

# THE MODERN INSECTICIDE (chlorantraniliprole) USED TO CONTROL CODLING MOTH (*Cydia pomonella* L.)

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## A B S T R A C T

A series of experiments aimed at testing the usefulness of the new chemical chlorantraniliprole (rynaxypyr) in the control of codling moth (*Cydia pomonella* L.) were conducted in the 2006-2007 time period. The product was applied in various doses: 0.075, 0.125, 0.175, and 0.2 l/ha. The control treatments were applied 2 or 3 times, depending on pest threat. The insecticide was applied in the period of codling moth mass flight. It was noted, that there was a significant reduction in the amount of fruit the codling moth larvae were able to damage in all the conducted experiments. Very good results in codling moth control were obtained after application of the tested product at a dose of 0.125 l/ha and higher.

**Key words:** codling moth, chlorantraniliprole (rynaxypyr), control

## INTRODUCTION

Codling moth is one of the most dangerous pests in apple and pear orchards. In Polish climatic conditions this pest usually develops two generations during the growing season. The summer generation is often less numerous than the one which overwinters (Pluciennik and Olszak, 2006). In recent years, we have seen the rise in the significance of the

second generation as well as an extension of the flight period length. In production orchards, the codling moth is controlled with 2 or 3 treatments, part of the population is destroyed by insecticides used against leaf rollers. Reasonable and efficient control of the codling moth should be based on monitoring and reacting with appropriate treatment during the optimal term of pest development in the particular orchard.

Appropriate treatment should involve highly effective insecticides that are safe for the environment. Appropriate rotation of insecticides with different types of influence on the pests, is critical to avoid selection of resistant forms of the pests. Researchers from different countries reported increased resistance of codling moth to insecticides belonging to different chemical groups (Charmillot et al., 2005; Reyes et al., 2007; Stara and Kocourek, 2007). According to Gorzka and Olszak (2011), it was observed that codling moth in Poland, only became more resistant to insecticides from the pyrethroid group.

The aim of this work was to estimate the efficacy of Coragen 200 SC, chlorantraniliprole (rynaxypyr) in the control of codling moth on apple trees. This product represents a modern chemical group that is different from the currently used insecticides in its mode of action against caterpillars (Bassi et al., 2008). Rynaxypyr has no short or long term negative impact on beneficial organisms (Marchesini et al., 2008).

## MATERIAL AND METHODS

The study was conducted in the 2006-2007 time period. The usefulness of a new chemical – Coragen 200 SC (rynaxypyr-DPX E2Y45 20 SC) at the rates of 0.075, 0.125, 0.175, and 0.2 l/ha, in the control of codling moth, was estimated in eight experiments. The treatments were applied 2 or 3 times, depending on pest threat. Codling moth pheromone traps were used for the monitoring of flight dynamics. The insecticide was ap-

plied in the period of codling moth mass flight. The efficacy of the treatments was assessed during harvest based on the number of fruit damaged by the larvae of the codling moth. From each treatment (4 replicates x 4 trees x 300 fruits), 1200 fruits were counted and the percentage of damage on trees sprayed with Coragen 100 SC were compared with the standard product acetamiprid as Mospilan 20 SP (0.2 kg/ha). The results were elaborated statistically using analysis of variance, which was carried out on data transformed according to Bliss. The significance of differences between means of particular experimental treatments was estimated using Newman-Keuls test at a 5% significance level. Effectiveness of the products was calculated according to Abbot's formula.

## RESULTS AND DISCUSSION

Coragen 200 SC at the following rates: 0.075; 0.125; 0.175 and 0.2 l/ha gave significantly reduced damaged fruits compared to untreated trees (Tab. 1,2). The lowest effectiveness (58%) was obtained in 2006 with the lowest rate – 0.075 l/ha, and in next year the higher rates were used. Coragen 200 SC at a dose of 0.125, 0.175, and 0.2 l/ha strongly reduced (83-100%) the number of wormy fruits during harvest (except one experiment in 2006, efficacy 76%). The effectiveness of the tested product depended on the pest population level. In the orchard with a high codling moth population (number of moths in the trap – above 200 male/trap), the best effect was

Table 1. Efficacy of codling moth (*Cydia pomonella*) control on apple trees (Coragen 200 SC) – 2006

Treatment	Rate kg/l per ha	Picked fruit damage [%] in three experiments			Average effective- tiveness [%] for three experiments
		I	II	III	
The check (untreated)	-	11.2 d*	3.9 b	4.8 c	-
Coragen 200 SC	0.075	4.7 c	0.7 a	0.8 b	69.5
Coragen 200 SC	0.125	2.7 b	0.4 a	0.4 ab	82.4
Coragen 200 SC	0.175	1.3 a	0.3 a	0.3 a	91.2
Mospilan 20 SP	0.2	4.2 c	0.8 a	0.5 ab	72.8
Number of treatments in a season		2	2	2	
Number of males/trap/season		299	100	219	

\*Means marked by the same letter are not statistically different according to Newman-Keuls test (p = 0.05)

Table 2. Efficacy of codling moth (*Cydia pomonella*) control on apple trees (Coragen 200 SC) – 2007

Treatment	Rate kg/l per ha	Picked fruit damage [%] in five experiments					Average effectiveness [%] for five experiments
		I	II	III	IV	V	
The check (untreated)	-	13.1 c*	5.4 d	12.9 e	4.0 c	3.1 c	-
Coragen 200 SC	0.125	0.7 b	0.9 c	1.8 c	0.5 ab	0.4 b	88.7
Coragen 200 SC	0.175	0.4 ab	0.4 b	0.8 b	0.3 ab	0.2 a	94.6
Coragen 200 SC	0.2	0.3 a	0.0 a	0.2 a	0.2 a	0.0 a	98.9
Mospilan 20 SP	0.2	1.0 b	1.0 c	3.8 d	0.8 b	0.7 b	81.2
Number of treatments in a season		3	3	3	3	3	
Number of males/trap/season		430	325	420	201	154	

\*Explanation; see Table 1

seen when Coragen 200 SC was applied at the highest doses – 0.175 or 0.2 l/ha (Tab. 1,2). Coragen 200 SC, especially at higher rates – 0.175 and 0.2 l/ha, and in some experiments with a rate of 0.125 l/ha, showed a significantly higher efficacy than with standard – Mospilan 20 SP. High effectiveness of rynaxypyr in control of the codling moth was also confirmed by other researchers (Milanesi et al., 2008; Sumedrea et al., 2009; Miletic et al., 2011). According to Pluciennik and Olszak (2009), Coragen 200 SC is also effective against leaf rollers. Application of Coragen 200 SC against codling moths will also reduce leaf rollers.

The obtained results were the basis for the registration of rynaxypyr as Coragen 200 SC at a dose of 0.125-0.175 l/ha to control the codling moth in Poland. Coragen 200 SC has no negative impact on beneficial organisms and is also recommended to protect orchards where fruit are produced according to Integrated Fruit Production (IPM) rules. Coragen 200 SC belongs to the completely new group of insecticides used in the protection of orchards against codling moth and leaf rollers. These new insecticides are considered extremely valuable for the growers. The use of such new insecticides will enable the correct rotation, so as to avoid selection of resistant forms of the pest.

## CONCLUSIONS

1. Coragen 200 SC (rynaxypyr) applied at a rate of 0.125 l/ha and higher (0.175 and 0.2 l/ha), was

highly effective in the control of codling moth (*Cydia pomonella*) on apple trees.

2. Efficacy of Coragen 200 SC was similar or higher when compared with the reference product acetamiprid as Mospilan 20 SP.

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## ZWALCZANIE OWOCÓWKI JABŁKÓWECZKI (*Cydia pomonella* L.) Z UŻYCIEM NOWEJ SUBSTANCJI CHEMICZNEJ (chlorantraniliprole)

Zofia Płuciennik

### S T R E S Z C Z E N I E

W latach 2006-2007 wykonano serię badań nad przydatnością nowej substancji chemicznej – chlorantraniliprole (rynaxypyr) – w zwalczaniu owocówki jabłkóweczki. Badany produkt stosowano w zróżnicowanych dawkach: 0,075; 0,125; 0,175 i 0,21/ha. W zależności od liczebności szkodnika wykonywano 2 lub 3 zabiegi zwalczające w okresie masowego składania jaj przez motyle owocówki jabłkóweczki. We wszystkich doświadczeniach stwierdzono istotną redukcję uszkodzeń owoców przez owocówkę. Najmniej efektywna była dawka najniższa (0,075 l/ha), szczególnie w sadzie, w którym populacja owocówki była bardzo wysoka. Bardzo dobre efekty zwalczania uzyskano po zastosowaniu badanego produktu w dawce 0,125 l/ha i dawkach wyższych. Uzyskane wyniki były podstawą do zarejestrowania badanego produktu w Polsce pod nazwą Coragen 200 SC do ochrony sadów przed owocówką jabłkóweczką. Preparat ten może być również stosowany w sadach prowadzonych w systemie Integrowanej Produkcji (IP), gdyż nie ma negatywnego wpływu na organizmy pożyteczne.

**Słowa kluczowe:** owocówka jabłkóweczka, zwalczanie, rynaxypyr, chlorantraniliprole