulsion fungicides recommended for controlling powdery mildew and black spot on rose as much as 30–50 % (Orlikowski, Wojdyła, 1995; Wojdyła, 1998; Wojdyła, 1999; Zdonek et al., 1986). Current literature data indicate high efficacy of the oils used to control many foliar pathogens responsible for plant diseases (Dell et al., 1998; Ko et al., 2003; Picton, Humer 2003). The author's own studies carried out during many years have also shown high efficacy of mineral and vegetable oils used at concentrations of 0.25–4 % controlling foliar pathogens. The oils employed in the protection of rose bushes against powdery mildew (*Sphaerotheca pannosa* var. *rosae*) were from 90 to 100 % effective inhibiting the development of disease symptoms (Wojdyła, 2002). In the protection of roses against black spot (*Diplocarpon rosae*) their efficacy ranged from 40 to 60 %. When used to control willow rust (*Melampsora epitea*) (Wojdyła

and Jankiewicz 2004) and *Puccinia pelargonizonalis* on geraniums (Wojdyła, 2005) they significantly hampered the development of these pathogens. In the protection of roses against grey mould (*Botrytis cinerea*) their efficacy limiting the extent of necrosis on rose petals was in the range of 24–78 % depending on the oil used (Wojdyła, 2003).

The aim of the experiments was to evaluate the product Olejan 85 EC in terms of its efficacy controlling chrysanthemum rust (*Puccinia horiana*) and willow rust (*Melampsora epitea*).

**Object, methods and conditions.** Control of *Puccinia horiana*. Seedlings of chrysanthemum cv. 'Fiji Yellow', susceptible to *Puccinia horiana*, were planted in 1 dm<sup>3</sup> pots filled with peat substrate. The plants were placed in a greenhouse on windowsills covered with capillary mats. A chrysanthemum with symptoms of rust sporulation was placed among the healthy, newly planted plants. In order to ensure air humidity above 90 % favourable to that pathogen's development the sills were covered with a thin-foil tunnel. After the first rust spots had been found on the leaves, but before the formation of telia, spraying of the plants began. The chrysanthemum plants were sprayed 4 times at 7-day intervals. Before application of the controlling agents and then after spray treatments, the percentage of infected leaves and the average number and percentage of dried-up telia were determined.

Control of *Melampsora epitea*. Willow tree cv. 'Iwa' growing on a loamy soil in open field, after the first signs of sporulation (clusters of uredinia) of rust (*M. epitea*) had been found on the underside of their leaves, was sprayed twice every 7 days with Olejan 85 EC at a concentration of 1 % solution. Prior to the experiment and after two spray treatments, the average percentage of diseased leaves, average number of uredinia formed per leaf, and the percentage of those uredinia that had turned brown and decomposed were determined.

In all the experiments undertaken, plants were sprayed in the morning using 1 dm<sup>3</sup> of working solution per 10 m<sup>2</sup> of surface area. Both the upper surface and the underside of the leaf blade were thoroughly covered. Saprol 190 EC (190 g · L<sup>-1</sup> triforine) was the standard fungicide used.

The experiments were set up in a random block design in 4 replications, with 5 plants (chrysanthemum) or 25 leaves (willow) per replication.

**Results.** Control of *Puccinia horiana*. In the first experiment, when the protection programme was finished, it was found that the average percentage of infected leaves protected with Olejan 85 EC was similar to that of the control plants (Table 1). However, the number of telia on the leaves sprayed with the product depending on its concentration was found to be from 2 to 3.6 times lower; from 1 to about 45 % of the telia had turned brown and were decomposing.

In the second experiment, when spray treatments were finished, the average percentage of infected leaves of chrysanthemum plants protected with Olejan 85 EC was similar, and in the concentrations of 0.5 % and 25 % even significantly higher compared with the control chrysanthemums (Table 2). On the leaves of the plants sprayed with the product, the number of telia forming per leaf was from 1.4 to 2.1 times lower in comparison with the control plants. In the case of chrysanthemum plants sprayed with

Olejan 85 EC at a concentration of 0.5 %, the number of telia per leaf was similar to that on the control chrysanthemums. On the plants protected with the product, from 19 to almost 37 % of telia were found dried-up.

**Table 1.** Effectiveness of Olejan 85 EC controlling *Puccinia horiana* on chrysanthemum cv. 'Fiji Yellow'. Beginning of experiment – 2003.08.01

**1 lentelė.** Olejan 85 EC efektyvumas kontroliuojant *Puccinia horiana* chrizantemose 'Fiji Yellow'. Bandymo pradžia – 2003.08.01

Treatment Variantas	Concentration Koncentracija (%)	Average percentage of diseased leaves Vidutinis užkrėstų lapų skaičius	Average number of pustules per leaf Vidutinis pustulių ant lapų skaičius	Average percent of dried pustules Vidutinis sudžiūvusių pustulių procentas
Control Kontrolė	-	62.3 b	11.6 c	0.2 a
Saprol 190 EC	0.15	26.5 a	0.7 a	0 a
Olejan 85 EC	0.5	51.1 b	4.2 ab	0.7 a
Olejan 85 EC	0.75	55.8 b	5.9 b	4.3 ab
Olejan 85 EC	1.0	54.0 b	3.4 ab	12.5 b
Olejan 85 EC	1.5	54.2 b	3.2 ab	43.5 c
Olejan 85 EC	2.0	59.1 b	3.3 ab	41.8 c

*Note:* Mean values marked with the same letter do not differ at the significance level  $p = 0.05$  according to the Duncan's test

*Pastaba:* Vidutinės reikšmės, pažymėtos ta pačia raide, pagal Dunkano kriterijų nesiskiria, kai  $p = 0,05$

**Table 2.** Effectiveness of Olejan 85 EC controlling *Puccinia horiana* on chrysanthemum cv. 'Fiji Yellow'. Beginning of experiment – 2003.08.26

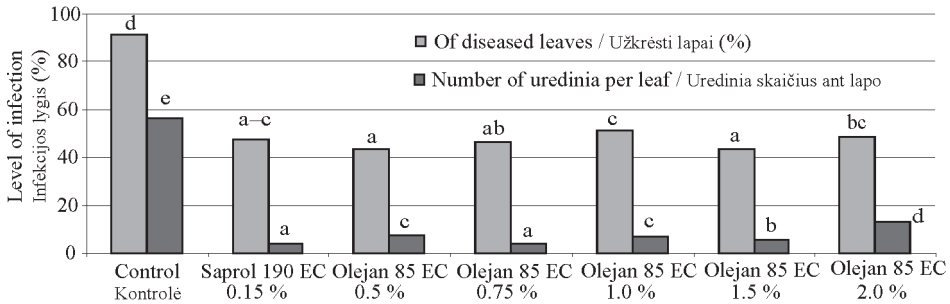
**2 lentelė.** Olejan 85 EC efektyvumas kontroliuojant *Puccinia horiana* chrizantemose 'Fiji Yellow'. Bandymo pradžia – 2003.08.26

Treatment Variantas	Concentration Koncentracija (%)	Average percentage of diseased leaves Vidutinis užkrėstų lapų skaičius	Average number of pustules per leaf Vidutinis pustulių ant lapų skaičius	Average percent of dried pustules Vidutinis sudžiūvusių pustulių procentas
Control Kontrolė	-	65.9 bc	24.2 d	0 a
Saprol 190 EC	0.15	61.7 a	18.3 c	7.3 b
Olejan 85 EC	0.5	72.0 d	24.7 d	25.5 d
Olejan 85 EC	0.75	65.2 b	17.8 c	19.3 c
Olejan 85 EC	1.0	67.4 bc	13.4 b	28.9 e
Olejan 85 EC	1.5	69.0 c	12.3 a	29.1 e
Olejan 85 EC	2.0	77.7 e	11.7 a	36.6 f

*Note:* See Table 1

*Pastaba:* žr. 1 lentelę

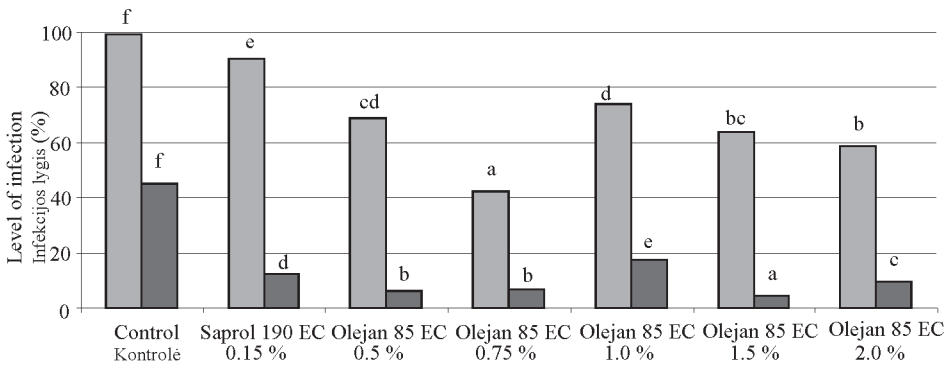
*Control of Melampsora epitea.* In the first experiment, when protection programme was finished almost 92 % of leaves on the control willow were found to be infected (Fig. 1). On the other hand, on the plants protected with the product being evaluated depending on its concentration only about 44–51 % of leaves were found to be diseased. Olejan 85 EC showed similar effectiveness controlling the degree of infection on willow leaves in comparison with the product Saprol 190 EC. After two spray treatments of willow the plants protected with Olejan 85 EC were found to contain from 4.4 to 13.7 times fewer uredinia forming per leaf, almost 10–26 % of which were dried-up and decomposing.



**Fig. 1.** Effectiveness of Olejan 85 EC controlling *Melampsora epitea* on willow.  
Beginning of experiment – 2003.08.21

**1 pav.** Olejan 85 EC efektyvumas kontroliuojant *Melampsora epitea* gluosniuose.  
Bandymo pradžia – 2003.08.21

In the second experiment, when spray treatments were finished almost 100 % of diseased leaves were found on the control willows (Fig. 2).



**Fig. 2.** Effectiveness of Olejan 85 EC controlling *Melampsora epitea* on willow.  
Beginning of experiment – 2003.09.07

**2 pav.** Olejan 85 EC veiksmingumas kontroliuojant *Melampsora epitea* ant gluosnių.  
Bandymo pradžia – 2003.09.07

By contrast, on the plants protected with the evaluated product depending on its concentration there were about 42–74 % of infected leaves. Olejan 85 EC showed significantly higher efficacy controlling the extent of leaf infection than Sapro 190 EC. After two spray treatments of willow, on the plants protected with Olejan 85 EC there were from 2.6 to 10 times fewer uredinia forming per leaf, 17–62 % of which had dried up and were decomposing. Also, considering the percentage of dried-up uredinia per leaf, Olejan 85 EC was significantly more effective in comparison with the fungicide Sapro 190 EC.

**Discussion.** Earlier studies had also shown high efficacy of Olejan 85 EC controlling willow rust (Wojdyła, Jankiewicz, 2004). The evaluated compound depending on its concentration caused 2 to 14-fold reduction in the formation of uredinia clusters, about 10–16 % of which were brown and decomposing. Similar experiments on geranium confirmed high effectiveness of Olejan 85 EC controlling *Puccinia pelargonii-zonalis* (Wojdyła, 2005). The author showed that the product at a concentration of 1 % after spraying geranium plants 4 times every 7 days caused an almost twofold reduction in the number of uredinia compared with control plants and 23 % of uredinia were dried-up.

**Conclusions.** 1. Olejan 85 EC used for curative spray treatments of chrysanthemum was found to significantly inhibit the development of rust. After 4 treatments depending on the concentration Olejan 85 EC caused from 1.4 to 3.6-fold reduction in the formation of telia of *Puccinia horiana* and sporadically caused almost 37 % of them to turn brown and decompose.

2. In the protection of willow, after 2 spray treatments Olejan 85 EC caused from 2.6 to 13.7-fold reduction in the formation of uredinia of *Melampsora epitea* and caused from 10 to 62 % of them to turn brown and decompose.

3. No evidence of phytotoxicity of Olejan 85 EC towards chrysanthemum and willow cultivars in the experiment was found.

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## **Olejan 85 EC veiksmingumas kontroliuojant chrizantemų ir gluosnių rūdis**

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### *Santrauka*

Saugant chrizantemas nuo *Puccinia horiana*, 4 kartus kas 7 dienas buvo purkšta 0,5 ir 2 % koncentracijos Olejan 85 EC (85 % rapsų aliejaus). Po keturių purškimų Olejan 85 EC sustabdė *Puccinia horiana* vystymąsi nuo 1,4 iki 3,6 karto priklausomai nuo koncentracijos ir sukėlė sporadišką beveik 37 % telia parudavimą ir suirimą.

Saugant gluosnius nuo *Melampsora epitea*, 0,5 ir 2 % koncentracijos Olejan 85 EC buvo purkšta 2 kartus kas 7 dienas. Po dviejų purškimų Olejan 85 EC sustabdė *M. epitea* vystymąsi nuo 2,6 iki 13,7 karto ir sukėlė 10–62 % uredinia parudavimą ir suirimą.

Olejan 85 EC buvo daug veiksmingesnis kovojant su lapų infekcija negu Sapro 190 EC. Atsižvelgiant į sudžiūvusius uredinia procentą, tenkantį vienam lapui, Olejan 85 EC taip pat buvo daug veiksmingesnis palyginus su fungicidu Sapro 190 EC. Jokia Olejan 85 EC koncentracija nebuvo fitotoksiška purkštiems augalams.

**Reikšminiai žodžiai:** kontrolė, *Melampsora epitea*, Olejan 85 EC, *Puccinia horiana*, rūdys.