

## Occurrence of *Parthenolecanium corni* (Bouché) on 18 cultivars of hazelnut

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### ABSTRACT

Observations dealing with the occurrence of *Parthenolecanium corni* on 18 cultivars of hazelnut were conducted in southeastern Poland in the years 2000 – 2002. During the leafless period the pest overwintering forms occurring on hazelnut shoots were counted. The results confirmed the differences between the numbers of larvae of *P. corni* on chosen cultivars. Larvae of *P. corni* occurred in the greatest number on the cultivars: ‘Negrett’, ‘Jeeve’s Seedling’, and ‘Wonder from Bollviller’. The cultivars: ‘Nottingham’, ‘Catalonische Zellernuss’ and species: *Corylus americana* were inhabited in the smallest amount. The chemical treatment with Promanal 60 EC used at the beginning of April 2002 reduced the number of *P. corni* larvae on average about 80%.

## INTRODUCTION

*Parthenolecanium corni* (Bouché) belongs to the most important pests of over 350 plant species (Kawecki 1958). It develops one generation per year. The second instars larvae overwinter, usually on the bottom of ligneous plant parts (Kosztarab and Kozár 1988).

Chemical control of *P. corni* and other soft scales is very difficult in practice. Scale insects from this family should be destroyed at two dates: from autumn through winter and early spring in order to destroy the overwintering second instars larvae, as well as in the period of the massive hatch of crawlers when they spread over the plant. The treatments carried out later are less effective, because the dorsal cuticle becomes thicker and harder with time, protecting the insect's body from unfavourable conditions of the environment, including insecticides.

Until the 1980's the chemical measures against larvae of *P. corni* were Karbolina DNK and Krezotol, used during the winter time. When the concept of integrated pest management programmes (IPM) was introduced they were withdrawn because of their high toxicity (Borecki et al. 1975).

Data relating to the susceptibility of different cultivars of hazelnut to the occurrence of *P. corni* were not found in the accessible literature. The present studies were conducted in order to determine the sensibility of 18 hazelnut cultivars to the *P. corni* as well as the effectiveness of Promanal 60 EC applied against overwintering second stage larvae.

## MATERIAL AND METHODS

The investigations were conducted on 18 hazelnut cultivars growing on a commercial plantation in the Provincial Centre of Agricultural Extension Service in Końskowola (southeastern Poland) in the years 2000 – 2002. During the course of the first two years of observations, no chemical treatments of *P. corni* were executed, but at the beginning of April in 2002 a chemical treatment with Promanal 60 EC in the dose 2 l per 100 l of water was carried out. In the leafless period, five parts of shoots about 20 cm long were taken from three randomly chosen shrubs of each cultivar. The number of overwintering larvae of *P. corni* was then calculated in the laboratory conditions under binoculars. Because of a lack of a control test, the average number of larvae of *P. corni* in the third year of the investigations was related to the average number of larvae in the course of the first two years of observations. In order to determine the species, the samples from plants attacked by soft scales were taken at the date of the occurrence of young females (the end of April until the middle of May). Identification was conducted on the basis of permanent microscopic slides, according to the method of Williams and Kosztarab (1972) modified by Łagowska (1996). In total, over 100 permanent microscopic slides were prepared. The results were worked out statistically and differences were determined at  $p = 0.05$  using one-way analysis of variance method.

## RESULTS AND DISCUSSION

The results of winter analyses concerning the occurrence of larvae stages of *P. corni* affirmed the differences between hazelnut cultivars. In the course of two years, this pest occurred in the greatest number on the following cultivars: 'Negrett', 'Jeeve's Seedling', and 'Wonder from Bollwiller', on which the number of larvae markedly exceeded 100 specimens per metre of shoots. The cultivars 'Nottingham' and 'Catalonische Zellernuss' and species *C. americana* were inhabited in the smallest degree. There, the average number of *P. corni* larvae ranged from 20 to 60 specimens per metre. The chemical treatment with Promanal 60 EC carried out at the beginning of April 2002, reduced the number of overwintering larvae on average about 80%, in comparison with the first two years of observations. On some cultivars, such as 'White Filbert' and 'Frayedleaved Filbert' and on species *C. americana*, the number of overwintering larvae of *P. corni* fell to almost zero, and the mean number on 18 cultivars was 25 specimens per metre. In the course of all three years of the research statistical differences between hazelnut cultivars in *P. corni* larvae occurrence were confirmed (Table 1).

Table 1. Number of *P. corni* larvae on hazelnut shrubs (per metre of shoots) depending on cultivar and observation year

Cultivar	Date of observation			Average
	12.12.2000	4.12.2001	22.11.2002	
'Wonder from Bollwiller'	165.7 bcd*	186.3 bcd	31.0 ac	129.2
'Webb's Garibaldi'	110.0 acd	117.3 acd	31.7 bc	86.3
'Redleaved Filbert'	120.3 acd	151.7 acd	61.3 b	111.1
'Krótkookrywowy'	90.7 acd	95.3 acd	37.0 bc	74.3
'White Filbert'	50.0 ad	70.0 ac	3.3 a	41.1
'Nottingham'	23.0 a	33.0 a	10.7 a	22.2
'Hall's Giant'	142.0 acd	148.0 acd	23.3 ac	104.4
'Webb's Prize Filbert'	148.0 acd	157.0 acd	34.0 bc	113.0
'Catalonische Zellernuss'	40.3 a	55.3 ac	15.0 ac	36.9
'Mogul-Nuss'	132.3 acd	192.3 bcd	18.7 ac	114.2
'Kulisty Pełny'	93.7 acd	105.7 acd	21.3 ac	73.6
'Jeeve's Seedling'	181.3 bcd	221.3 bd	14.3 ac	132.3
'Redfruited Filbert'	110.3 acd	114.3 acd	36.0 bc	86.9
'Negrett'	221.3 c	218.3 bd	22.3 ac	153.9
<i>Corylus americana</i>	33.3 a	40.7 a	2.0 a	25.3
'Truchsess'	123.3 acd	145.0 acd	41.0 bc	103.1
'Frayedleaved Filbert'	51.0 ad	61.7 ac	3.7 a	38.7
'Syrena'	102.0 acd	144.7 acd	40.7 bc	95.7
Average	107.6	124.3	25.1	-
LSD <sub>0.05</sub>	134.0	142.6	29.6	-

\* Values marked with the same letters do not differ statistically at  $p = 0.05$

The cultivation of resistant or tolerant cultivars is one of more modern methods of pest control. Because of their qualities, resistant cultivars are advisable in every system of production and their cultivation is considered as perfect (Arseniuk 1995). The research showed great variability in the occurrence of *P. corni* among hazelnut cultivars. 'Catalonische Zellernuss' is the most suitable hazelnut cultivar to recommend. It is characterized not only by the lowest susceptibility to the occurrence of overwintering stages of *P. corni*, but also by its fair resistance to the hazelnut weevil (*Curculio nucum* L.) (Piskornik 1994, Gantner 2003).

In Poland, *P. corni* is the most dangerous pest of all the recorded species of soft scales in orchards. Their polyphagous character and high fecundity of females together with abandoning winter chemical treatments, caused mass occurrence of this species. According to the recommendations of the Institute of Pomology and Floriculture in Skierniewice, *P. corni* should be destroyed at the time of white buds of plum-trees, applying Owadofos 540 EC (2.25 l per ha), Sumithion Super 1000 EC (1.125 l per ha), and Zolone 350 EC (1.8-2.6 l per ha), preferably in a temperature above 15°C, but the efficiency of these treatments is closely related to the term of their performance. At present, the preparations based on paraffin oil, e.g. Para Sommer 75EC (3 l per ha), Promanal 60EC (2%), and Paroil (2%), have appeared on the market. These are IV class toxic preparations with contact effect, practically harmless to bees. They work on the surface, blocking the pest's breathing system. The important information is that they can be used from autumn to spring at a temperature of above 0°C, which allows avoid ance of a common mistake of too late spring treatment with other recommended preparations.

## CONCLUSIONS

1. The differences between hazelnut cultivars in *P. corni* larvae occurrence were confirmed.
2. Larvae of *P. corni* occurred in the greatest number on: 'Negrett', 'Jeeve's Seedling', and 'Wonder from Bollwiller'. 'Nottingham', 'Catalonische Zellernuss', and species *Corylus americana* were inhabited in a significantly smaller number.
3. Early-spring chemical treatment with Promanal 60 EC reduced the number of *P. corni* larvae on average about 80%.

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WYSTĘPOWANIE MISECZNIKA ŚLIWOWEGO *PARTHENOLECANIUM CORNI* (BOUCHÉ) NA 18 ODMIANACH LESZCZYNY UPRAWNEJ

**Streszczenie:** Obserwacje nad nasileniem występowania misecznika śliwowego *Parthenolecanium corni* Bouché na 18 odmianach leszczyny uprawnej przeprowadzono na plantacji zlokalizowanej w pd.-wsch. Polsce, w ODR Końskowola, w latach 2000 – 2002. W ciągu dwóch pierwszych lat badań na plantacji nie były wykonywane żadne zabiegi zwalczające misecznika śliwowego, natomiast na początku kwietnia 2002 roku zastosowano Promanal 60 EC w dawce 2 l na 100 l wody. W wyniku przeprowadzonych zimowych obserwacji dotyczących występowania stadiów larwalnych misecznika śliwowego stwierdzono różnice pomiędzy odmianami leszczyny. Średnio w ciągu dwóch lat badań

najliczniej szkodnik ten wystąpił na odmianach: 'Negrett', 'Jeeve's Seedling' i 'Wonder from Bollwiller', na których liczba larw znacznie przekraczała 100 szt. na 1 mb pędów. Najmniej zasiedlone okazały się odmiany: 'Nottingham', 'Catalonische Zellernuss' oraz gatunek *Corylus americana*, na których średnia liczba larw na 1 mb wahała się w granicach od 20 do 60 sztuk. Wykonany na początku kwietnia 2002 roku zabieg chemiczny przy użyciu Promanal 60 EC zmniejszył liczbę larw misecznika śliwowego średnio o 80% w porównaniu z dwoma pierwszymi latami obserwacji.

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