



Analytical and traceability survey to determine the authenticity of honey labelled as Irish on the Irish market

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1	SUMMARY	2
2	EU LEGISLATION RELATING TO HONEY.....	3
3	SAMPLING AND ANALYSIS.....	3
4	PART I: LABORATORY ANALYSIS.....	3
4.1	Introduction.....	3
4.2	Botanical Origin.....	3
4.3	Physiochemical Analysis:.....	4
4.4	Results.....	5
4.4.1	Botanical Origin	5
4.4.2	Physiochemical Analysis:	6
5	PART II: AUDIT OF PREMISES.....	8
5.1	Audit Process.....	8
5.2	Audit Findings.....	8
5.3	Audit Follow Up.....	10
5.4	Supervision of Premises.....	10
6	CONCLUSIONS	11
7	TABLES.....	12
	Table 1. Absolute Pollen Content of 20 Samples of Honey.....	12
	Table 2. Melissopalynology of 20 Samples of Honey.....	13
	Table 3. Results of Physiochemical Tests on 20 Honey Samples.	15
	Table 4: Sample Listing:	16
8	FURTHER INFORMATION	17

IMPORTANT NOTE

It must be noted that this survey only represents a snapshot in time. Only single samples of each product were tested. The results cannot be used to determine the authenticity or otherwise of other batches that have not been tested.

1 SUMMARY

Between July 2005 and April 2006 the Food Safety Authority of Ireland (FSAI) completed analysis and audits to determine whether honey sold as Irish on the Irish market complied with Council Directive 2001/110/EC¹ and Council Directive 2000/13/EC². A total of 20 Irish honey samples were analysed by the Department of Life Sciences, University of Limerick and five food business operators were subjected to a detailed audit.

The work was undertaken to investigate concerns raised by the Federation of Irish Beekeepers' Associations that a greater amount of Irish honey was sold compared to that produced in Ireland.

The physiochemical tests carried out included moisture, ash, free acidity, hydroxymethylfurfural (HMF) content, electrical conductivity, reducing sugars and sucrose.

- ◆ Moisture: 5% of samples were marginally above (21.6%) the allowed 20% moisture level, as specified in the legislation.
- ◆ HMF content: 15% of samples were considerably over the 40mg/kg EU limit and 10% were marginally so. The high HMF values were probably caused by overheating at the processing stage.
- ◆ All samples complied with the requirement (to be over 60%) for invert sugars. 5% of samples exceeded the required 5% level for sucrose (sucrose = 6.28%); all other samples were under the limit.

Of the 20 samples analysed six were found to be non-compliant with legislative requirements. All 20 samples were tested for antibiotics. One sample was found to contain 410µg/kg sulfadimidine (sulfamethazine) and less than 10µg/kg of other sulfonamides. Four samples were labelled as being of Irish origin and were not. One sample, also not Irish, was misleadingly labelled as Irish.

Audits were carried out with the food business operators responsible for packing/distributing the six non-compliant samples. During the audits, the non compliances regarding legislation relating to the labelling and authenticity of the products were outlined to the food business operators. Corrective action was requested of each food business operator to ensure the relevant legislation was being complied with.

¹ Council Directive 2001/110/EC of 20 December 2001 relating to honey

² Council Directive 2000/13/EC on the approximation of the laws of the Member States relating to the labelling, presentation and advertising of foodstuffs

2 EU LEGISLATION RELATING TO HONEY

Council Directive 2001/110/EC¹ Annex II stipulates the compositional criteria for honey. When placed on the market as honey or used in any product intended for human consumption, honey must meet the stated composition criteria.

The EU Directive 2001/110/EC¹ also identifies the requirements for placing honey on the market; in particular Article 2 4(a)

“the country or countries of origin where the honey has been harvested shall be indicated on the label. However, if the honey originates in more than one Member State or third country that indication may be replaced with one of the following, as appropriate:

- ‘blend of EC honeys’,
- ‘blend of non-EC honeys’,
- ‘blend of EC and non-EC honeys’.

3 SAMPLING AND ANALYSIS

A total of 20 random samples were selected from honey labelled as Irish, in a variety of premises in Ireland. Samples were gathered with the assistance of environmental health officers on a nationwide basis from various manufacturers and retail outlets.

The botanical origin and physiochemical properties were analysed for each sample. Samples were then analysed for moisture, ash, acidity, hydroxymethylfurfural content (HMF), glucose, fructose, sucrose, and electrical conductivity.

All samples were tested for the presence of antibiotics.

4 PART I: LABORATORY ANALYSIS

4.1 Introduction

Analytical investigation of the quality of Irish honey used melissopalynology and physiochemical determinations.

4.2 Botanical Origin

A melissopalynological study involves the quantitative and qualitative analyses of honey samples. The former refers to the absolute pollen content (APC), which is defined as the number of pollen grains/10g of honey. Most floral honeys extracted by centrifugation have an APC between 20,000 – 100,000 grains/10g of honey. An APC <1,000 grains/10g of honey is an indication of syrup adulteration or pressure filtering during processing.

Analysed samples can be classed as follows:

- | | |
|----------------|-------------------------------|
| Group 1 | <20,000 grains/10g |
| Group 2 | 20,000 – 100,000 grains/10g |
| Group 3 | 100,000 – 500,000grains/10g |
| Group 4 | 500,000 – 1,000,000grains/10g |
| Group 5 | >1,000,000 grains/10g |

Honey samples in Group 1 have a “poor” pollen content, in Group 2 an “intermediate” pollen content and samples in Groups 3, 4 and 5 are “rich” in pollen.

The qualitative analysis is the identification of the floral source of a honey, based on the pollen percentages present of different nectariferous plants. This is expressed according to the frequency classes. A unifloral honey has >45% of a pollen belonging to one taxon, while a multifloral honey is best described as one in which no one pollen type dominates

4.3 Physiochemical Analysis

The physiochemical analysis of honey is aimed at assessing the quality of honey and includes the determination of the moisture content, ash, acidity, hydroxymethylfurfural content (HMF), apparent reducing sugars, apparent sucrose and electrical conductivity.

- **Moisture:** This quality criterion determines the capability of a honey to remain stable and resist spoilage, due to yeast fermentation. The higher the proportion of water present, the higher the probability that the honey will ferment. The EC Directive 2001/110/EC¹ specifies moisture content of not more than 20%.
- **Ash:** The ash content is a quality criterion for botanical origin, with blossom honeys having a lower ash content than honeydew honeys.
- **Acidity:** There is a considerable natural variation in the acidity of honey. However, fermentation can cause an increase in the acidity of honey and thus this measurement is important as a quality criterion. The EC Directive 2001/110/EC¹ recommends a level of total acidity <40 milliequivalents/kg.
- **Hydoxymethylfurfural content (HMF):** The HMF content of a honey is an indicator of honey freshness or overheating. In fresh honey there is practically no HMF, but this increases upon storage, depending on the pH of the honey and the storage temperature. The EC Directive 2001/110/EC¹ limit is <40 mg/kg.
- **Apparent reducing sugar/apparent sucrose:** Testing for actual glucose, fructose and sucrose was carried out. The EC Directive 2001/110/EC¹ which gives compositional criteria based on actual values, as follows: sum of glucose plus fructose “not less than 60g/100g” and sucrose “not more than 5g/100g”.
- **Electrical conductivity:** Conductivity is a criterion for determining the botanical origin of a honey. The values in the EC Directive 2001/110/EC¹ vary according to the botanical origin of the honey. For most honeys, electrical conductivity should be <0.8mS/cm, but values up to 1.8mS/cm can occur in certain honeys.

4.4 Results

All 20 samples were blossom honey or nectar honey (honey which comes from nectarines of flowers), as defined in the EC Directive 2001/110/EC¹, Annex 1, 2 (a) (i). None of the samples were honeydew honey (honey obtained mainly from secretions of living parts of plants or excretions of plant sucking insects on the living part of plants).

4.4.1 Botanical Origin

- **Quantitative analysis (Absolute Pollen Content):** Seven honey samples had an “intermediate” pollen content (20,000 – 100,000 pollen grains/10g) and the remainder had “rich” pollen content (100,000 – 500,000 grains/10g) (Table 1), as defined previously in Section 4.2.

These results are all acceptable. They do not give any indication of possible adulteration or the reduction of pollen content by filtration at the processing stage.

- **Qualitative analysis (pollen frequency):** Melissopalynology is used to identify the floral origins of honeys, by identifying the pollens found in honey. This enables Irish honey to be distinguished from foreign honey, based on the pollen types present. The overall results for the 20 samples are given in Table 2. 25% of samples (sample numbers 1, 3, 14, 17 and 20) were found not to be Irish.

Sample 1 Molaga Pure Honey, Sample 17 Kilkenny Pure Irish Honey and Sample 20 Natural Ireland Honey:

These had *Eucalyptus* and *Echium* pollens in numbers which suggest Mediterranean/Spanish honey. The occurrence of *Eucalyptus*, *Echium*, Labiates and *Cistus* together is very typical of Mediterranean/Spanish honey and these pollens were found in samples 1, 17 and 20. Labiates are also typical of Spanish honey, occurring with pollen such as *Ulex* type. The occurrence of *Cistus spp.* also indicates misrepresentation in Irish honey but is typical of Mediterranean honey, especially Spanish honey.

Sample 3 Irish Honey – Wheelocks Fruit Stall:

Detailed examination showed isolated pollens of *Borreria* (a Brazilian bush), *Richardia* type, *Mimosa bimucronata* and possible *Mimosa pudica*. *Convolvulaceae* pollen was also present. Not Irish; probably South American, e.g. Brazilian, in origin.

Sample 8 Bolgers Honey:

Sample 8 had *Eucalyptus*, but no *Echium*, therefore it is of questionably Irish origin. Usually, when *Echium* is present with *Eucalyptus*, the conclusion from previous works has been that the honey is not Irish. When *Echium* is not present, i.e. *Eucalyptus* only, as in sample 8, then it could be Irish, but this would be unusual. According to Sawyer (1988)³, *Eucalyptus spp.* and *Echium spp.* occur in “sporadic” amounts in English and Irish honey, but are never found together in the same sample. *Echium spp.* is generally found locally in honey produced in calcareous regions, while *Eucalyptus* pollen occurs in honey in the vicinity of mature *Eucalyptus* trees.

³ Sawyer, R. W. (1988) Honey identification. Cardiff. Cardiff Academic Press.

Sample 14 Wexford Honey – Jim Kenny:

Not Irish; possibly East European to Chinese in origin.

4.4.2 Physiochemical Analysis:

A descriptive analysis of the physiochemical parameters are given in Table 3.

- **Moisture:** The moisture content depends on the botanical origin of the honey, the degree of ripeness, the processing techniques and the storage conditions. In this study, the moisture content varied between 16.5% - 21.6%. The EC Directive 2001/110/EC¹ specifies 20%, as the maximum moisture content. Two samples slightly exceeded the upper limit. This could be caused by the inclusion of unripe honey. It could reduce the shelf-life of the product, but is not likely to be a major quality issue.
- **Ash:** In general, honey has a low ash content and depends on the material collected by the honey bees during foraging. The ash content of all 20 samples was very low. The EC Directive 2001/110/EC¹ does not prescribe limits for this variable.
- **Total Acidity:** Acidity in honey is due to the presence of organic acids, particularly gluconic acid in equilibrium with lactones or esters and inorganic ions, such as phosphates and chlorides (Takenaka and Echigo, 1974)⁴. The EC Directive 2001/110/EC¹ specifies “not more than 50 milliequivalents acid per 1,000 grammes”. All 20 samples were well within this limit.
- **Hydroxymethylfurfural content (HMF):** The HMF content is widely recognised as a parameter in evaluating the freshness of honey. According to the EC Directive 2001/110/EC¹, the acceptable standard is <40mg/kg for all retailed honey and <80mg/kg for all processed honeys declared tropical or blended honeys. Five samples in the present survey were above the acceptable limit of <40mg/kg and these will be investigated further. It is likely that high HMF values are due to overheating at the processing stage. This may be carried out to liquefy crystallized honey and to prevent its re-crystallization on the shelf.
- **D-glucose, D-fructose and sucrose:** The values for these three sugars are in Table 3. The EU Directive 2001/110/EC¹ gives compositional criteria for D-glucose, plus D-fructose (not less than 60g/100g). All of the samples achieved this criterion (mean 78.9, range 69.2 – 94.6 g/100g). The EU Directive 2001/110/EC¹ criterion in the case of sucrose is not more than 5g/100g. Sample 13 exceeded this value (6.28g/100g). However, it must be noted that there is discussion in the literature (e.g. Bogdanov 1999)⁵ which suggests that some variation can be expected for honeys from different sources. Elevated sucrose levels might be caused by direct adulteration of honey with sucrose, or, more likely, by bee keepers feeding their bees with sugar syrup before removing honey for extraction.

⁴ Takenaka, T, Echigo, T. (1974) Changes in enzyme activity during the storage of honey. Bulletin of the Faculty of Agriculture, Tamagawa University, No. 14: 19-25

⁵ Bogdanov, S. (1999) International regulatory standards: review by International Honey Commission. Bee World 80(2), 61-69

- **Electrical conductivity:** Electrical conductivity (EC) is a good criterion of the botanical origin of a honey (Bogdanov, *et al.*, 1997)⁶ and is very often used as a routine honey control. An upper limit of <0.8mS cm⁻¹ is given by the EC Directive 2001/110/EC¹ for blossom honeys. In this study, the EC values ranged from 0.14mS cm⁻¹ to 0.52mS cm⁻¹ and thus, all samples complied with the EC Directive 2001/110/EC¹.

- **Presence of antibiotics:** All 20 samples were tested for antibiotics, as follows:

- ♦ chloramphenicol (none detected)
- ♦ tetracycline (none detected),
- ♦ streptomycin (none detected),

and 12 different sulphonamides were screened for, as follows:

1. Sulfachloropyridazine
2. Sulfadiazine
3. Sulfadimethoxine
4. Sulfadimidine (Sulfamethazine)
5. Sulfamerazine
6. Sulfamethizole
7. Sulfamethoxypyridazine
8. Sulfapyridine
9. Sulfaquinoxaline
10. Sulfathiazole
11. Sulfaisoxazole
12. Sulfadoxine

No antibiotics were detected in 19 samples. Sample 13 was found to contain 410µg/kg sulfadimidine (sulfamethazine) and less than 10µg/kg of other sulfonamides.

On analysis, sulfonamides at these levels present a negligible risk, however, antibiotic residues should not be present in honey.

⁶ Bogdanov, S., Martin, P., Lullmann, C., (1997). Harmonised method of the European Honey Commission. *Apidologie* (extra issue), 1-59

5 PART II: AUDIT OF PREMISES

On receiving the results of the laboratory analyses, the packers, brand owners and retailers of six samples, which were in breach of the legislative requirements, were established. All 20 samples were tested for antibiotics. One sample was found to contain 410µg/kg sulfadimidine (sulfamethazine) and less than 10µg/kg of other sulfonamides. Four samples were labelled as being of Irish origin and were not. One sample, also not Irish, was misleadingly labelled as Irish. The FSAI then conducted a series of audits with the relevant food business operators to determine compliance with Council Directive 2001/110/EC¹, Council Directive 2000/13/EC² and Regulation 18 of Regulation (EC) 178/2002⁷ regarding traceability.

5.1 Audit Process

The audit team held an opening meeting with the food business operator at the commencement of each audit. The purpose of the opening meeting was to introduce the audit team, confirm the information regarding the premises and food business, define the scope of the audit and outline the legislation under which it was being conducted. During the audit, the processes and procedures used by the food business operator regarding the labelling and traceability of honey was examined in detail. The audit team held a closing meeting at the end of each audit. The purpose of this closing meeting was to outline the findings of the audit and any non-compliances identified, and to allow the food business operator to clarify any point of information. The audit team also advised the food business operator that a formal on-site report of the audit would be issued.

Letters were sent to all auditees, as well as to all brand owners and retailers regarding their products and detailing the breaches of legislation in each case. The food business operators were requested to provide the FSAI with written details of the corrective action taken to address the non-conformances identified.

5.2 Audit Findings

Five food business operators were audited as part of the survey; these were the packers, brand owners and/or retailer of the samples that were identified as containing antibiotics or as not being of Irish origin. Please refer to table 4 for the full listing of the 20 samples analysed.

Sample 1 Molaga Pure Honey, Sample 17 Kilkenny Pure Irish Honey and Sample 20 Natural Ireland Honey:

An audit was carried out with the food business operator responsible for packing samples 1, 17 and 20 at his premises. This food business operator produces his own honey, but also purchases from other local producers, as well as importing honey. At the time of the audit, there was a traceability system in place; however, product traceability was not possible, as there was insufficient detail recorded and there were no records available to the audit team for products packed in 2005. The audit team were advised that there were no product specifications agreed between the packer and the customers. Sample 17 was packed, but not labelled by this food business operator.

⁷ Regulation (EC) 178/2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety

The audit team advised the food business operator and the brand owners of the products as to the legislative breaches, and requested details of the corrective action in each case. The legislative breaches are as detailed below:

Sample 1:

- Honey of Mediterranean/Spanish origin, with a label inferring Irish origin
- No special conditions for conservation and use

Sample 17:

- Honey of Mediterranean/Spanish origin, labelled as Irish
- No address of manufacturer/packer
- No date of minimum durability (best-before date)
- No special conditions for conservation and use

Sample 20:

- Honey of Mediterranean/Spanish origin, labelled as Irish
- No special conditions for conservation and use

Sample 3 Irish Honey – Wheelocks Fruit Stall:

The follow-up carried out with regards to sample 3, included two separate audits, one with the retailer of the product and one with the named packer of the product. In both cases, traceability and other records were insufficient to meet legal requirements. The audit team were advised that there were no product specifications agreed between the customer and supplier. The legislative breaches are as detailed below:

- Honey of South American origin, labelled as Irish
- No name/trade name/address of manufacturer/packer/seller on label
- No date of minimum durability (best-before date)
- No special conditions for conservation and use

Sample 13 The Clare Jam Company Honey

Sample 13 tested positive for antibiotics and an audit of the food business operator responsible for packing this product was carried out. The audit team were advised that there were no product specifications agreed between the packer and the brand owner. The product is sent to the customer packed, but unlabelled. This food business operator purchases product from another local producer to supplement his own supply. At the time of the audit, there was no traceability system in place. The audit team advised the food business operator and the brand owner of the product, as to the legislative breaches, and requested details of the corrective action in each case. The legislative breaches are as detailed below:

- Presence of sulphonamides (410 µg/kg Sulfadimidine)

Sample 14 Wexford Honey – Jim Kenny:

The audit team carried out an audit with the brand owner of the product. Traceability and other records were insufficient to meet legal requirements. The audit team were advised that there were no product specifications agreed between the brand owner and supplier.

The audit team advised the brand owner of the product as to the legislative breaches, and requested details of the corrective action in each case. The legislative breaches are as detailed below:

- Honey with origin of Eastern Europe to China, labelled as Irish
- No address of manufacturer/packer/seller on label
- No date of minimum durability (best-before date)
- No special conditions for conservation and use

5.3 Audit Follow Up

As part of the audit process, auditees were advised of the legal requirements and the breaches thereof. As a follow up to the audit, copies of the relevant legislation as well as FSAI guidance notes and information regarding labelling and traceability were forwarded to all auditees.

Formal samples were taken, as part of the audits, for further analysis, from the food business operators responsible for the packaging / retailing of the products which were of non-Irish origin, as well as the product which contained antibiotics.

5.4 Supervision of Premises

Retail premises selling honey are subject to inspection by Environmental Health Officers of the Health Service Executive (HSE). Where known, packers, distributors and importers would also be inspected by the HSE. Producers of honey who pack their own produce are inspected by Department of Agriculture and Food inspectors. Until the new provisions of Regulation (EC) No 852/2004⁸ on the hygiene of foodstuffs came into effect on the 1st of January 2006 not all food businesses were required to be registered. The audit of the food businesses for this honey survey identified that not all were known operators to the inspection agencies and therefore, were not subject to the normal inspection regime. Regulation (EC) No 852/2004⁸ and Regulation (EC) No 853/2004⁹ require that food business operators are registered with the relevant inspection agency. Registration of such food business operators will resolve this situation.

⁸ Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs.

⁹ Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin

6 CONCLUSIONS

It must be noted that this survey only represents a snapshot in time. Only single samples of each product were tested. The results cannot be used to determine the authenticity or otherwise of other batches that have not been tested.

The majority of Irish honey samples had a “rich” or “intermediate” APC. From the APC point of view, all samples would be acceptable as blossom honey.

The melissopalynological analysis suggests that 25% of samples (1, 3, 14, 17 and 20) were not Irish and sample 8 was questionably Irish. The other samples had a pollen spectrum suggesting they were Irish blossom honey.

Moisture content was exceeded in samples 6 and 7. Otherwise, all samples were within acceptable limits.

Total acidity and electrical conductivity were all within the EC Directive 2001/110/EC¹ limits. Hydroxymethylfurfural (HMF) levels were exceeded by 25% of samples (1, 7, 10, 11, 12). In the case of samples 10, 11 and 12, the values were greatly in excess of the EC Directive 2001/110/EC¹ limits and these will be investigated further.

The EC Directive 2001/110/EC¹ criterion was exceeded for sucrose by sample 13.

All 20 samples were negative for the following antibiotics: chloramphenicol, tetracycline and streptomycin. Twelve different sulphonamides were screened for and none were detected in 95% of samples. Sample 13 was found to contain 410µg/kg sulfadimidine (sulfamethazine) and less than 10µg/kg of other sulfonamides.

In audits carried out with the food business operators, the level of record keeping was insufficient to facilitate traceability or product recall. The food business operators audited also demonstrated a lack of awareness regarding legislative requirements, with regards to traceability, under Regulation 178/2002⁷, general labelling under Directive 2000/13/EC², and product specific requirements under Directive 2001/110/EC¹.

Food business operators are reminded of their obligations regarding labelling, traceability (one step back to their supplier and one step forward to their customer), as well as the need to have confidence in their suppliers. Food business operators were also advised to document and agree specifications with suppliers and customers.

The FSAI highlights the need for consumers to read labels carefully when purchasing products. The FSAI has an information leaflet on Understanding Food Labelling, and further information on food labelling is available from the FSAI website.

Monitoring of honey for authenticity and accurate labelling is ongoing in Ireland and appropriate action will be taken where breaches of the legislation are identified.

7 TABLES

Table 1. Absolute Pollen Content of 20 Samples of Honey

“Group” refers to frequency class (see Part 1: Laboratory Analysis 4.2: Botanical Origin).

Sample	APC	Group
1	128015	3
2	27429	2
3	166809	3
4	51371	2
5	342055	3
6	61715	2
7	348896	3
8	198582	3
9	26724	2
10	146491	3
11	149959	3
12	41909	2
13	212476	3
14	141234	3
15	364972	3
16	43183	2
17	223404	3
18	93124	2
19	220739	3
20	232811	3

The figures represent percent occurrence in each sample. Yellow = not Irish; Green = Questionably Irish.

[illegible]

Table 2 cont'd.

Pollen type / Sample:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Hypericum spp.						1.6					0.4		1.4		1.4				0.4	
Ilex spp.	0.3	0.4	0.4	1.7	0.3	1.9	1.6	2.1	7.9		0.4	0.4			0.7					
Impatiens spp.		0.4						5.6												
Labiatae	12.8																4.2			5.4
Ligustrum spp.				4.0		0.6				0.3		0.4							0.4	
Loranthus europaeus			3.8											2.3						
Mimosa spp.			1.9																	
Olea spp.	0.7																			0.7
Other Ulex type				8.4	1.0	1.6			2.2						0.7			0.3	0.4	
Others	1.4	3.0	4.5	1.7	0.7	1.6	0.7		1.4	2.1	1.5	0.7	2.1	4.2	0.7		2.5	1.0	1.5	2.0
Papaver spp.				0.3	0.3	0.3					0.4				0.3					
Pinus spp.				0.7		0.3														
Plantago spp.						0.6					0.4		0.3			0.4				
Primula spp.											1.1									
Protea spp.														3.5						
Prunus/Pyrus type		21.9		13.7	28.3	5.8			7.6	3.1		4.0	8.0		19.9			8.8	0.4	
Quercus spp.									1.1	0.3										
Ranunculus spp.		2.2		0.3	2.0	1.6			2.2	2.7	0.4	0.4	0.7					0.3	0.8	0.3
Ribes spp.		0.7		1.0	0.7						1.1		2.4							
Robinia spp.			2.6											1.9						
Rosaceae	1.0	16.4		2.3	3.0	16.1			27.1	17.5	0.4	12.4	23.6	1.9	8.9	1.5	1.4	6.1	4.9	1.3
Rubus spp.		1.1				4.5	0.3		0.4	39.0	4.0	59.9	33.3		7.9	90.1		4.7	43.6	0.3
Sambucus spp.		9.7		3.3	2.7	2.3	0.7		9.7	2.4	0.7	0.4	1.0		1.0			0.3		
Saxifragaceae						0.3														
Scrophulariaceae	0.3	1.5			0.3	2.6			0.7	3.1		1.5	3.5		2.1	0.4			1.5	
Taraxacum type	0.3		0.4			0.3	0.3		1.4		0.4			0.4			0.7			1.0
Teucrium spp.											0.4		0.3							
Tilia spp.				0.3							0.4				0.7					
Trifolium pratense			2.3				2.6	1.8						1.2			1.4	0.3		3.0
Trifolium repens	3.7	8.19	0.8		1.0	15.2	22.5	10.5	4.3	10.6	2.2	6.9	3.5	5.4	3.8	0.7	0.7	3.7	34.1	0.7
Ulex type	9.5	6.7		15.1	7.0	5.5	0.7	0.7	6.1	3.4	1.1	0.7	1.4	1.5	1.0	0.4	17.5	5.4	3.4	8.8
Umbelliferae	0.3		2.3				0.7	1.1			0.4			0.4	0.3					
Vicia spp.		0.4	0.4	0.7			4.2	3.7							1.0			5.4	0.4	
Viola spp.		0.4																		

Table 3. Results of Physiochemical Tests on 20 Honey Samples

(See Part I: 4.3: Physiochemical analysis for the abbreviations used).

Samples which do not conform to EU Directive¹ limits are highlighted in yellow.

sample	moisture	Pct ash	acidity	HMF	EC
1	17.5	0.20	35	41.1	0.319
2	18.8	0.20	17	21.1	0.274
3	17.1	0.20	17	20.1	0.297
4	18.8	0.21	22	12.6	0.140
5	18.8	0.41	23	5.3	0.376
6	20.4	0.20	25	10.5	0.522
7	21.6	0.40	23	43.6	0.180
8	18.6	0.19	25	39.6	0.242
9	18.3	0.20	21	24.3	0.453
10	18.0	0.19	25	140.8	0.194
11	18.8	0.20	17	237.3	0.174
12	18.0	0.21	26	108.8	0.197
13	16.5	0.20	19	1.2	0.199
14	17.4	0.60	21	32	0.222
15	17.9	0.20	24	9.3	0.443
16	16.7	0.20	26	6.4	0.239
17	17.4	0.19	39	24.1	0.322
18	18.6	0.21	27	9.7	0.368
19	17.6	0.21	29	25.9	0.181
20	17.9	0.20	39	37.5	0.325

Table 4: Sample Listing

Sample Number	Product Name	Product Information	Claimed Origin	Probable Origin
1.	Molaga Pure Honey Collins, Timoleague, Co. Cork, Ireland	Batch E Best before 9.8.07	Irish	Mediterranean/ Spanish
2.	Pure Wexford Honey Clody Valley Apiaries, Bunclody	No information	Irish	Irish
3.	Irish honey ex Wheelock's Fruit stall Wexford	No information	Irish	South American
4.	Pure Irish Honey Tony Walshe, Carrigbyrne Apiary, Foulksmills, Co. Wexford	Best before 30.6.06	Irish	Irish
5.	Mileeven Pure Irish Honey Owning Hill, Piltown, Co. Kilkenny	No information	Irish	Irish
6.	100% Irish Honey S. Kennedy, The Hook, Co. Wexford	Best before July 2008	Irish	Irish
7.	100% Irish Honey - Healy's Natural Irish Honey Ballincollig, Co. Cork	Best before 25.04.2009	Irish	Irish
8.	Bolgers Honey– 100% Pure Co. Wexford	Batch 600 Use by 12.12.08	Irish	Questionably Irish
9.	William's Honey Tincurry, Cahir, Co. Tipperary	Best before End 2006	Irish	Irish
10.	Moynihans Pure Irish Honey, Moynihan Apiaries, Dungarvan	Best before 1Jun08 Batch 024	Irish	Irish
11.	Wild Irish Honey Líos na Graí, Co.Limerick	Best before 1Apr08 Batch 016	Irish	Irish
12.	Kelkin Pure Irish Honey Ballymount, Dublin 12	Best before 1Mar08 Batch 011	Irish	Irish
13.	The Clare Jam Company Honey Lough North Doolin, Co. Clare	Best before 01 Aug 07	Irish	Irish
14.	Wexford Honey Jim Kenny, Golden Hive Apiaries	No information	Irish	Eastern Europe to China
15.	Jan's Old Fashioned Irish Honey, PO Box 6166, Dun Laoghaire, Co. Dublin	Best before 06.07	Irish	Irish
16.	Pure Irish Honey J. Collins, Gurranes, Timoleague, Bandon	Batch E Best before 9.8.08	Irish	Irish
17.	Kilkenny Pure Irish Honey	No information	Irish	Mediterranean/ Spanish
18.	Wexford Honey A. Murphy, Brownswood, Enniscorthy	No information	Irish	Irish
19.	Pure Wexford Honey Sean O'Gorman, Killanne	No information	Irish	Irish
20.	Natural Ireland Honey Unit 6, Canal Walk, Park West, Dublin 12	Batch E Best before 9.8.07	Irish	Mediterranean/ Spanish

8 FURTHER INFORMATION

Further information on this survey can be obtained from:

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Food Safety Authority of Ireland
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