Utilizing scale hive data in beekeeping in Finland

Helmi Hyvönen, Laura Vertainen and Anneli Salonen

Jamk University of Applied Sciences, Jyväskylä and Finnish Beekeepers' Association, Helsinki, Finland

Background

The Finnish Beekeepers' Association (SML) maintains a scale hive (Fig. 1.) monitoring website, where observer beekeepers are reporting measurement results of their own hive scale weight development, as well as free-form observations on weather conditions and plants around their apiary. Here we report results of the data collected during ten-years period from year 2014 to 2023.

Materials and methods

Data from 373 hive scales were studied. Some data had to be excluded because of the missing data or difficuties with the scale or the hive. Data from 295 (79 %) hive scales was usable and monitored (Tab. 1). The data was analysed and explanatory factors were sought for the timing of the harvest season and the annually variation of the honey harvest. By combining numerical and verbal data, it was possible to observe the cumulative weight development of the hive, the plants of the harvest season, the effect of weather conditions, and the timing of the harvest season and harvest.

Year	Total number of scale hives	Scale hives excluded	Scale hives included	Proportion of included-%
2023	44	7	37	84 %
2022	50	8	42	84 %
2021	31	10	21	68 %
2020	40	11	29	73 %
2019	36	5	31	86 %
2018	38	5	33	87 %
2017	33	9	24	73 %
2016	34	9	25	74 %
2015	36	12	24	67 %
2014	31	2	29	94 %
Total	**373**	**78**	**295**	**79 %**

Tab. 1. Number of used data from scale hives in different years.

Fig.1. A combination of a hive and a hive scale forms one scale hive.
Photo: A. Tanskanen

Results

- The results showed large variation in the weight measurement of the hive scales and the timing of the harvest season, which are primarily explained by geographical differences between Northern and Southern Finland. Observations of flowering plants during the harvest season were similar in different localities and varied according to weather conditions. Duration of the harvest season varied between 57 (year 2016, bad honey yield) and 76 days (years 2018 and 2019) (Fig. 2).
- In figure 3 a, average yearly cumulative weight increase (kg) of scale hives from year 2014 to 2023 is presented. When comparing these results with the total honey yield in Finland of same years in figure 3 b it can be seen, that scale hive results predict quite well the total honey yield of each year. Only exception is year 2019. We didn't find any logical explanation for this exception.
- When comparing results of seven regions in Finland, it can be seen that Finland is a large country. In same year, the average weights of hive scales in different regions are not nessessearly the same (Fig. 4.). Years 2016 and 2023 had low honey yield in every regions while years 2017, 2018 and 2022 were good honey years in all regions. In year 2020 Central Finland had a good honey year unlike other regions. A similar situation is seen in year 2021 when Kanta-Häme had the best honey yield.

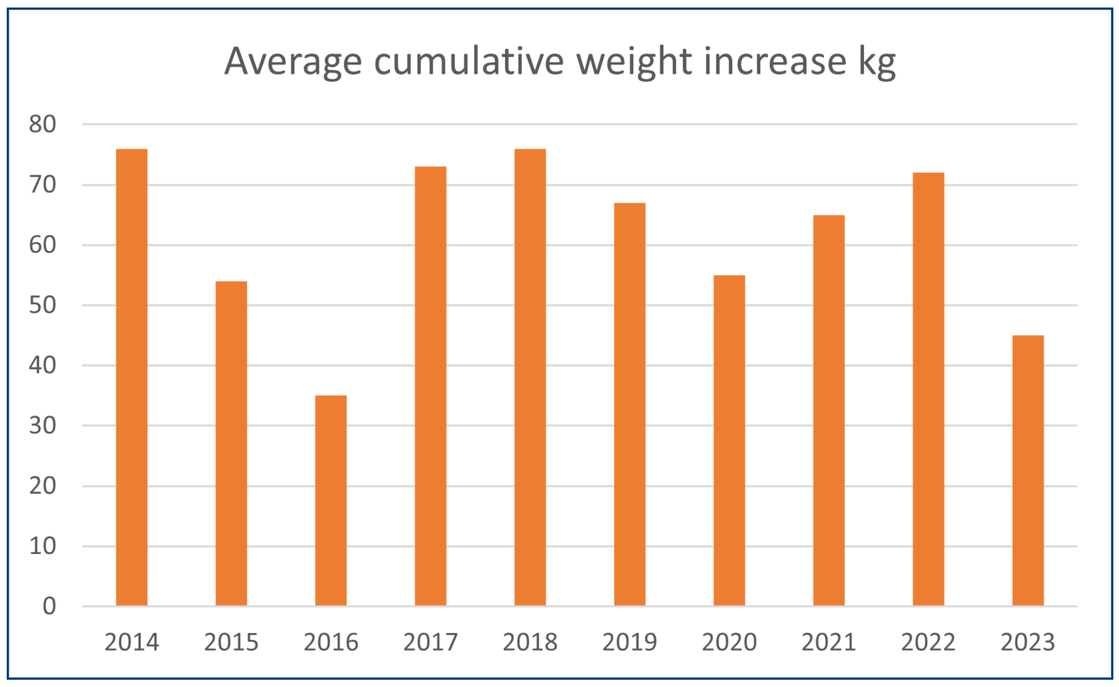
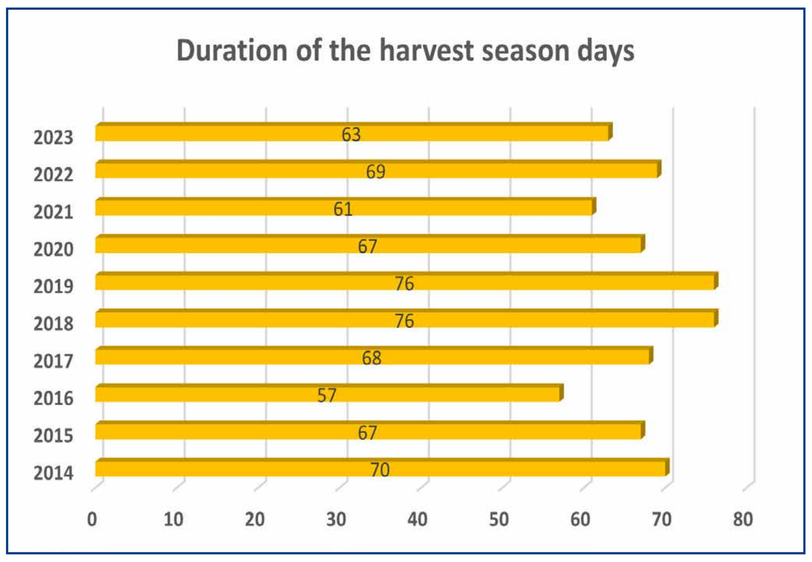


Fig.3 a. The average cumulative weight increase in Finnish scale hives from 2014 to 2023.

Fig.2. The average duration of the harvesting season in Finnish scale hives from 2014 to 2023.



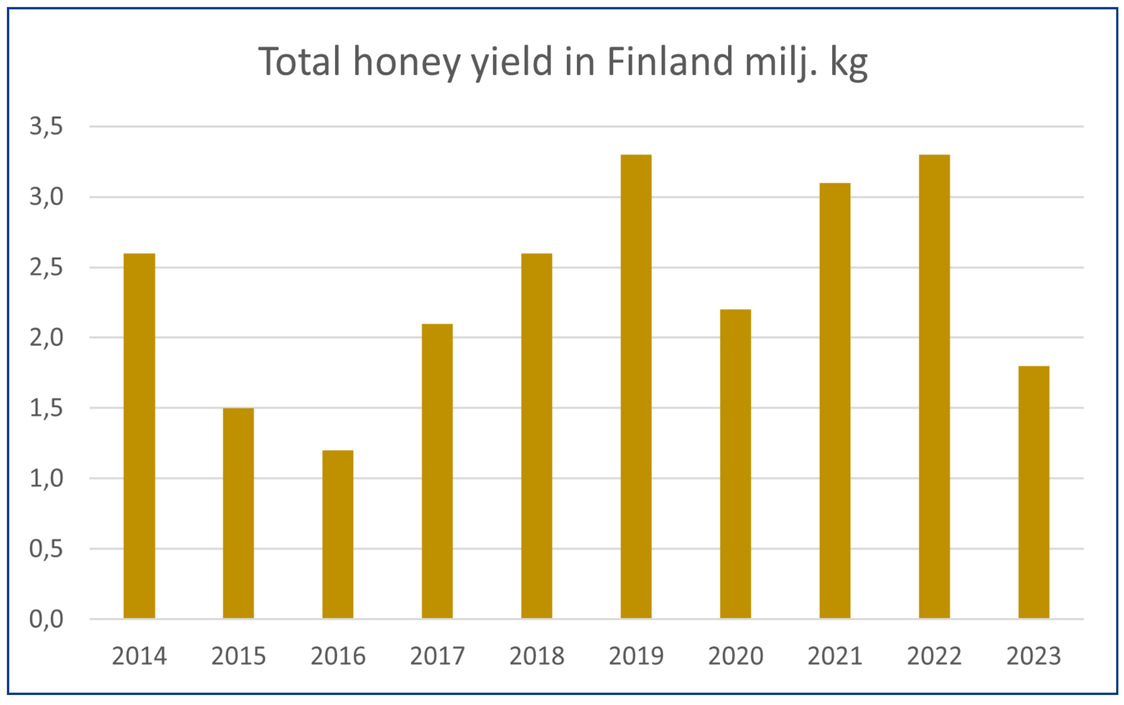


Fig.3 b.Total honey yield in Finland from 2014 to 2023.

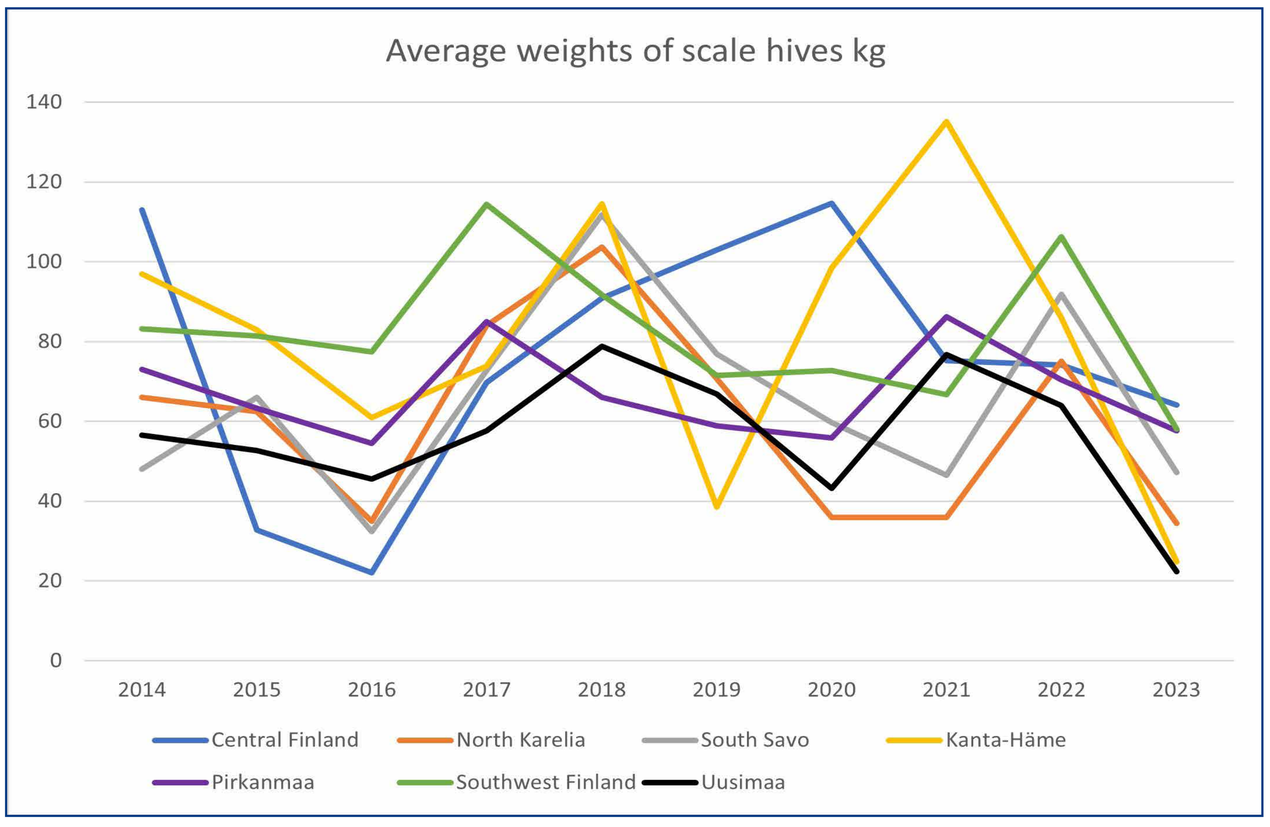


Fig.4. Average weight of scale hives in seven regions of Finland between years 2014 and 2023

Conclusions

Based on this study, some suggestions for improving the scale hive monitoring system of SML were made.

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