THE NATURAL HONEY OF HONEY

Pollen Analysis isn't Enough

Gudrun **Beckh**

Bees have the tendency to forage mainly on one nectar source once it has been recognized as attractive and flowers are abundantly available, thus producing monofloral honey. Of course the honey is unlikely to contain 100% nectar of one plant species unless under experimental conditions. Therefor the market needs a definition when a honey can be called monofloral[1].

Monofloral honey almost entirely from one floral source is of higher commercial value than a polyfloral honey in the U.S. as well as in Europe. For correct labeling a monofloral honey must be proven to originate wholly or mainly from the indicated source and possesses organoleptic, physico-chemical and microscopic characteristics of the source[1,2,3]. Therefore it is necessary to define clear criteria for the required characteristics in order to harmonize quality control of importers, packers and officially authorized EU inspection bodies – approx. 50% are imported from third countries into the EU.

The legal basis for the Definition of Honey including quality parameters and labeling rules in Europe is Council Directive 110/2001EC. This Directive is implemented in national law in the member's states with the possibility to add national specific requirements especially in labeling.

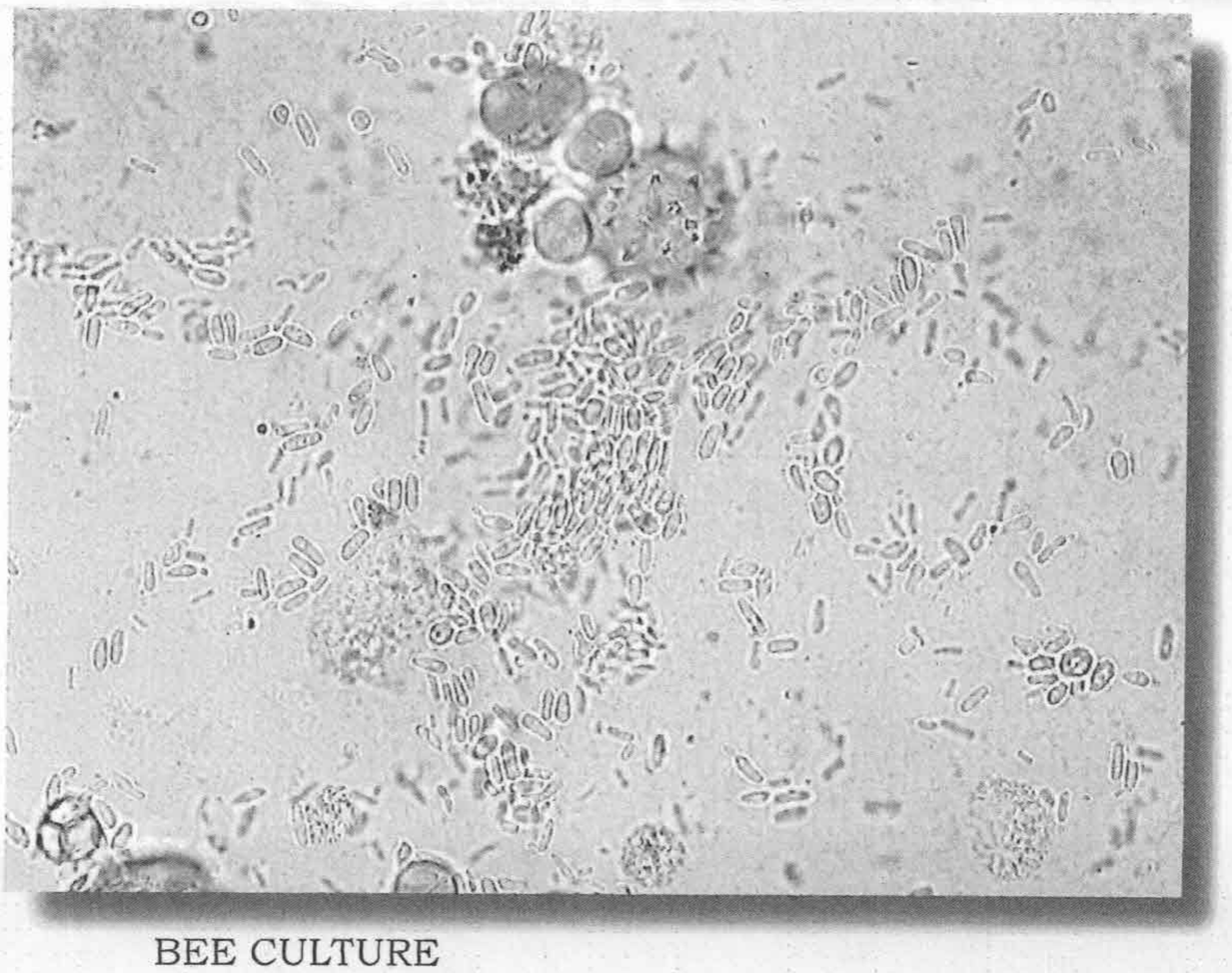
For correctly labeling the botanical and geographical origin expertise is necessary. Detailed specifications setting limits for accepting a honey as monofloral are not part of EU-legislation but quite common business practice. In Germany a first attempt has been made to publish recommendations for the main honey types on the market with so called "Deutsche Leitsätze für Honig" in official Food Law like existing for other food products. Other EU-member states have established similar official criteria for national monofloral honey types but there is no harmonization on EU-level.

Worldwide quality control in the laboratory must consider all mentioned criteria whereas for the consumer the main and only test criteria are the organoleptic characteristics: taste, smell, appearance, consistency, color.

Organoleptic testing is quite subjective whereas a real sensory description is complex and needs well-trained assessors and harmonized vocabulary. Anyway the organoleptic characteristics are the main decisive ones. If taste and smell fail, it is not possible to declare the honey as monofloral even if the other parameters comply with the international or national specifications.

Official methods for physico-chemical parameters are laid down worldwide in the Codex Alimentarius as well as in Food Law in Germany (§64 LFGB based on DIN-methods) e.g. electric conductivity, pH value, acidity, sugar analysis and enzyme activities as well as color gradation and detection of source-specific components(see also [4, 5, 6]).

For the microscopic analysis which is still the only method to determine botanical and geographical origin – an important fact also for the US customs – unless we have filtered honey where the natural pollen content is removed there are as well official methods and a lot of publications worldwide. The importance of



Honey type: **Clover** (Trifolium sp./Melilotus sp.)

	„Target range"	Tolerance
Pollen%	>70	>60
	Pollen normal represented	
Electric conductivity mS/cm	<0,20	<0,40 (N. Zealand, Argentine)
Fructose/Glucose ratio	<1,20	<1,25
Color mm	<35	
Organoleptic		
Color	White to light yellow	
Smell	Mild aromatic	
Taste	Mild aromatic, floral	
additional	Quick crystallization	

Honey type: **Basswood**/Linden (Tilia sp.)

	„Target range"	Tolerance
Pollen%	>20	>10
	Pollen underrepresented	
Electric conductivity mS/cm	>0,30 (approx. 0,65)	
Fructose/Glucose ratio	>1,05	>1,00
Color mm	11-55 approx. 33 (IHC)	
Organoleptic		
Color	Light amber	
Smell	medical-mint	
Taste	Strong, woody, long persistency, little bitter	
additional	Low pollen content corr. with higher el. conductivity; pH value >5,0 possible	

Honey type: Orange resp. **Citrus** (Citrus sp.)

	„Target range"	Tolerance
Pollen%	>20	>10
	Pollen underrepresented	
Electric conductivity mS/cm	0,1-0,5	
Fructose/Glucose ratio	>1,10	
Color mm	10-70	
Methylanthranilate	>2	>1,7 (Pollen% >20)
Organoleptic		
Color	White to light amber	
Smell	Aromatic, floral, Orange blossom	
Taste	Intense floral	
additional	Low in enzyme, sucrose max 10% according to honey directive	

the pollen analysis was recently exposed in this magazine by M.E.A. MCNEIL[7]. She introduced Vaughn Bryant who has worked in the field for many years. Vaughn Bryant described the procedure for pollen analysis in the U.S. which is similar to the European methodology but not identical. The main difference is that his methodology with acetolysis destroys the sediment particles of honey, like yeasts, wax, and feeding material which gives us more information about the quality of honey than only the acetolysed pollen grains. Some pollen types with a more sensitive pollen wall might be destroyed as well.

Increased yeast content e.g. might indicate fermentation[8,9], feeding material or other contamination not natural to honey means that the beekeepers did not follow good beekeeping practice. High counts of starch grains may indicate adulteration. Honeydew elements like spores, hyphae, algae are important for honeydew honey. The official method in Germany (§64 LFGB L-40.00-11; DIN-10760:2002) defines a microscopic test for counting the pollen. Pollen percentages then must be interpreted carefully in terms of nectar percentages considering naturally over- and under-represented pollen due to flower morphology, pollen size as well as beekeeping practice leading to over- or underrepresentation. No official and harmonized European or international (e.g. Codex Alimentarius) rules are approved up to now for interpretation of pollen counts in terms of nectar percentages. Experimental attempts have been made in order to define coefficients for some plants but it is impossible to define these figures for worldwide nectar sources plants.

BECKH and CAMPS[1] collected literature data as well as statistical data from daily lab routine and summarized these as specifications (including Pollen%) of monofloral honeys (blossom and honeydew honeys labeling) in a publication. Based on this survey the German Food Commission established the already mentioned Guidelines in Germany which are recommended to be followed by the market and official controls.

In the U.S. it is common practice to "filter" honey in order to remove pollen from the honey for the purpose of stopping crystallization and keeping the honey liquid. As mentioned before it is not possible anymore to trace back the botanical or geographical origin by pollen analysis which may lead to fraud. In Europe it is mandatory to label the geographical resp. country of origin (EC-Honey Directive 110/2001, Article 2, 4.) It is also not allowed to label a filtered honey as monofloral e.g. clover or sage. For blends the packer may use the labeling EC and/or non EC. In order to control traceability of honey for importers, packers, retailers in EU it is routine to test honey for pollen analysis which gives them the chance to control their suppliers. Of course method is limited if pollen spectra of regional areas are quite similar due to the same vegetation covering more than one country. In this case new developed methods e.g. trace elements or isotopic elements can help if there is enough data on authentic honey available. Since food safety and consumer protection is one of the main objectives of EU-legislation traceability is mandatory for food business operators (see also[10-15]).

The benefit of filtration, e.g. long-time texture is disproportioned to other quality features. Focusing on diversity of nature as well as maturity of consumer it is necessary to let the customer decide which honey he prefers – he is the expert on the favored taste in the end. QSI established in 1954, is the expert for pollen analysis, honey labeling and the other mentioned features as well in Germany, who is in charge for customers all over the world. BC

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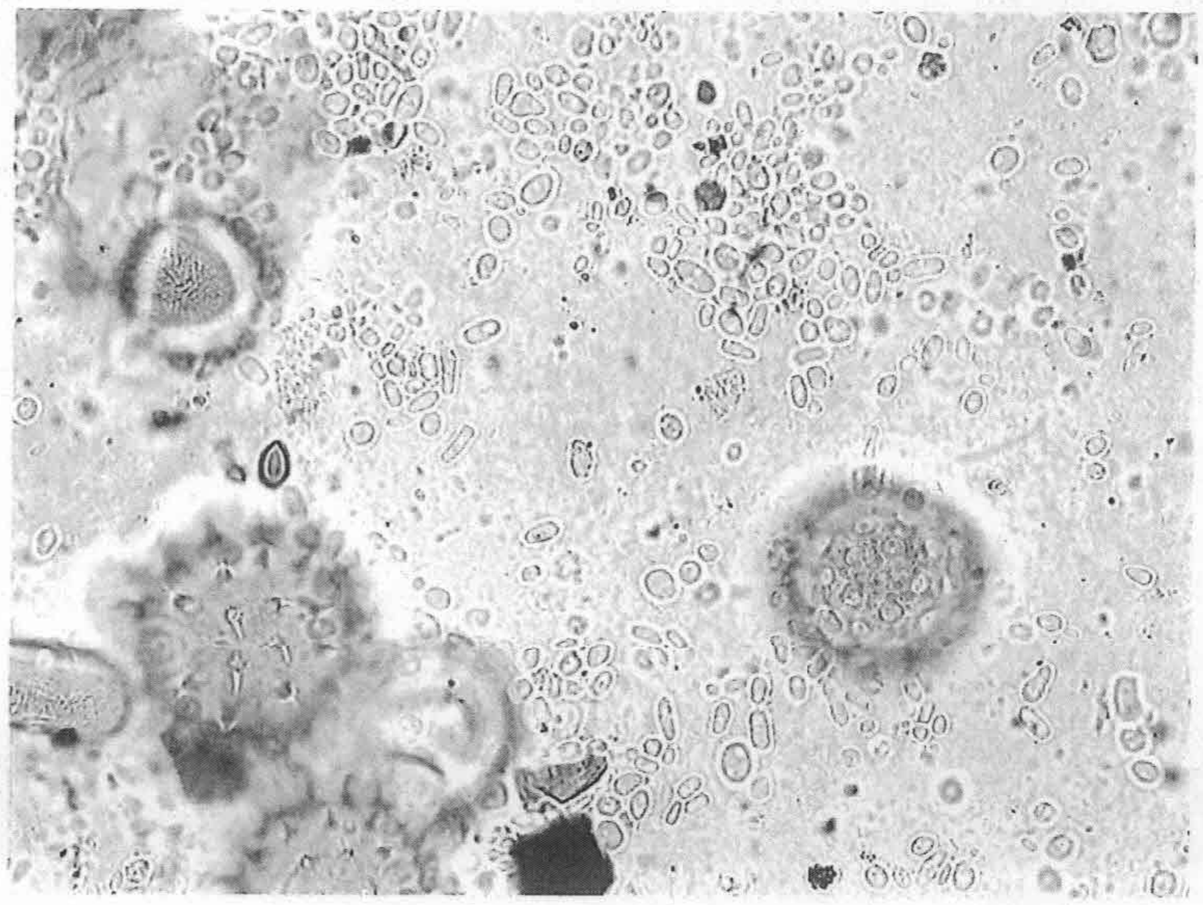

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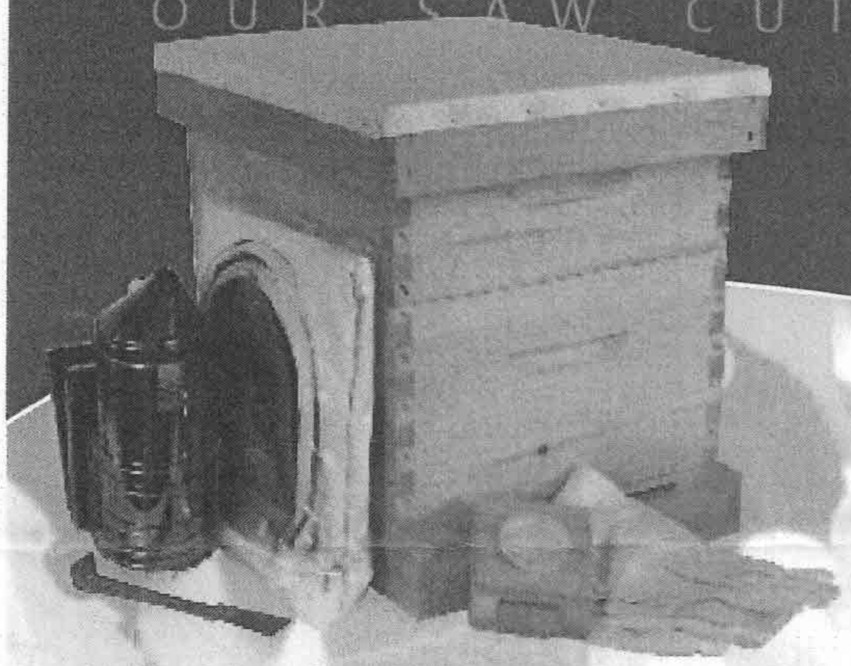

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