

Monitoring of the nitrofurans residues in honey bees from Timis County in the period 2007-2009

Gheorghița Simion^{1*}, Lăcrămioara Damiescu¹, Alexandra Trif²

¹Sanitary Veterinary and Food Safety Directorate, Timș, Martir Caceu No. 4, 300585, Timișoara, Romania

²Faculty of Veterinary Medicine Timișoara, Calea Aradului No. 119, 300645, Timișoara, Romania

Received: 31 May 2011; Accepted: 29 December 2011

Abstract

During the period 2007-2009, a total of 55 honey samples of three assortments (polyfloral, acacia, lime) were analyzed for nitrofurans residues by immunoaffinity ELISA methods. Research results have emphasized that residues of nitrofurans (furazolidone metabolite, AOZ 3-amino-2-oxazolidona and furaltadone metabolite, AMOZ 3-amino-5-2-oxazolidona morfolinometyl) were detected in all three kinds of honey and had values ranging from 0.630-0.892 $\mu\text{g} / \text{kg}$ for AOZ and between 0.842-0.894 $\mu\text{g} / \text{kg}$ for AMOZ, both metabolites analyzed having values below the MRPL (minimum required performance limit) of 1 $\mu\text{g} / \text{kg}$.

Keywords: honey, residues, nitofurans

1. Introduction

Nitrofurans are synthetic compounds that have the basic structure of a ring of 5-nitrofuran to which there are linked various groups. Their action spectrum is considered in general as widely bacteriostatic, but in high concentrations may have bactericidal activity. They are part of drugs that can overdose very easily, but which are not of actual toxicological importance, but have rather a health importance, because of the accumulation of residues [1].

The European standards (European Honey Directive of the European Honey Commission) recommended the absence of nitrofurans residues in honey and in accordance with Annex IV of EC Regulation 37/2010 they are prohibited substances [5, 6].

Nitrofurans were frequently used as feed additives for growth promotion and prophylactic and therapeutic treatment of animals and colonies of bees in bacterial infections [3].

The EU has established a minimum required performance limit (MRPL) of 1 $\mu\text{g}/\text{kg}$ for nitrofurans

2. Materials and methods

Between the period 2007-2009 the study was conducted on a total of 55 honey samples of three varieties (polyfloral, acacia, lime), samples that were harvested from apiaries located in the Timis county. Measurements were performed in the Sanitary Veterinary and Food Safety Laboratory from Timisoara, using immunoenzymatic ELISA kits produced by R-Biopharm. Software Ridawin was used to interpret the results and expressions were made in $\mu\text{g} / \text{kg}$.

3. Results and Discussion

Results obtained from tests carried out to identify residues of nitrofurans in the period 2007-2009 emphasized that from 55 honey samples, six (10.90%) were positive for AOZ and five (9.09%) were positive for AMOZ.

* Corresponding author: e-mail: gelisimion@yahoo.com

The distribution of the positive samples in the three types of honey has been for AOZ as follows: three samples (13.63%) of polyfloral honey, one sample (6.25%) of acacia honey, two samples (11.76%) of lime honey.

AMOZ residues were detected in two samples (9.09%) of polyfloral honey, two samples (12.5%) of acacia honey and one sample (5.88%) of lime honey (table 1 and figure 1)

Table 1. Distribution of the positive samples in different assortments of honey analyzed

Types of honey	No. samples analyzed	Positive samples			
		AOZ		AMOZ	
		No.	%	No.	%
Polyfloral	22	3	13.63	2	9.09
Acacia	16	1	6.25	2	12.50
Lime	17	2	11.76	1	5.88
Total samples	55	6	10.90	5	9.09

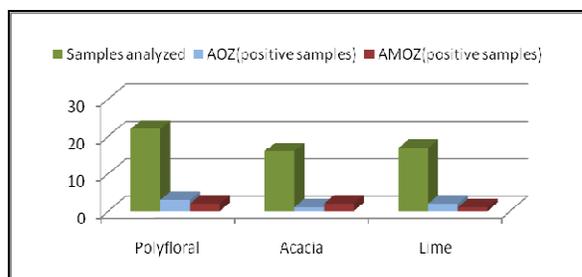


Figure 1. Prevalence of nitrofurans residues (AOZ and AMOZ) in different honey assortments

The concentration of nitrofurans residues in honey samples analyzed ranged between 0.630-0.892 µg / kg for AOZ and between 0.842-0.894 µg / kg for AMOZ (table 2 and figures 2-3). The concentrations of nitrofurans were below the MRPL's for the two metabolites which were analyzed. Researches carried out by Sfetcu [2] showed that nitrofurans residues were detected in lime honey from Timiso county and their concentration (1.2 µg / kg) was higher than that obtained in the present study.

Table 2. The concentration of nitrofurans residues (AOZ and AMOZ) in different honey assortments

Types of honey	AOZ (µg/kg)			AMOZ (µg/kg)	
	0,633	0,892	0,720	0,868	0,894
Polyfloral	0,633	0,892	0,720	0,868	0,894
Acacia	0,641			0,862	0,886
Lime	0,630	0,723		0,842	

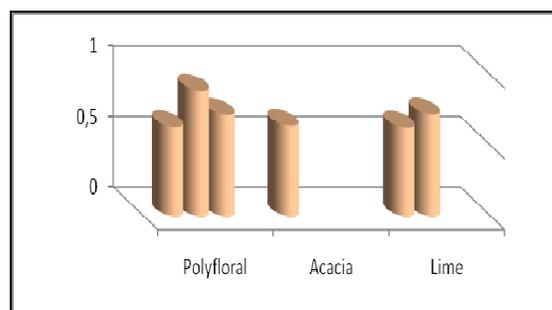


Figure 2. The levels of AOZ residues in different honey assortments

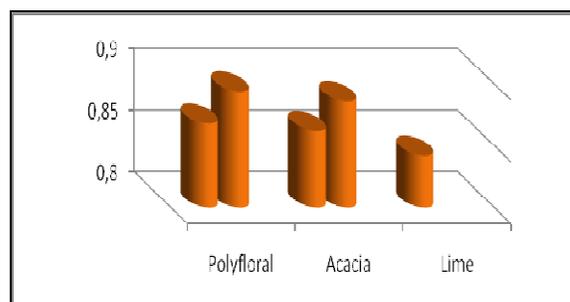


Figure 3. The levels of AMOZ residues in different honey assortments

Even if the use of medicinal substances from nitrofurans group is not allowed, they are still found as residues in honey, fact confirmed by the Rapid Notification Alert System for Food and Feed. It was reported the presence of nitrofurans in honey from Ukraine in 2007 and Hungary in 2008. According to a report by the Nestle Research Center in 2004, in samples of honey which came from several countries, including Romania, nitrofurans residues were detected in concentrations between 0.3 and 24.7 µg / kg [7].

4. Conclusion

Research results have emphasized that nitrofurans residues (AOZ and AMOZ) were detected in all three types of honey (polyfloral, acacia, lime) in the period 2007-2009 and the concentration of both analyzed metabolites were below the limit set by European legislation (EC Regulation 37/2010).

References

1. Cristina, R. C., *Introducere în farmacologia și terapia veterinară*, Editura Solness, Timișoara, 2006, 343.
2. Sfetcu, Ioana, *Salubritatea produselor apicole-un indicator al relației mediu-consumator*, Teză de doctorat, USAMV București, 2007.

3. Vass, M. ;Hruska, K.; Franek, M. , Nitrofurant antibiotics: a review on the application, prohibition and residual analysis, *Veterinarni Medicina*, **2008**, 53(9): 469–500.
4. ***Council Directive 2001/110 relating to honey, Official Journal of the European Communities, 2002.
5. ***COMMISSION REGULATION (EU) No 37/2010 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin.
6. ***Council Directive 2001/110 relating to honey, Official Journal of the European Communities, 2002.
7. ***http://www.http://ec.europa.eu/food/food/rapidalert/archive_en.htm