

POLLEN ANALYSIS OF HONEY FROM FINLAND IN 2008-2023

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Introduction

This study reports some results of the qualitative melissopalynological analyses of Finnish honey samples between the years 2008–2023 and changes in their pollen content during the period 1960–2023.

Materials and methods

Finnish beekeepers' Association collects in average one hundred honey samples for melissopalynological analyses every year. Qualitative melissopalynological analyses have been conducted by slightly modified methods recommended by the International Commission for Bee Botany. In years 2008-2023 pollen content of 1567 honey samples were analysed. In average 428 pollen grains were counted from every sample. Pollen grains were identified and classified, frequencies and relative portions of pollen classes were calculated and results were arranged according to the geographical origin of the samples. In addition, results were compared with previous corresponding data from Finland.

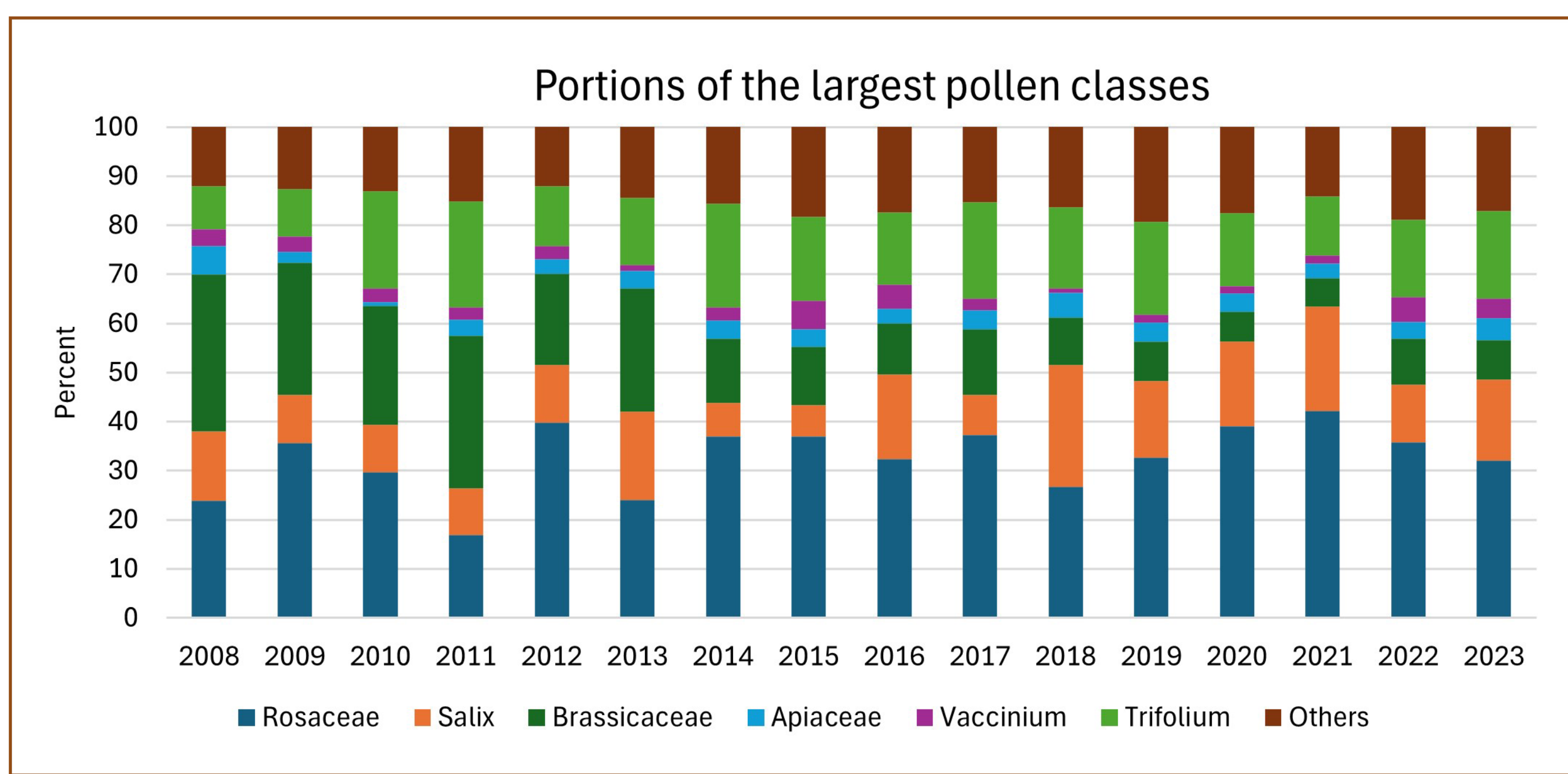


Figure 1. Changes in the portions of the six largest pollen classes from year 2008 to 2023.

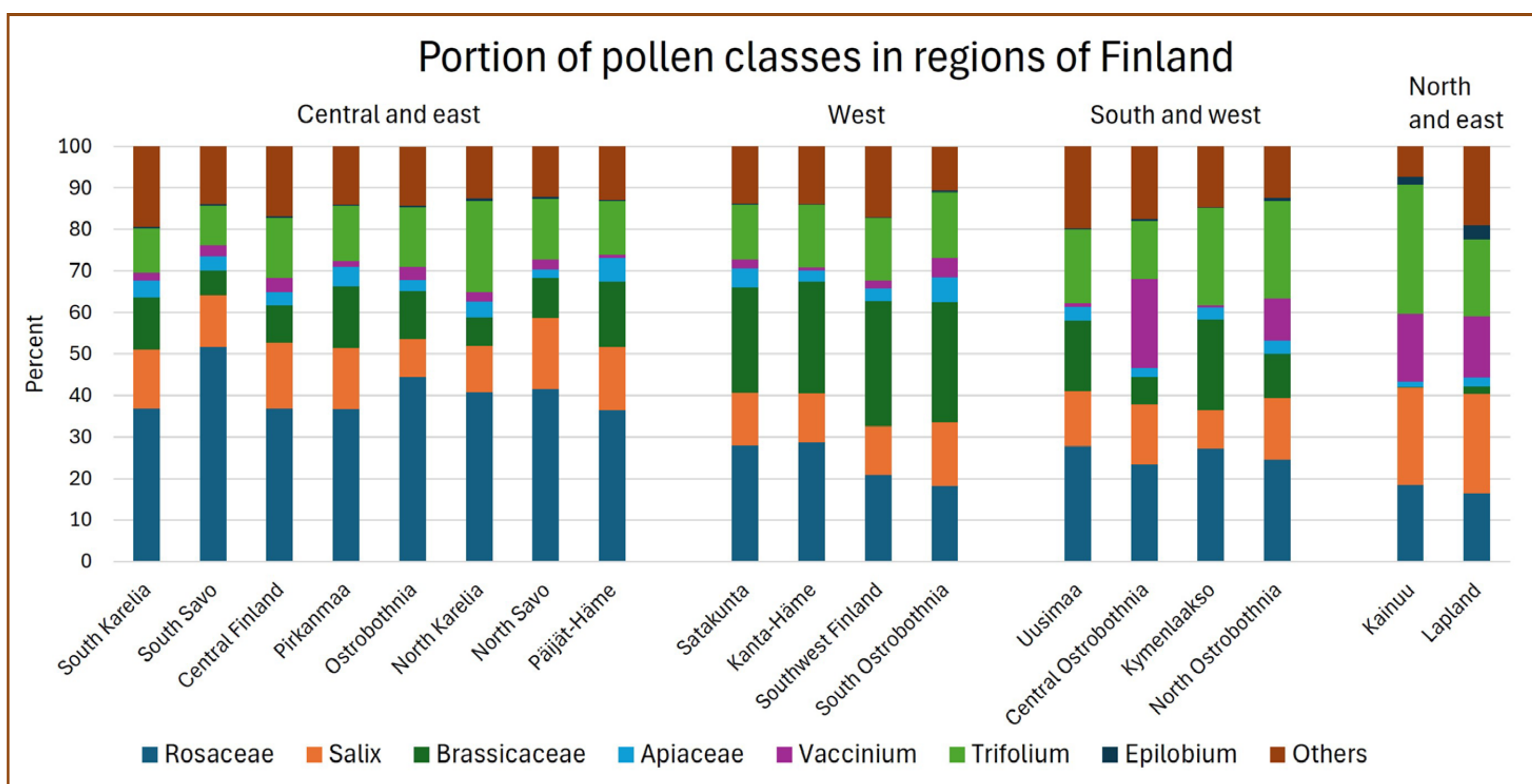


Figure 2. All pollen samples were arranged according to their geographical origin region and relative portions for each pollen group were calculated.

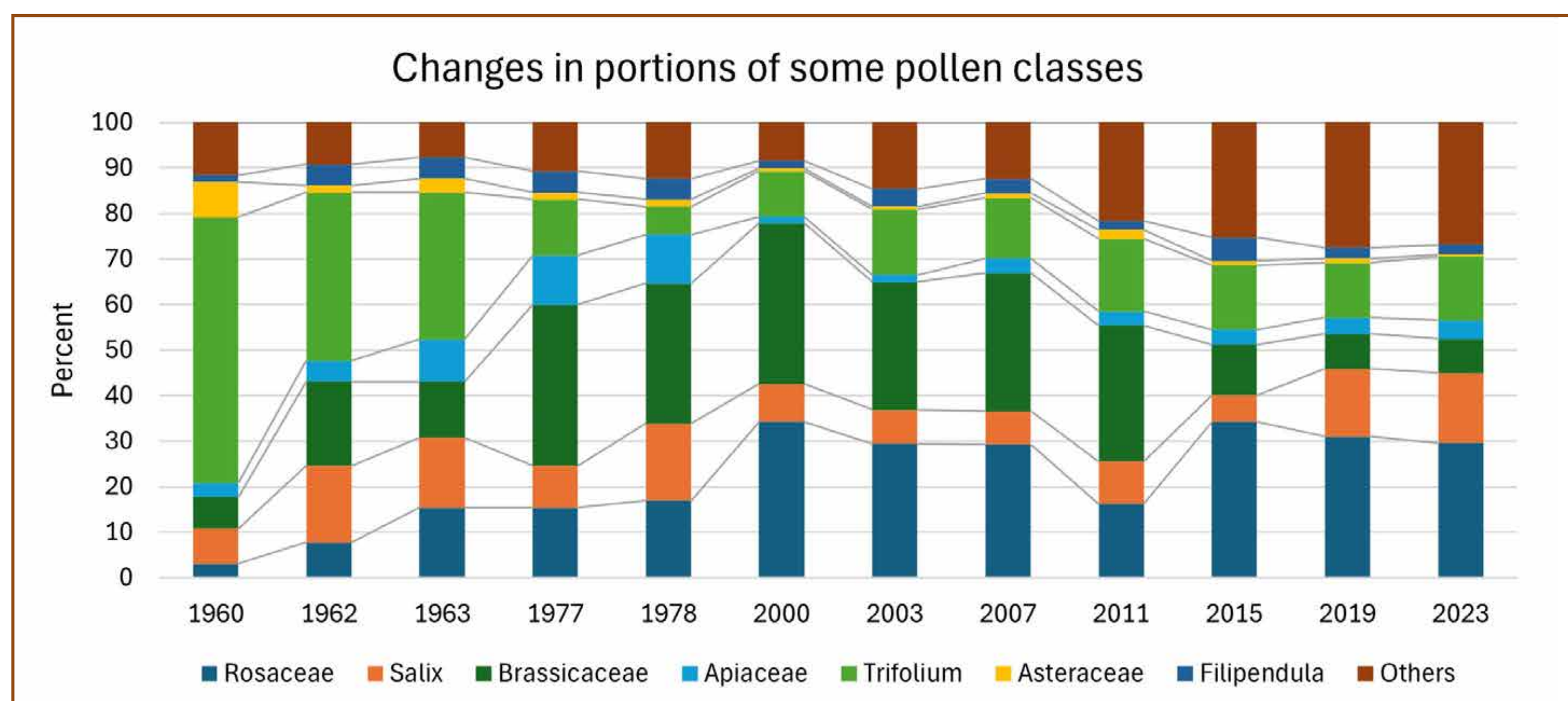


Figure 3. Changes in portions of pollen classes during last six decades.

Conclusions

Pollen classes typical for Finnish honey samples are Rosaceae (*Rubus*), *Salix*, Brassicaceae, *Trifolium*, Apiaceae, *Vaccinium*, *Epilobium* and *Filipendula*. Follow-up study like this give interesting data about the changes in the plants that honey bees forage. Explanations for these changes can be found in agriculture (cultivated food and feed plants), beekeeping practices (where apiaries are) and even in forestry (clear-cuts).

Year	Number of honey samples	Number of counted pollen grains	Number of pollen classes found in samples	Range of pollen classes found in one sample	Range of melliferous pollen classes	Range of non-melliferous pollen classes
2008	100	44017	94	13-50	9-37	1-13
2009	100	43133	91	11-50	9-43	2-13
2010	100	44908	95	12-53	9-39	2-14
2011	100	43042	92	11-50	9-38	1-12
2012	99	42715	90	13-56	10-43	2-14
2013	100	42325	98	10-37	10-44	0-11
2014	101	43249	93	8-45	6-36	1-11
2015	103	44519	90	12-46	9-38	1-12
2016	103	44574	98	14-50	9-39	1-12
2017	104	44896	90	10-52	8-41	1-12
2018	100	47295	89	13-46	11-35	1-11
2019	100	43084	96	15-58	10-47	2-12
2020	99	42576	95	17-54	11-43	1-14
2021	101	43404	89	12-54	8-42	0-14
2022	76	32338	89	13-50	11-39	0-11
2023	81	34939	91	13-53	11-39	2-14
Total	1567	681014	89-98	8-58	8-47	0-14

Table 1. Numerical results of the pollen analyses.

Results

Pollen classes and frequencies

In years 2008-2023, pollen grains from 89 to 98 pollen classes were identified from the honey samples. In one sample it was possible to find from 8 to 58 pollen classes (tab.1). Pollen grains of Rosaceae species and *Salix* can be found in almost all samples. In addition, pollen grains of *Trifolium* species, Brassicaceae and Apiaceae are found in over 90% of samples. Other common pollen grains from melliferous pollen classes in honey samples are *Syringa/Ligustrum*, *Vaccinium* species and *Fragaria*. From non-melliferous species pollen grains of *Filipendula* are found in over 80% of samples.

Relative portions of pollen classes

Almost one third of the counted pollen grains in years 2008-2023 were classified in Rosaceae pollen class. Secondary pollen classes were Brassicaceae (15.1%), *Trifolium* species (14.8%) and *Salix* (12.8%). Pollen classes of Apiaceae (3.3%), *Syringa/Ligustrum* (2.9%), *Vaccinium* species (2.8%) and *Filipendula* (2.8%) were identified as minor pollen class. The pollen grains in these pollen classes represent over 82% of all counted pollen grains.

Variation within years 2008-2023 in relative portions of pollen classes is presented in figure 1. During the study period, the portion of Brassicaceae pollen class has decreased from about 30% to less than 10%. The proportion of the pollen class of Rosaceae has been increasing and it has been the dominant pollen class from year 2014 onwards. In addition, after year 2017 the portion of *Salix* pollen class has showed slight increase.

Pollen classes of honey samples from Finnish regions

Honey samples were arranged according to their origin geographical region and relative portions for each pollen group were calculated (fig.2). Eight regions in middle and eastern Finland form a group where pollen class of Rosaceae has most abundant portion. West from this group are four regions, where Brassicaceae pollen class has an equal or bigger portion than the pollen class of Rosaceae. Honey samples from regions in southern and western Finland do not have any dominant pollen class. In Kainuu and Lapland the portions of *Vaccinium* and *Epilobium* are bigger than in other regions and portion of Brassicaceae is very low.

Changes in the portions of pollen classes from 1960 to 2023

The portion of *Trifolium* pollen class has decreased nearly 50% from year 1961 to 2023 (fig.3). In early 2000 Brassicaceae pollen class was dominant, but its portion has decreased later on. The opposite development can be seen in pollen classes of Rosaceae and others, whose proportion has increased from 1960 to 2023.

References

- Varis, A.-L. (2000). Influence of changes in crop cultivation areas on pollen contents of honey. *Agric. Food Sci. Finland*, 9, 253–257.
 Varis, A.-L., Helenius, J. & Koivulehto, K. (1982). Pollen spectrum of Finnish honey. *J. Sci. Agric. Soc. Finland*, 54, 403–420.
 Salonen A., Ollikka T., Grönlund E., Ruottinen L. & Julkunen-Tiitto R. Pollen analyses of honey from Finland. *Grana*, 2009; 48: 281–289.

