

Losses of honey bee colonies in Austria and the Czech Republic during the 2015/16 winter

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Introduction:

Winter losses of honey bee colonies make up one of the biggest challenges to sustainable beekeeping. Austria (A) and the Czech Republic (CZ) closely cooperate in colony losses monitoring using the standardized COLOSS questionnaire. Losses annually fluctuate, and treatments against *Varroa* mites are important factors in colony health.

Material and Methods:

The COLOSS questionnaire was distributed and promoted through beekeeping journals, internet and at meetings between February and May. Next to the common analysis of risk factors that the COLOSS questionnaire allows, we present this year two not yet investigated factors: Robbing, which was surveyed in the CZ and sea level derived from GPS coordinates in A.

Results:

The geographic origin of participants of our 2015/16 survey of winter colony losses in A and CZ and loss rates of all investigated years are shown in Fig. 1 and 2. The loss rate in all three years is lower in the Czech Republic compared to Austria. The probability of colony losses decreased when no robbing between colonies was observed (Fig. 3). In Austria, sea levels below 400 m experienced higher loss rates than above 400m (Fig. 4). A comparison of *Varroa destructor* treatments in A and CZ can be found in Table 1.

Discussion:

In both countries the COLOSS survey on winter losses is well established now. In contrast to the preceding winter, both countries experienced low losses of honey bee colonies during winter of 2015/16. A comparison of the last three winters shows similar trends in both countries, suggesting superordinate reasons for extremely high or low losses in central Europe. Lower losses in CZ could be caused by different *Varroa* treatment strategy: whereas A is mainly organic acid treatments are applied, in CZ the synthetic acaricides in Gabon strips are very popular.

In addition to the common factors identified as detrimental for colony mortality, we found that robbing in Czech Republic and sea level in Austria affects winter mortality. These two factors deserve further attention in a comprehensive investigation of colony losses.

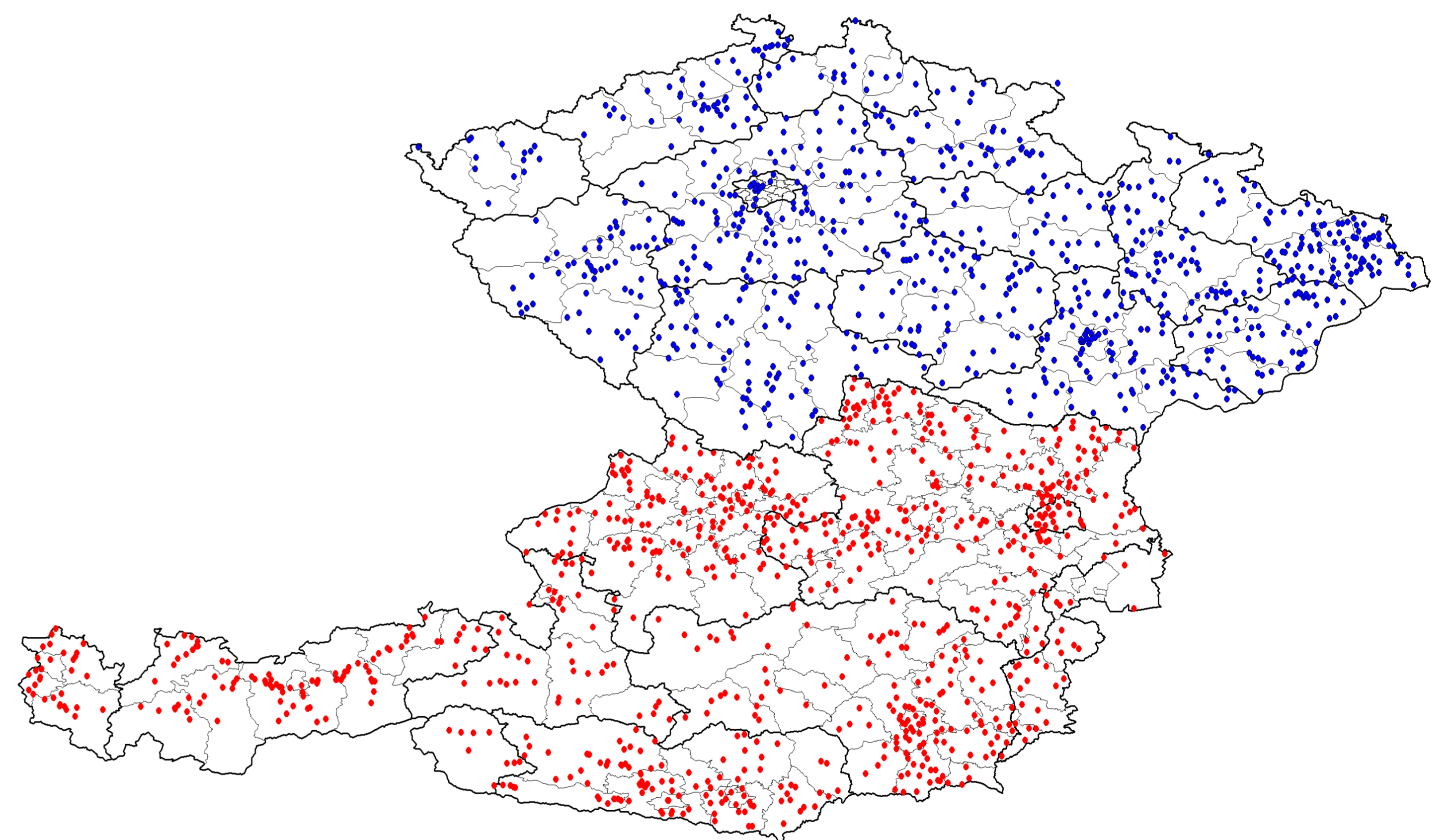


Figure 1: Geographic origin of the 1289 responders in Austria and the 968 responders in Czech Republic, respectively.

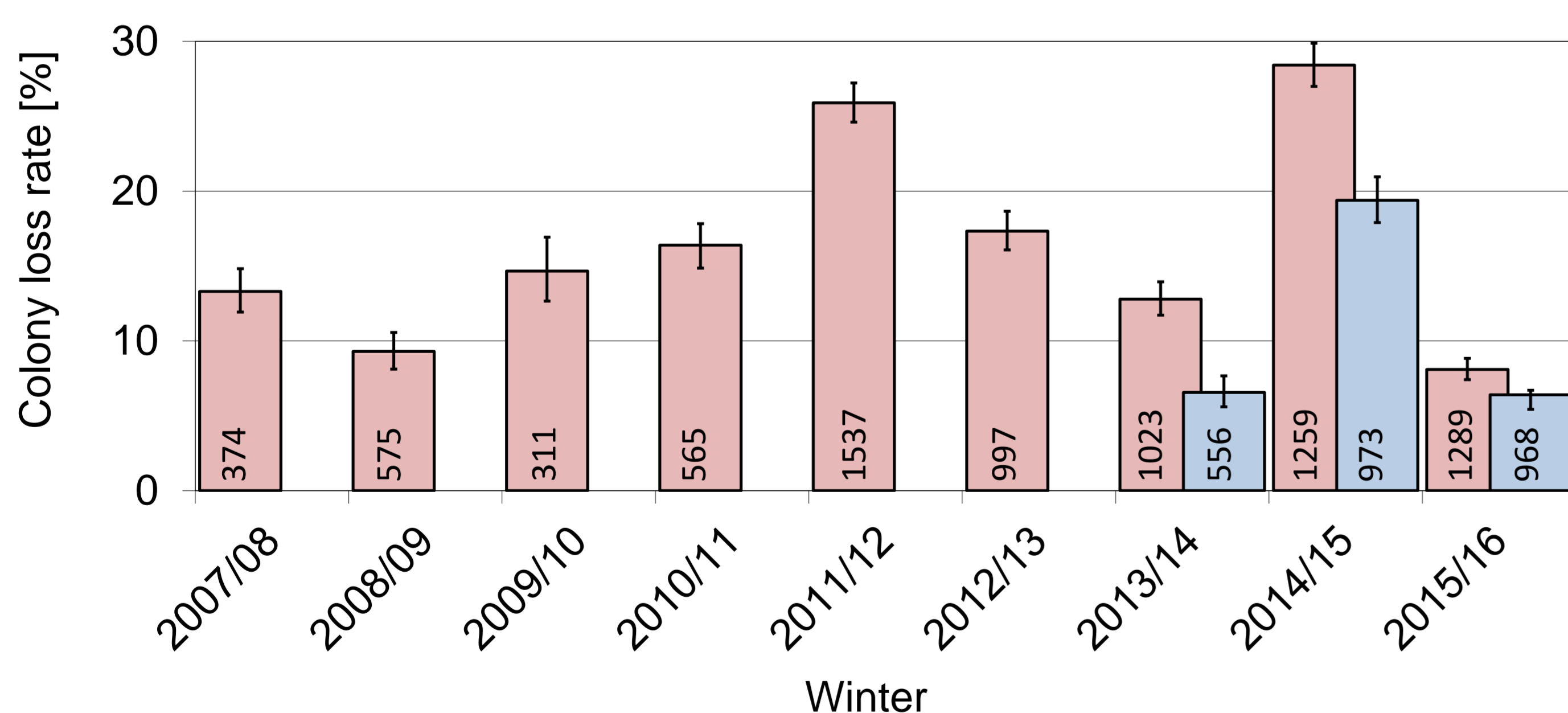


Figure 2: Winter loss rate (and 95% confidence interval) of honey bee colonies in Austria (red) and the Czech Republic (blue) for the last nine and three years, respectively. Sample size = number of beekeeping operations.

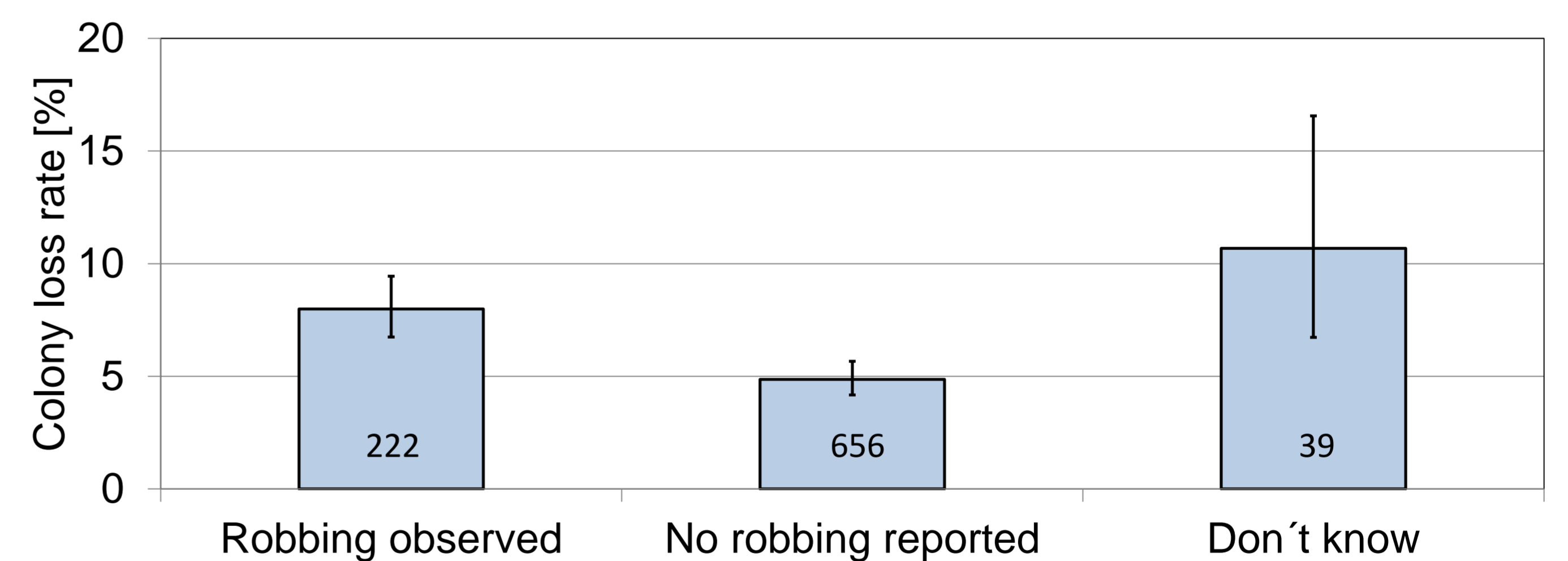


Figure 3: Probability of colony losses in the Czech Republic in dependence of robbing through bees at respondent's apiary or robbing of respondent's bees somewhere in neighborhood. Sample size = number of beekeeping operations.

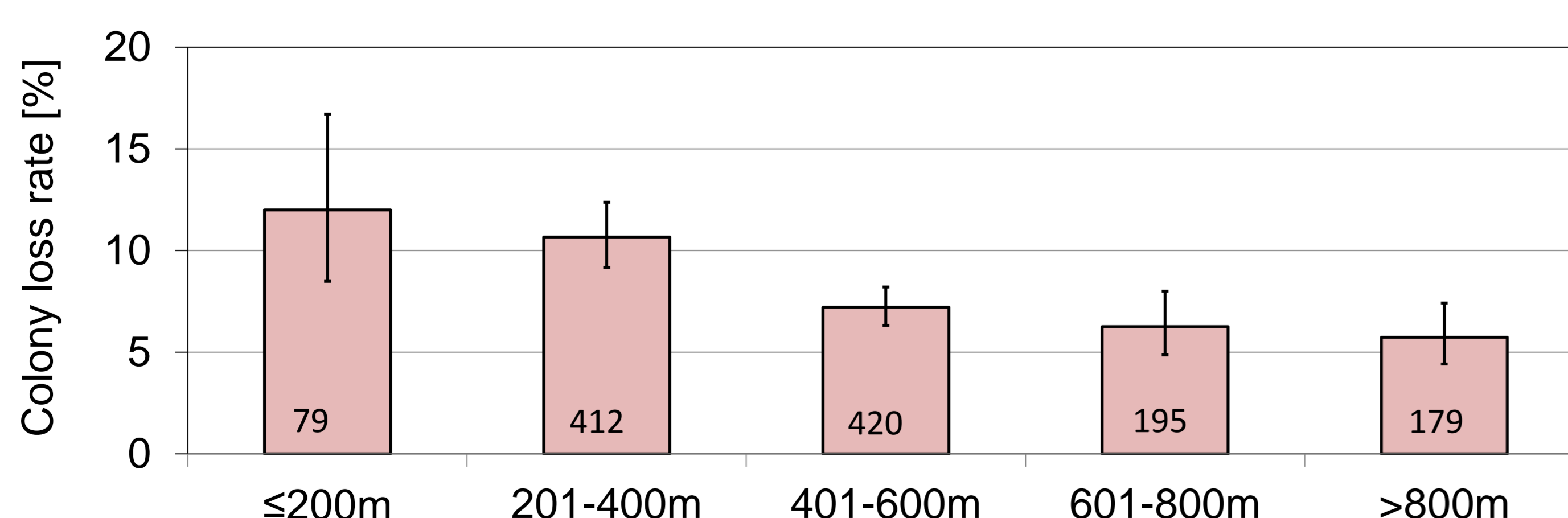


Figure 4: Honey bee colony loss rate in Austria in dependence on sea level. Sample size = number of beekeeping operations.

	July		August		September		October		November		December	
	A	CZ	A	CZ	A	CZ	A	CZ	A	CZ	A	CZ
FA short	21,0	27,1	31,0	27,4	16,4	13,8	4,8	3,5	1,3	1,4	0,6	0,1
FA long	13,9	7,5	26,5	9,0	16,9	6,0	4,0	2,6	0,9	0,5	0,2	0,3
Lactic acid	1,0	0,7	0,7	0,2	0,7	0,0	0,6	0,1	0,3	0,2	0,6	0,4
OA trickling	1,6	0,1	1,9	0,3	1,8	0,2	3,5	0,5	7,0	0,9	16,6	8,2
OA sublimation	1,0	0,3	2,0	0,5	3,8	0,3	7,2	0,5	14,2	1,0	23,8	1,7
Thymol	4,4	1,9	9,2	4,3	6,9	2,8	3,2	0,7	1,7	0,2	0,9	0,1
Gabon strips*	-	6,2	-	28,9	-	6,9	-	2,7	-	1,2	-	0,5

Table 1: Comparison of usage of selected *Varroa* treatments by beekeepers (in %) between A and CZ during second half of 2015. FA = formic acid, OA = oxalic acid, * fluvanilate or acrinathrin or flumethrin.

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