Evaluation of three methods for monitoring the varroa mite infestation level in colonies

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INTRODUCTION

Methods of estimation the *Varroa destructor* population in bee colonies during the summer is an important diagnostic tool that allows beekeeper a quick decision on the mite control. Preferred methods are: flotation (Rinderer et al., 2004), shaking varroa from bees using powder sugar (Dieteman et al., 2013) and observation of the natural mite fall on hive bottom board (Bieńkowska, 2001; Branco et al., 2006).

The aim of the study was to compare the three above-mentioned methods to assess the level of colonies' infestation with varroa mite and to answer the question whether those methods can be used for proper estimation the colonies' infestation level.

MATERIAL AND METHODS

The study was performed in 2015 in 15 bee colonies. Varroa mite infestation in experimental colonies was evaluated on basis of:

- natural mite fall on hive bottom board, from 12th May to 6th July
- flotation: infestation of samples of 100 ml of bees
 (average 369 individuals) collected separately, from the brood combs and store combs (12th May, 11th June)
- shaking varroa with powder sugar: infestation of samples of 100 ml of bees collected separately, from the brood combs and store combs (12th May, 11th June)

Additional parameters checked in experimental colonies:
- colony strength evaluation with Liebefeld method done 3 times a season (12th May, 11th June, 6th July): number of bees and brood cells in colonies
- bees' hygienic behavior - PIN test
Bee samples that were checked with powder sugar method,
were further taken for flotation in order to determine the accuracy of the previous method applied. In all tested colonies, from 10th July to the end of November, treatments against varroa were applied (oxalic acid, Biowar 500 and Apiwarol AS) in order to determine the total number of mites in experimental colonies.

The interaction between infestation level evaluated with tested methods and the sum of varroa mites identified during summer-autumn treatments, strength of colonies and hygienic behavior of bees, were

RESULTS

A significant correlation was stated between the number of varroa mites in samples of bees, which were checked with powdered sugar, and the total number of mites found in colonies during the experiment (Table 1). It was also observed that bees collected from brood combs better reflected the total level of colony infestation. There was no significant correlation between the number of mites on hive bottom board and number of mites in bees checked using flotation, and general infestation of colonies. This result may have been influenced by the low general infestation of colonies (20 to 534 mites/colony). There was no significant correlation between hygienic behaviour of bees and colonies infestation and natural mite fall. It was found, however, that the number of mites in bee samples collected from brood combs and shaken with powder sugar was significantly higher when brood area in colonies was lower. The accuracy of the method was set at 77%.

Table 1. The relationship between *Varroa destructor* infestation level evaluated with different methods, general colonies' infestation level, and strength of experimental colonies

Checked parameters	Methods of estimation the *Varroa destructor* population in bee colonies				
	Powder sugar method		Flotation method		Natural mite fall
	Bee samples taken from brood combs	Bee samples taken from store combs	Bee samples taken from brood combs	Bee samples taken from store combs	
Sum of mites	0.77*	0.64*	<0.3	<0.3	<0.3
Brood area in colonies (average from 2 measurements)	-0.47*	<0.3	<0.3	<0.3	<0.3
Number of bees in colonies (average from 2 measurements)	0.33	<0.3	<0.3	<0.3	<0.3

*p≤ 0.05

References

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