

SOME TYPICAL SYMPTOMS OF MULBERRY SILK WORM POISONING WITH THE NEONICOTINOID INSECTICIDES *CONFIDOR* AND *ACTARA*

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Abstract

An incidence of mulberry silkworm poisoning with residual amounts of the neonicotinoid chemicals Actara and Confidor is presented in the paper. The development and final outcome of toxic poisoning is described in detail. Poisoning with Actara and Confidor occurs very quickly (within 30 min for Confidor and within 1-2 h for Actara, contrary to poisoning with nicotine (within about 2-3 days). The nervous system is affected and the mulberry silkworm body changes in size, shape and structure.

Key words: silkworm, actara, konfidor, toxic

INTRODUCTION

In the last years the mulberry silk cocoon production in our country has been quite inconsistent. The reasons for that are the restructuring of agriculture, on the one hand, and, the competition of artificial fibers, on the other.

Quite often mass mortality of the silkworms is reported, which is accompanied by an abrupt yield decrease, worsened quality of the cocoons and the silk filament. The reasons are various, however the major one is the loss caused by silkworm poisoning with agricultural chemicals.

Mulberry silkworms, in contrast to warm-blooded animals, are highly susceptible to the effect of different chemicals such as fluorine, cadmium, zinc, lead, sulfur chemicals, carbamate and organophosphorus pesticides, insecticides, waste gases from enterprises, antibiotics, etc., even when applied at minimal rates (1, 3). The first instars are more vulnerable to the effect of the chemical substances compared to the last instars.

There are also cases of poisoning with nicotine, met in practice, although rarely. When feeding the silkworms with mulberry leaves from a plantation established near tobacco fields, the poisoning symptoms appear within 1-2 days.

The mass application of neonicotinoid chemicals coincides with the feeding stage of the larvae. The slightest negligence of the agricultural producer and not abiding by the restrictions, may lead to mass mortality of the silkworms in the region. In our daily activities in 2011 we registered such a case. That fact and the lack of data about silkworm poisoning with such chemicals motivated us to carry out a study on the effect of the chemicals Actara and Confidor on the habits, development and health status of silkworm larvae.

MATERIAL AND METHODS

Water solutions of the two chemicals were used at concentrations of the active substance 50 mg/ml for Actara and 4,6 mg/ml for Cofidor, respectively, to induce poisoning. The solutions were sprayed in the inter-row space between the mulberry trees. When the solution dried out, we collected the leaves at the periphery and the low part of the tree canopy and used them for feeding the fourth and the fifth instar larvae, which were distributed into two groups of 100 individuals for Actara and Confidor, respectively. The rest of the larvae were used as control. The studied silk worms were of the hybrid 'Super 1' x 'Hesa 2', at 4th-5th day of development for the respective age. In order to isolate and

prove the existence of the chemicals, we applied the thin-layer chromatography method suggested by Hristev and Ivanova (2).

Development of toxicosis

The leaves with visual traces of the chemicals, after drying out of the solution, were given to the silkworms. The first symptoms of food refusal and vomiting were observed within 15-20 min when the leaves treated with Confidor were offered and within 60-100 min after treatment of the leaves with Actara. 20-30 min later an obvious shortening of the body and swelling was established, as well as 'C' or 'S'-curving spasms of some silkworms.



Fig. 1. Normally developing silkworms



Fig. 2. A leaf with traces of the chemical



Fig. 3. Silkworms with shortened body

During feeding the silkworms got restless, uncoordinated body movements were observed, accompanied by frequent up and down shaking of the head (tics) and excretion of dark brown liquid from the mouth. The body felt softer to touch and the autopsy showed disintegration of the structure of some organs and their turning into homogeneous dark-brown mass. Within 2-3 hours all the

larvae, which had consumed mulberry leaves treated with Actara and Confidor, died.



Fig. 4. Silkworms with loss of appetite and vomiting



Fig. 5. A moment of vomiting

CONCLUSIONS

The results of the investigation showed that mulberry silkworms are highly susceptible to the effect of small amounts of the neonicotinoid chemicals Actara and Confidor. The conclusions of other authors that the younger instars are more susceptible to toxic substances, were confirmed. In contrast to poisoning with nicotine, when toxicosis develops within 2-3 days, poisoning with Actara and Confidor develops very quickly (within 30 min for Confidor and within 1-2 h for Actara), affecting the nervous system and causing changes of the body in size, shape and structure.

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