

# Efficiency of Varroa monitoring methods

## The benefits of standardized monitoring devices



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In the global debate about varroa (*Varroa destructor*) management, honey bee health experts and beekeepers often focus on varroa treatments, but a well-organized monitoring routine lays the foundation for a successful treatment strategy and can be one of the keys to overwintering survival. In a field study (2017) conducted in the Czech Republic, we compared the efficiency of four established Varroa monitoring methods: the two standardized, industrial methods “Varroa EasyCheck®” (Vétro-pharma) and “Varroa Tester®” (Swienty) and the two home-made methods “Powdered Sugar Dusting” and “Alcohol Wash” (Figure 1).

Figure 1

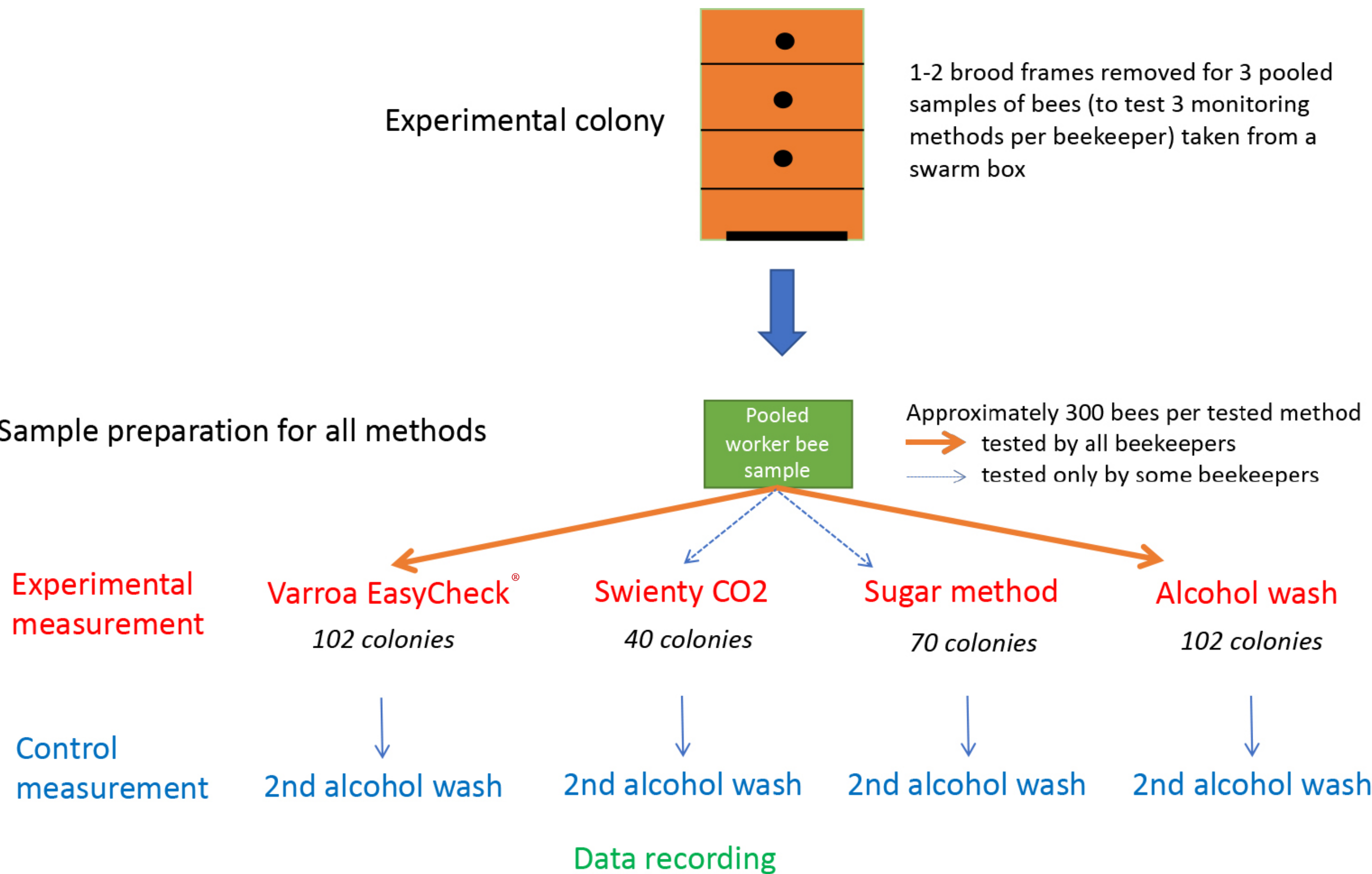


### MATERIALS AND METHODS

Each of the 10 beekeepers participating in the study tested three monitoring methods. For this purpose, three worker bee samples were taken from each of the 102 tested colonies (see Figure 2 for a schematic overview of the experimental setup). All samples from a single colony were taken on the same day between July and end of August 2017 from a pooled sample in a swarm box. The efficiency of the monitoring methods was tested with a (second) alcohol wash right after the first monitoring method had been applied on the same worker bee sample.

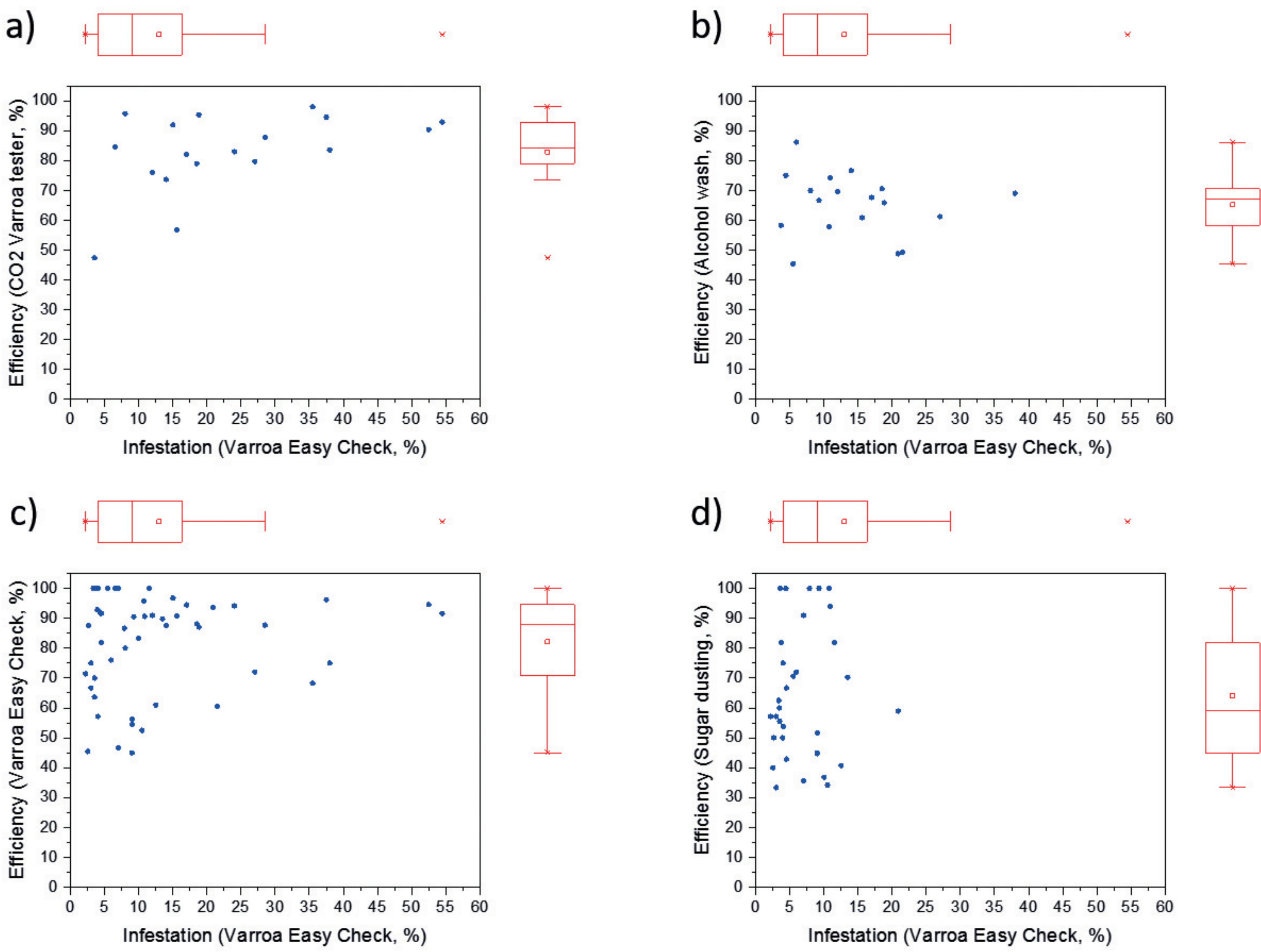
For data analysis, colonies with infestation levels lower than 3% were removed from the analysis. Two of the ten beekeepers found very low infestation levels in their colonies (< 3%), and their data were excluded. Efficiency of the four monitoring methods was compared in an ANOVA followed by a Bonferroni Test as post hoc analysis for comparison of means.

Figure 2: Schematic overview of sampling and monitoring methods tested in the 2017 field study



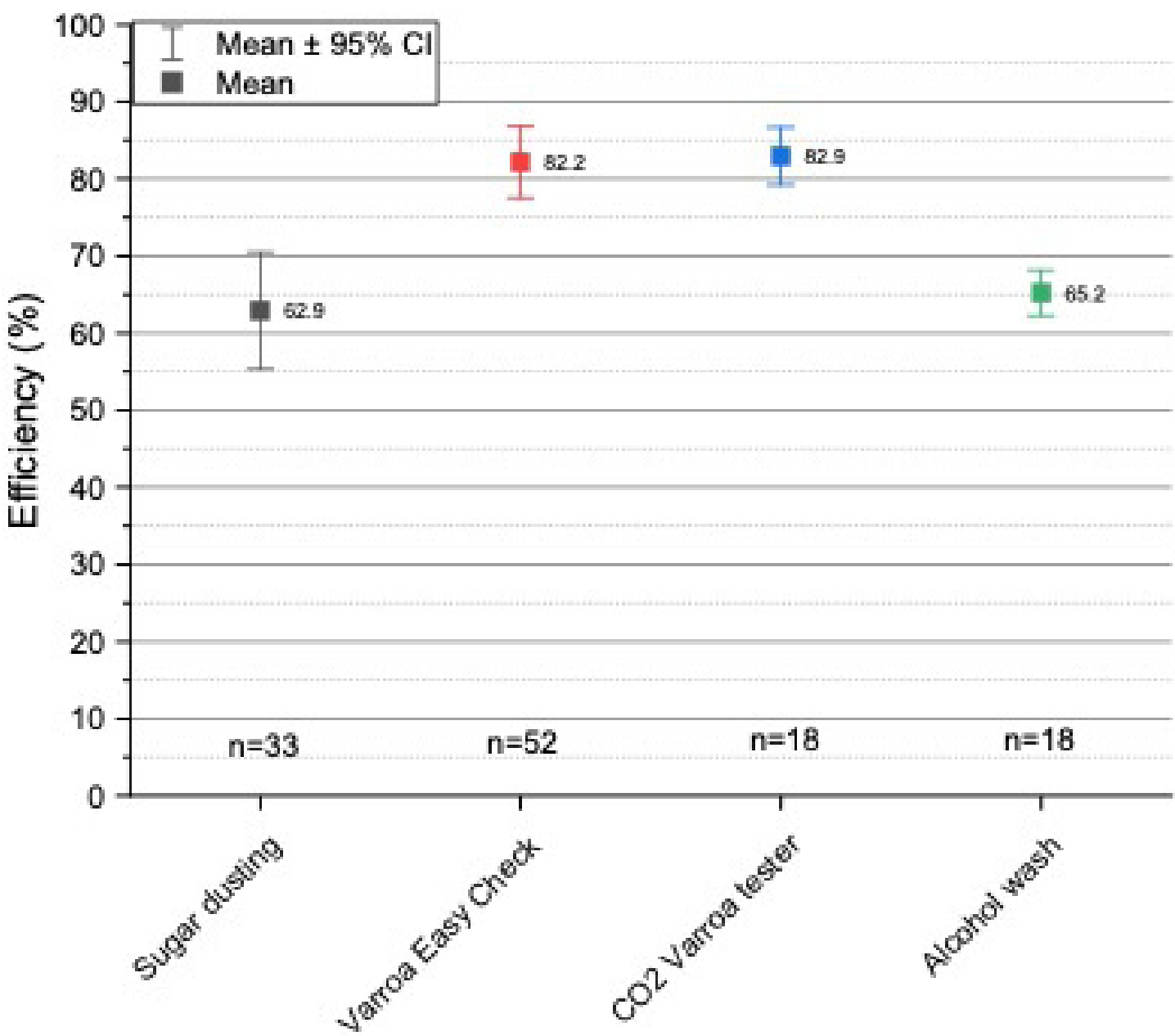
**Acknowledgement:** We thank beekeepers from Mendel Bee Research Association (Czech Republic) for participating in the trial.

Figures 3: Efficiencies of monitoring methods displayed on level of individual colonies and their infestation measured by VEC

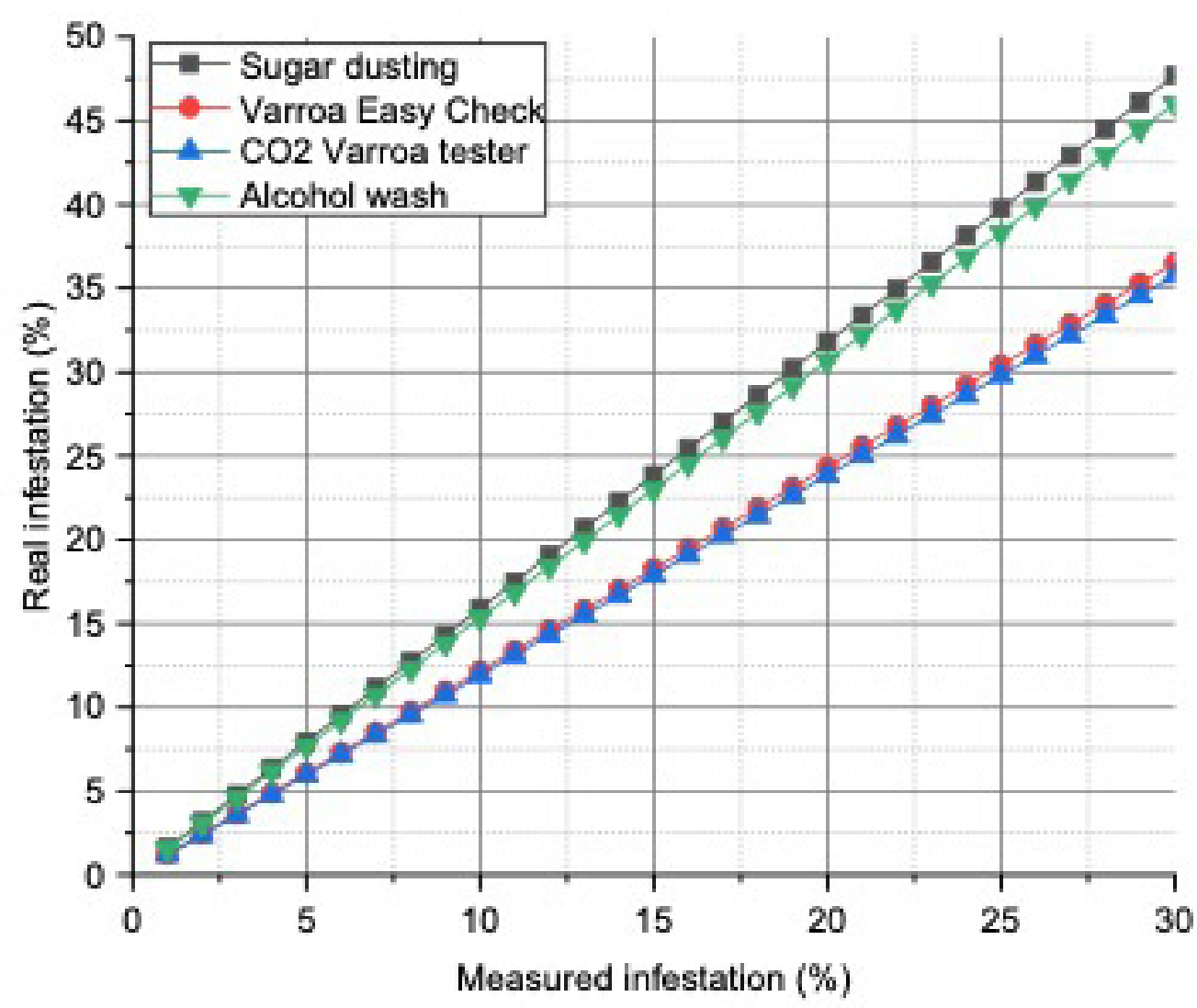


Figures 4

4a) Efficiency of the four tested monitoring methods: Sugar dusting, Varroa EasyCheck, CO2 Varroa tester and Alcohol wash in detecting the phoretic infestation level in samples of ca. 300 worker bees.



4b) Measured infestation level in samples of ca. 300 worker bees as detected by the four tested monitoring methods, plotted against the real infestation detected in a second alcohol wash.



### RESULTS

Efficiency of the four tested monitoring methods was highly variable with higher variability at lower infestation rates (Figure 3).

Of the four tested methods, Varroa EasyCheck® and the Varroa Tester® were significantly more efficient in detecting varroa mites in worker bee samples compared to the two homemade methods, powdered sugar dusting and alcohol wash (Figure 4a). There was no significant difference between the efficiency of Varroa EasyCheck® and the Varroa Tester®. There was also no difference between the sugar dusting and the homemade alcohol wash methods. Figure 4b shows the varroa mite infestation level as detected by each monitoring method and plotted against the real infestation level determined in a second alcohol wash.

In an additional 2-way ANOVA, a potential interaction of “beekeeper” and “infestation category” was tested. The interaction was non-significant, but the factor “beekeeper” significantly affected the efficiency of the powdered sugar dusting. This factor did not affect the efficiency of Varroa EasyCheck®, the Varroa tester® or the home-made alcohol wash.

### Conclusion

- Efficiency of all tested monitoring methods was variable with higher variability at lower infestation rates.
- The Varroa EasyCheck® and Varroa Tester® were the most efficient of the four tested monitoring methods (82.3% and 83.9%, respectively), whereas the Sugar Dusting (64.9%) and the home-made Alcohol Wash (65.2%) methods demonstrated a significantly lower efficiency.
- In the present field study, standardized monitoring methods were more efficient compared to home-made solutions.
- The factor “beekeeper” significantly affected the efficacy of the powdered sugar dusting method, but not that of Varroa EasyCheck® or the Varroa Tester®.