

# **BOTANICAL AND GEOGRAPHICAL ORIGIN OF HONEYES OF PERM KRAI**


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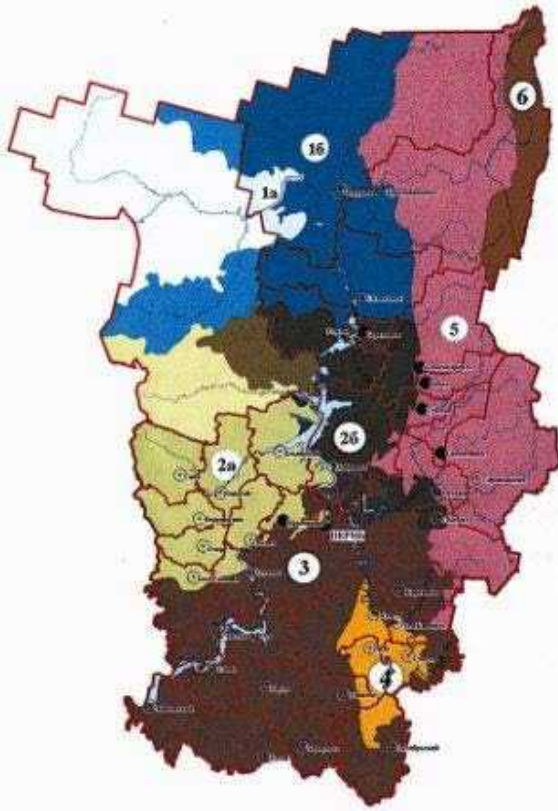
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- 2005-2008 and 2010-2012,
  - 409 honey samples,
  - from five phytogeographical regions of Perm Krai (1a, 1b, 2a, 3, 4, 5)

# Figure 1. Phytogeographical regions of Perm Krai (according to Ovesnov S.A., 2000)



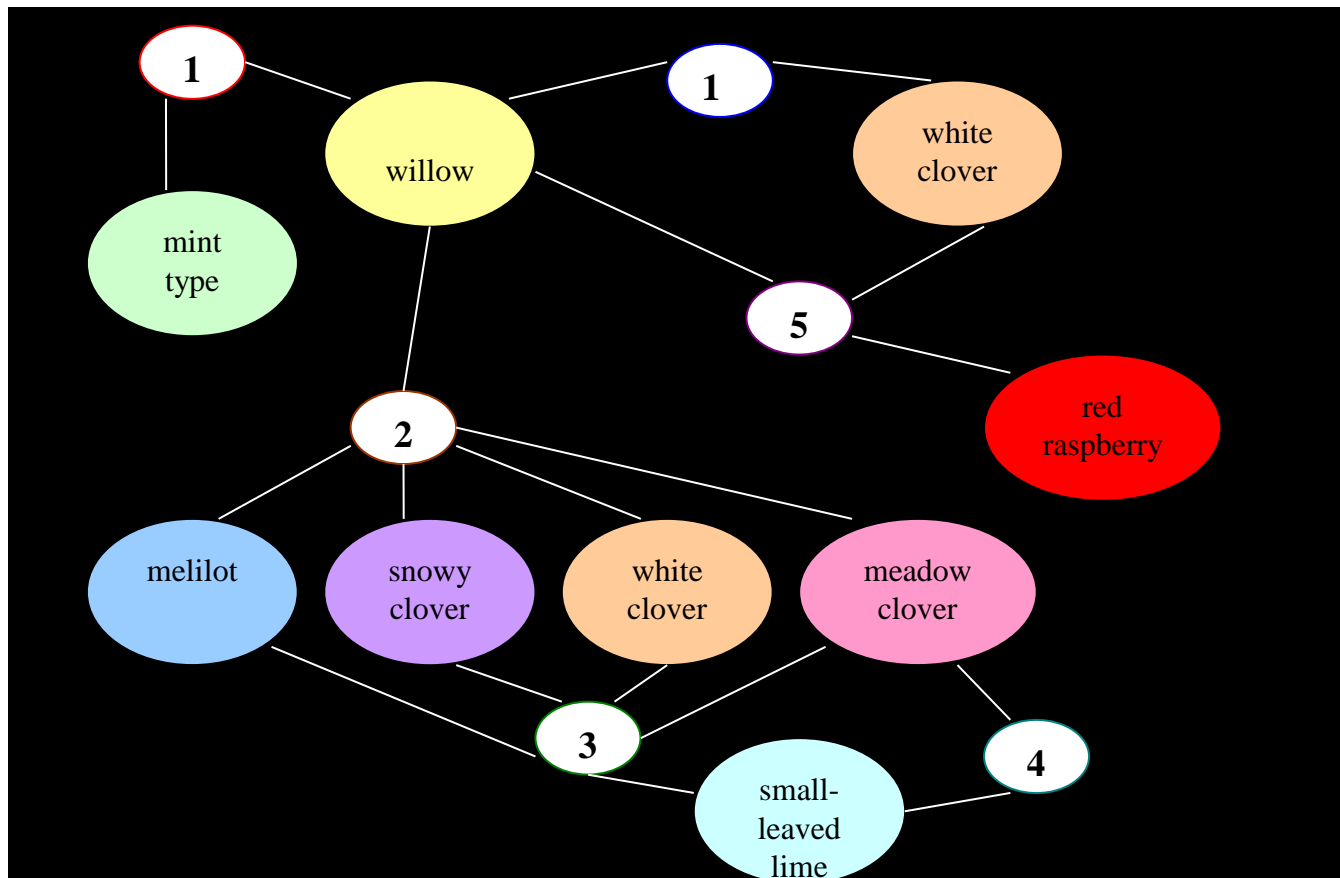
- 1 – middle-taiga spruce-fir forests:
  - a – North European pine and spruce forests predominating,
  - b – Kama-Pechora-Western Urals spruce-fir forests predominating;
- 2 – south-taiga Kama-Pechora-Western Urals spruce-fir forests: a – agricultural lands predominating, b – aspen and birch forests predominating at the location of dark coniferous forests;
- 3 – broadleaved-spruce-fir (sub-taiga) forests;
- 4 – Kungur insular forest-steppe;
- 5 – middle and south taiga submontane fir-spruce and spruce-fir forests;
- 6 – north and middle taiga cedar-spruce mountain forests.

# Documents:

- GOST 19792-2001 “Natural honey. Specifications”,
- GOST R 52940-2008 “Honey. Determination of the relative frequency of pollen”,
- “Harmonised methods of the International Honey Commission”,
- programme STATISTICA (discriminant and cluster analyses ).

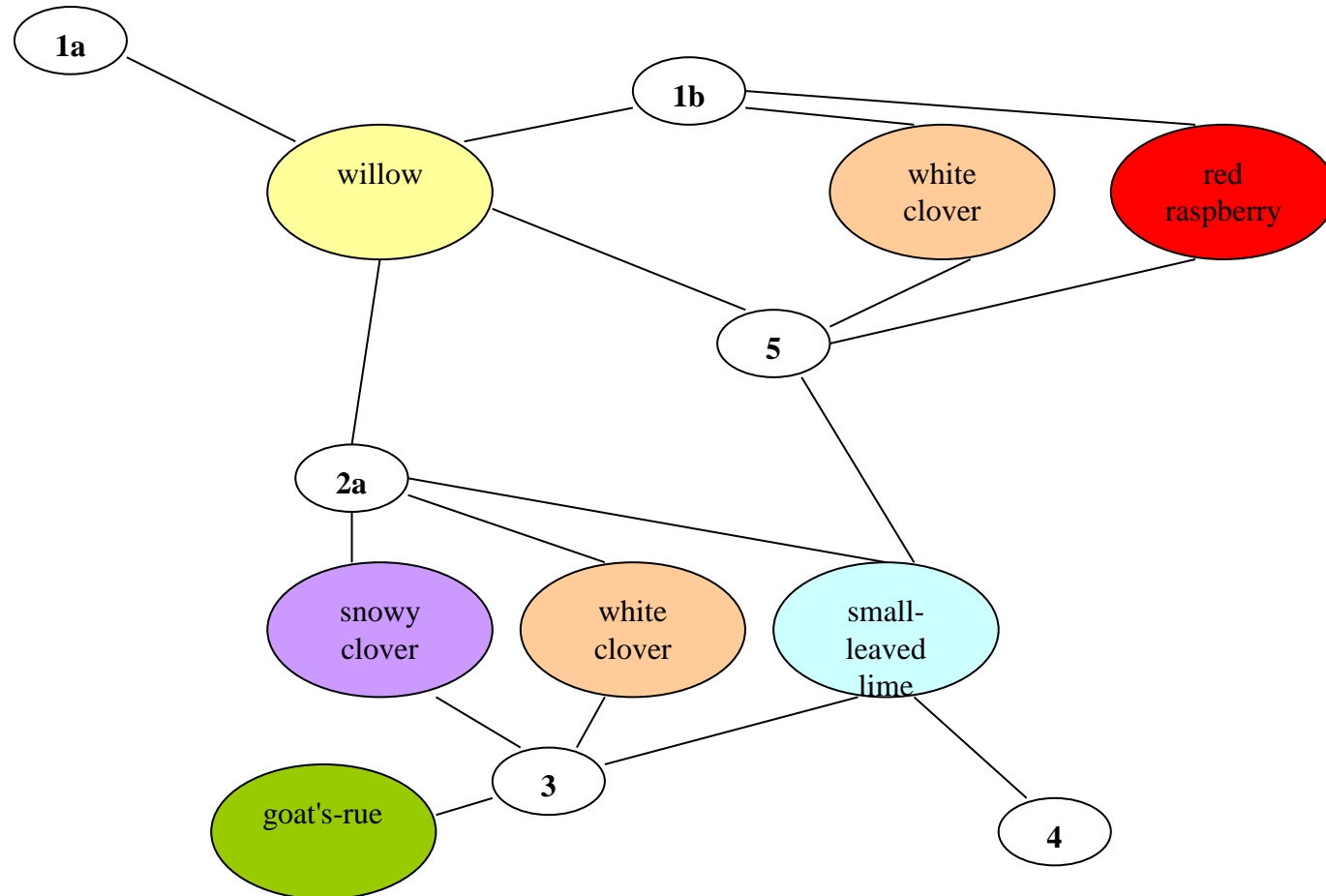
# Geographical origin of honeys

We determined the highest pollen-grains frequency in honeys (more than 80% of samples).



# Botanical origin of honeys

Honeys containing more than 45% of the pollen grains were determined:



# Monofloral honeys of Perm Krai



Small-leaved lime  
(*Tilia cordata* Mill.)



White clover  
(*Trifolium repens* L.)



Raspberry - *Rubus* L.



Willow (*Salix* L.)

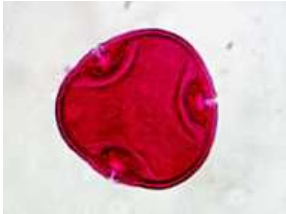

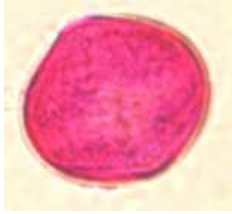


Melilot - *Melilotus* L.



Blooming sally  
- *Chamaenerion angustifolium* L.

# Some honey samples with more than 35 % of pollen grains were analysed:

25 samples of lime honey	
6 samples of willow honey	
23 samples of white clover honey	

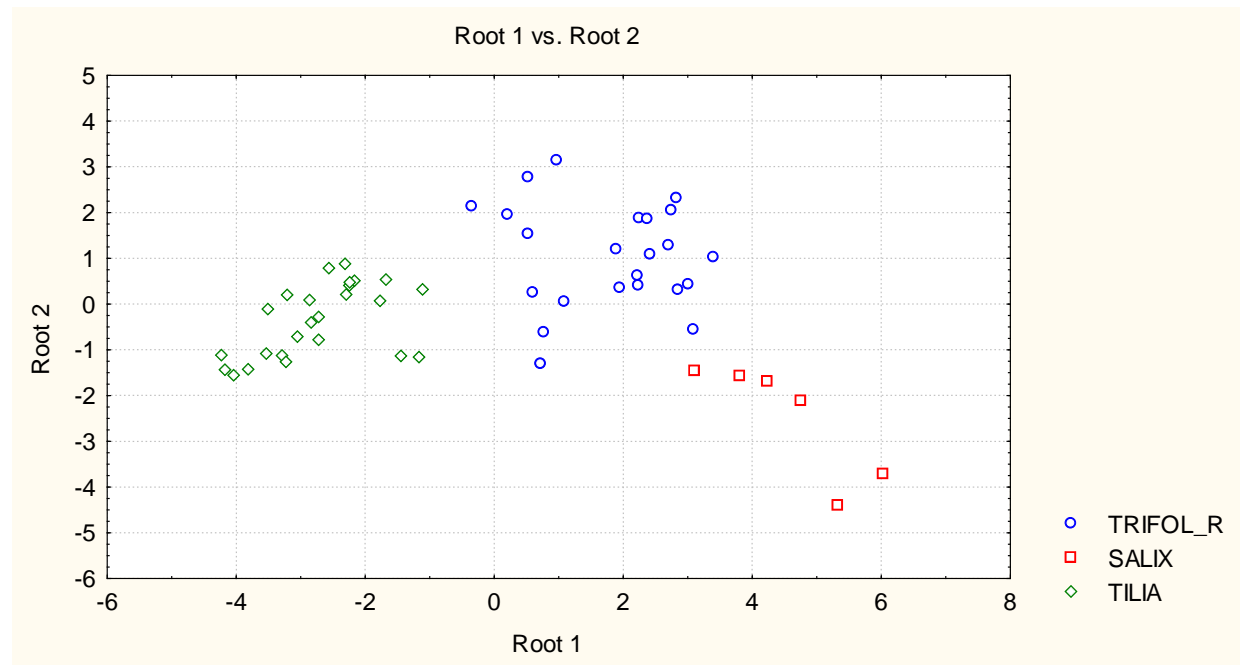




# Parameters

- pH,
- conductivity,
- colour,
- hydroxymethylfurfural,
- total acidity,
- diastase number

# Figure 2. Results of discriminant analysis



The statistical values of Wilks' Lambda for all parameters are about 0.1.

# Table 1. The numerical values of monofloral honeys

Values	Diastase number, Gothe units	Total acidity, cm <sup>3</sup> /100 g of honey	Hydroxy-methylfurfural content, mg/kg	Conductivity, mS/cm	pH	Colour Pfund scale, mm	Pollen-grains content, %
White clover ( <i>Trifolium repens</i> L.)							
min	8.3	1	1	0.12	3.5	19	35.5
max	36.2	2.73	4.32	0.53	4.5	78	86.1
average	20.2	1.61	2.42	0.23	3.9	41	51.4
Willow ( <i>Salix</i> L.)							
min	11.4	1.5	1	0.22	3.8	60	41.3
max	25.4	2.91	10.56	0.64	4.3	91	78.8
average	20.5	2	6.07	0.34	4.1	70	53.1
Small-leaved lime ( <i>Tilia cordata</i> Mill.)							
min	7.3	1	1	0.3	4.3	15	35
max	24.5	1.65	2.3	0.59	6.4	34	86
average	14.7	1.08	1.19	0.46	5.3	24	51

# Conclusion

- 409 honey samples produced in Perm Krai were analysed during 7 years.
- Types of pollen grains of honey and pollen plants are defined by pollen analysis. The data are used for the determination of geographical and botanical origin of honeys.
- Using results of discriminant analysis we found out values of physicochemical parameters for three types of monofloral honeys (lime honey, willow honey, white clover honey) with more than 35 % of pollen gains.



**Thank you for your  
attention!**