Highest level of winter colony losses in Austria over five years of monitoring reached in 2011/2012

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- Introduction -

We investigated honey bee colony losses in Austria for the fifth consecutive year using the COLOSS questionnaire. We asked beekeepers for colony numbers wintering in 2011 and number of colonies lost during winter.

- Material & Methods -

The questionnaire was distributed and promoted through a beekeeping journal, the internet and at meetings between February and 15th of July 2012. We received 1537 questionnaires representing 32471 colonies (Fig. 1). Total loss and 95% confidence interval (95% CI) are presented for total loss and subgroups.

- Results & Discussion -

The winter of 2011/12 saw the highest colony losses in Austria documented by surveys so far (Fig. 2). Hot spots with high losses were the northern part of Austria, the south-east and Vorarlberg in the west (Fig. 3). Colony losses are associated with several risk factors: Location (Fig. 3), honey and pollen sources (sunflower and maize, Tab. 1). In contrast to previous years, this year no significant effects were detected for operation size (Fig. 4), transport of colonies (Fig. 5) and honeydew remaining in colonies over winter (Fig. 6). Losses can significantly be reduced when drone brood is removed already in April (Fig. 7) and are significantly higher in operations that did not treat against *Varroa destructor* in July or August (Fig. 8). Scheduled requeening (Fig. 9) did not reduce winter losses.

Fig. 1. Response:
Geographic origin of the 1537 questionnaires gathered according to postal code.

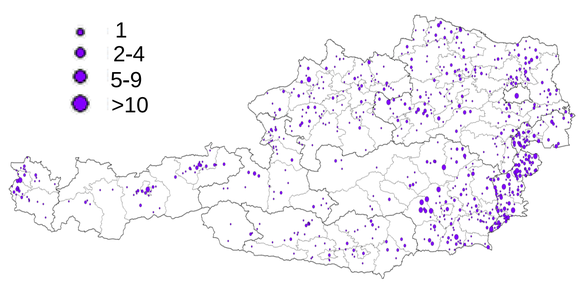


Fig. 2. Five years of monitoring:
Winter loss and 95% confidence interval. N=374, 575, 311, 565, 1537 operations overwintering 7676-32471 colonies.

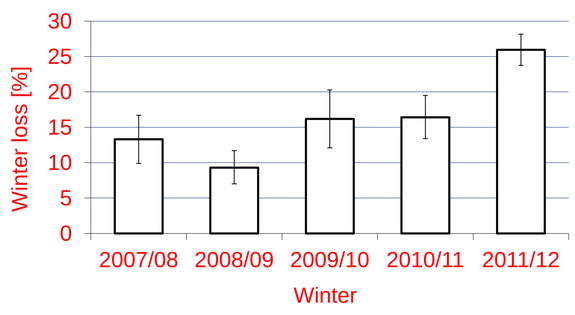
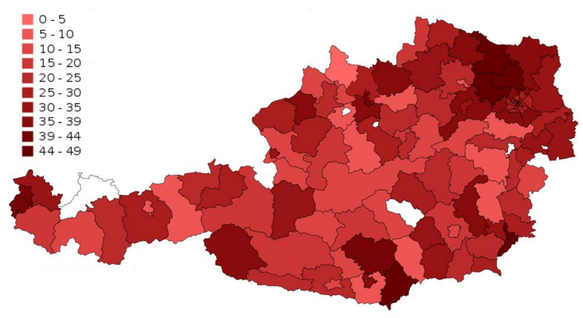


Fig. 3. Losses per district:
Losses for single districts in % are shown using 10 shades of red. White = no data.



Tab. 1. Important honey and pollen sources:
Number of Austrian operations naming the respective source as one of the 5 most important honey or pollen sources and winter losses experienced by these operations.
For comparison, lower loss of operations not reporting maize and sunflower are highlighted.

	#operations	#wintered colonies	% loss (95% CI)
Honeydew	525	14355	23.0 (19.4-26.6)
Dandelion	478	11038	24.5 (20.6-28.3)
Wild flowers	347	7931	25.1 (20.5-29.7)
Willow	346	8507	22.9 (18.5-27.4)
Lime tree	306	6330	29.4 (24.2-34.5)
Rape	223	5244	29.2 (23.2-35.2)
Acacia	200	6162	31.8 (25.3-38.2)
Clover	167	3736	23.3 (16.9-29.7)
Sunflower	125	2927	41.0 (32.4-49.7)
Chestnut	95	2667	30.2 (21.0-39.5)
Maize	95	2770	43.0 (33.0-53.0)
Non-Sunflower	667	16622	23.6 (20.3-26.8)
Non-Maize	698	16783	23.4 (20.3-26.5)

Fig. 4. Operation size:
Winter loss and 95% confidence interval of beekeeping operation categorized by size.
N=1121, 310, 106 operations, respectively.

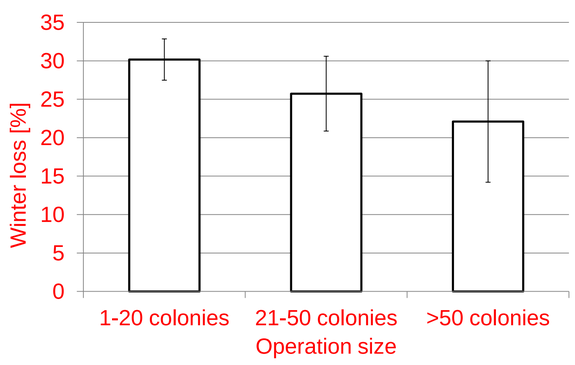


Fig. 5: Transport of colonies:
35,8% of Austrian beekeeping operations transport their colonies. The winter losses (95% CI) of migratory (n=280) and sedentary (n=503) operations do not differ.

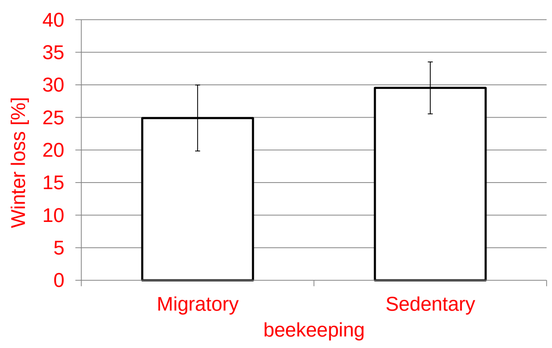


Fig. 6: Remaining honeydew:
Operations overwintering colonies on remaining honeydew (n=164) did not experience higher losses than operations (n=537) that did not.

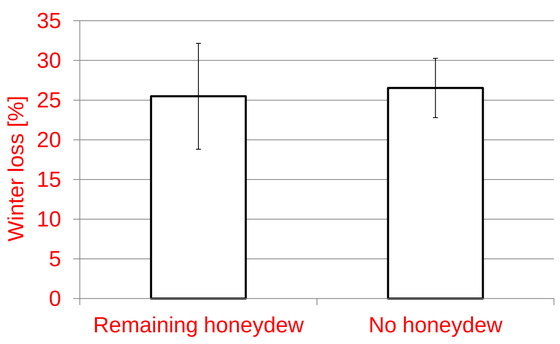


Fig. 7: Drone brood removal:
12.1% of beekeepers removed drone brood in one month, 11.8% in two months, 8.9% in three months and 3.4% in more than three months. Removal of drone brood already in April significantly decreased winter losses.

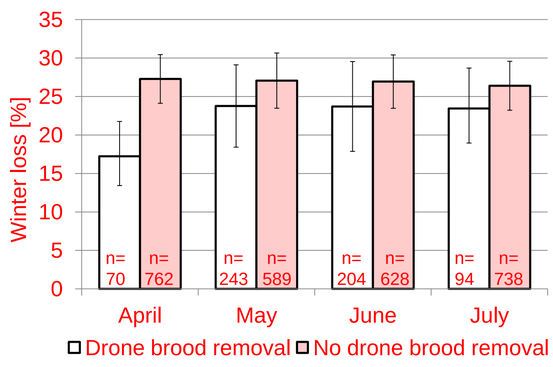


Fig. 8: *Varroa sp.* treatment:
Winter losses were significantly lower in operations that treated their colonies in July or August (n=838) compared to operations that did not treat in these months (n=78). Treatment exclusively with thymol (n=120) was not different from treatment with formic acid only (n=546).

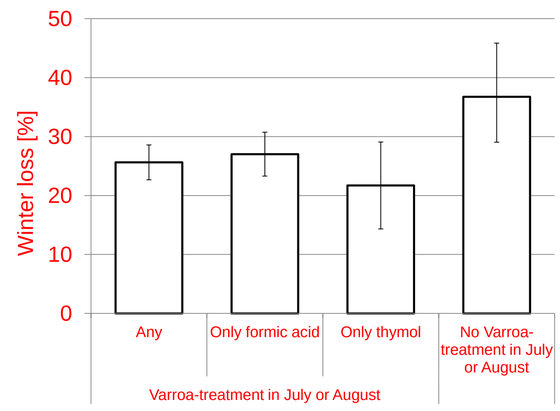
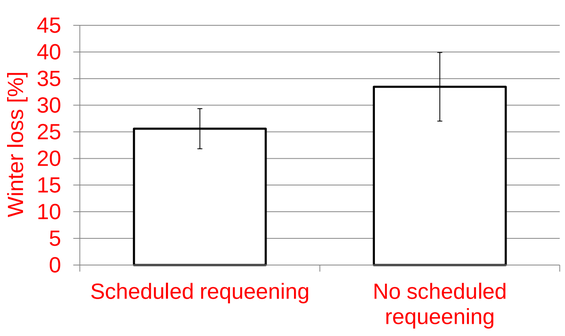


Fig. 9: Scheduled requeening:
Winter losses were not significantly lower in operations with a regular requeening schedule (n=515) compared to operations without (n=206).



8th COLOSS Conference
Halle – Germany. 1.-3.9.2012