Appendix I. Glossary for unifloral honeys sensory description (Persano Oddo and Piro, 2004). All numbered lists correspond to a possible scale relative to the parameter considered. All bulleted lists correspond to a non-exhaustive list of descriptors of the parameter considered. Description of texture is not included in this assessment.
Definition of the main sensory analysis terms can be found in ISO 5492 (1992).

A. VISUAL ASSESSMENT

It consists in observing all visible attributes on a small sample (about 40 g) of honey, in wineglass (balloon type, 160 mL capacity), at room temperature (18–25 °C). Only colour is described, because it is the only visual attribute completely related to the botanical origin.

A.1. Colour intensity

It refers to the degree of lightness or darkness of the colour of honey when observed in its liquid form (luminance). As a reference it can be considered that "very light" corresponds to almost no colour and "very dark" corresponds to nearly black. In crystallized honey, the intensity degrees are from white to almost black, through more or less dark beige tones, however the colour can vary very much following the possible types of granulation and/or process, so we preferred to refer to liquid honey, and to indicate in a note possible typical aspects of crystallized honey.

1. very light 2. light 3. medium 4. dark 5. very dark.

A.2. Colour tone

It refers to different attributes of the honey colour, like hue, luminance, saturation, fluorescence, as they can be seen in liquid or crystallized honey. The references for "normal honey colour" are the glass standards of the Lovibond 2000 honey comparator.

• normal honey colour • bright yellow • whitish • greyish • yellow • reddish • orange • dull • bright • green fluorescence.

B. OLFACTORY ASSESSMENT

It refers to the honey odour perceived sniffing a small sample (about 40 g), in wineglass (balloon type, 160 mL capacity), at room temperature (18–25 °C), just after stirring it with a plastic spoon.

B.1. Intensity of odour

It refers to the overall intensity of sensation perceived when honey is smelled in the above-described conditions. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of odour in honey in the above described conditions.

0. absent 1. weak 2. medium 3. strong.

B.2. Description of odour

It refers to the terminology and references of the "Honey aroma wheel" (Fig. 2).

C. TASTING ASSESSMENT

It refers to all chemical sensations perceived when a small quantity (1–2 g) of raw honey, at room temperature (18–25 °C), is put in the mouth, dissolved and swallowed. On a physiological basis, sensations described below are referred to gustatory, olfactory and trigeminal stimulations, pseudothermal effects or complex sensations like astringency, persistence and after-taste. Between each tasting assessment and the following one, some minutes have to pass and the mouth has to be rinsed with water; a piece of apple, preferably juicy and slightly acidulous but not bitter or astringent, or some bread can be eaten.

C.1. Sweetness

It refers to the intensity of sweet sensation perceived when honey is dissolved in the mouth. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of sweet taste in honey in the above described conditions. Several observations indicate that differences in sweet intensity are more related to the physical state of the samples (liquid/crystallized) or to the presence of other perceptions (more acid and bitter, less sweet) than to the botanical origin.

1. weak 2. medium 3. strong.

Appendix I. Continued.

C.2. Acidity

It refers to the intensity of acid sensation perceived when honey is dissolved in the mouth. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of acid taste in honey in the above described conditions.

0. absent 1. weak 2. medium 3. strong.

C.3. Saltiness

It refers to the intensity of salty sensation perceived when honey is dissolved in the mouth. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of salty taste in honey in the above described conditions. In our experience on honey salty taste is perceived in a very uneven way. In trials performed by the IHC no honey sample was significantly described as salty and we did not use this attribute in European unifloral honey descriptions.

0. absent 1. weak 2. medium 3. strong.

C.4. Bitterness

It refers to the intensity of bitter sensation perceived when honey is dissolved in the mouth and after swallowing it. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of bitter taste in honey in the above described conditions.

0. absent 1. weak 2. medium 3. strong.

C.5. Intensity of aroma

It refers to the global intensity of the odour component perceived via the back of the nose when honey is dissolved in the mouth. As a quantitative reference it can be considered that the proposed scale must cover all possibly perceived intensities of aroma in honey in the above described conditions.

0. absent 1. weak 2. medium 3. strong.

C.6. Description of aroma

It refers to the terminology and references of the "Honey aroma wheel" (Fig. 2).

C.7. Persistence/after-taste

They refer to the duration of the sensations in the mouth after swallowing. An after-taste, according to ISO 5492 (1992), corresponds to a new sensation that appears during this period. As reference it can be considered that "short" corresponds to less than 30 seconds and "long" corresponds to more than five minutes. When an after-taste is present its characteristics are described in brackets with the terminology and references defined for odour and aroma (Fig. 2).

0. absent 1. short 2. medium 3. long.

C.8. Other mouth perceptions

In this step, other sensations perceived in the tasting assessment that are not related with olfactory or gustatory stimulation are taken into consideration. They are occasionally perceived in honey and definitions are given for each term employed:

– Astringent – describes the complex sensation, accompanied by shrinking, drawing or puckering of the skin or mucosal surface in the mouth, produced by substances such as kaki tannins and sloe tannins (ISO 5492, 1992);
– Piquant – describes a trigeminal sensation perceived as irritating or aggressive in the mouth or in the throat; a perception like this is often perceived in honey, mostly when in liquid form, but the sensation does not correspond to that give by capsaicin (reference for this attribute according to Bérodier et al., 1997). In trials performed by the IHC no honey sample was significantly described as piquant and we did not use this attribute in European unifloral honey descriptions;
– Refreshing – describes a cool sensation unrelated to the temperature of the substance produced for example by menthol (pseudothermal effect). In honey, it is often related to small glucose crystals that absorb heat while melting.

Appendix I. Continued.

D. Physical characteristics

D.1. Crystallization rate

Crystallization rate is a non-specific parameter, depending also on factors different from botanical origin (storage and processing). Moreover, from some physicochemical parameters (sugar composition, ratio fructose/glucose and glucose/water) it is possible to know if a unifloral honey tends to granulate more or less quickly. However the traditional descriptions always report this physical characteristic, and it can be useful to indicate if a honey is likely to be found in liquid or crystallized form. "Slow" corresponds to several months in liquid form and "quick" corresponds to a few weeks in liquid form.

1. slow 2. moderate 3. quick.

D.2. Other physical characteristics

If present, other physical characteristics common in some honey types are described, as texture or some typical aspect of crystallized honey. They can not be considered as diagnostic parameters, also depending on factors different from botanical origin, and no reference terminology was established for them.

Appendix II. Evaluation form.

No. sample:

Date:

Assessor:

DEFECTS

Olfactory assessment

(unstructured 10 cm scale) ➔

Off odour of fermentation ----------

➔

Taint of ... ----------

Tasting assessment

➔

Off flavour of fermentation ----------

➔

Taint of ... ----------

UNIFLORAL CORRESPONDANCE

Olfactory assessment

➔

Unifloral of ... ----------

Tasting assessment

➔

Unifloral of ... ----------

Notes:

Appendix III. Tenerife honey tasting Committee classification scheme (Bentabol, unpublished data).

Defects		
Median	Category	Destination
0	AA	suitable for the denomination “Miel de Tenerife”
3	A	suitable for the denomination “Miel de Tenerife”
3.1–6.5	B	not suitable for the denomination “Miel de Tenerife” (suitable to direct consumption)
> 6.5	C	not suitable for direct consumption
Conformity to typical profile		
Median	Category	Destination
7.5	Very typical	suitable for Identification of botanical origin in labelling
5–7.4	Typical	suitable for Identification of botanical origin in labelling
< 5	Not typical	not suitable for Identification of botanical origin in labelling

Appendix IV. χ^2 test ($P \leq 0.05$). Minimum number of replies in one category for considering valid a yes/no classification trial.

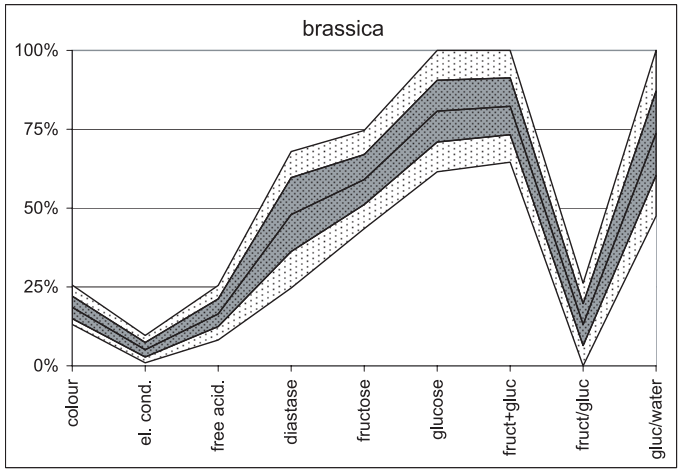
Number of assessors	Minimum number of replies in one category to consider valid the trial	Number of assessors	Minimum number of replies in one category to consider valid the trial
7	7	19	14
8	7	20	15
9	8	21	15
10	9	22	16
11	9	23	17
12	10	24	17
13	11	25	18
14	11	26	18
15	12	27	19
16	12	28	20
17	13	29	20
18	14	30	21

Appendix V. List of participant laboratories and researchers (for further information on participating laboratories, see www.apis.admin.ch/english/host/hosthoney/hosthoney.htm).

Country	Laboratory	Researcher
Belgium	CARI Louvaine la Neuve	Etienne Bruneau Christine Guyot Declerck
Bulgaria	Experimental Bee Station Kostinbrod	Tzeko Ivanov
Czech Republic	Bee Research Institute Dol	Jiina Piškulová
France	AFSSA, Section apicole Sophia Antipolis	Christian Flamini
France	Naturalim-France Miel Mouchard	Joël Lheritier
France	Bernard Michaud S.A. Jurançon	Monique Morlot
Germany	Handels und Umweltslabor Hamburg	Harald Russmann
Germany	Niedersächsisches Landesinstitut für Bienenkunde Celle	Werner Von der Ohe Katharine Von der Ohe
Greece	Laboratory of Quality Control - Bee Culturing Co. ATTIKI Athens	Sophia Karabournioti
Greece	Dept. of Food Hygiene and Technology - Institute of Veterinary Research of Athens - National Agricultural Research Foundation Athens	Angeliki Tsigouri Maria Passaloglou-Katrali
Greece	Laboratory of Apiculture & Sericulture, Aristotle University Thessaloniki	Andreas Thrasyvoulou
Greece	Laboratory of Analytical Chemistry Mediterranean Agronomic Institute of Chania (M.A.I.Ch) Chania, Crete	Panagiota Gotsiou Panagiotis Kefalas
Italy	Istituto Nazionale di Apicoltura Bologna	Anna Gloria Sabatini Gian Luigi Marcazzan
Italy	Ist. Sper. Zoologia Agraria, Sezione di Apicoltura Roma	Livia Persano-Oddo Maria Gioia Piazza Lucia Piana
Italy	Istituto Zooprofilattico della Lombardia e dell'Emilia Romagna Brescia	Roberto Piro
Netherlands	Inspectorate for Health Protection and Veterinary Public Health Amsterdam	Jacob D. Kerkvliet
Portugal	Escola superior agraria de Santarem S.Pedro	Joanna Godhino
Spain	Centro Regional Apicola Guadalajara	Alberto Ortiz Valbuena
Spain	Casa de la miel Tenerife, Canarias	Antonio Bentabol
Switzerland	Federal Dairy Research Station, Swiss Bee Research Centre, Liebefeld	Stefan Bogdanov Kaspar Ruoff*

* Ruoff provided data for Finland honeys.

colour (mm Pfund)
el. conductivity (mS/cm)
free acidity (meq/kg)
diastase (DN)
fructose (g/100g)
glucose (g/100g)
Fruct.+Gluc. (g/100g)
Fruct./ Gluc. ratio
Gluc. / Water ratio



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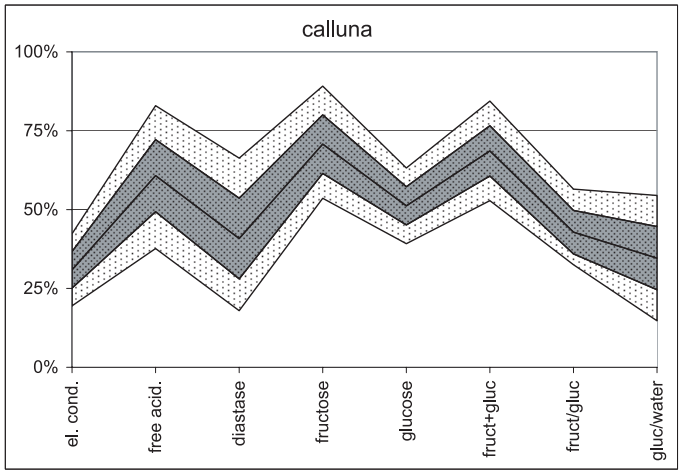
Fruct./ Gluc. ratio
Gluc. / Water ratio



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glucose (g/100g)
Fruct.+Gluc. (g/100g)
Fruct./ Gluc. ratio
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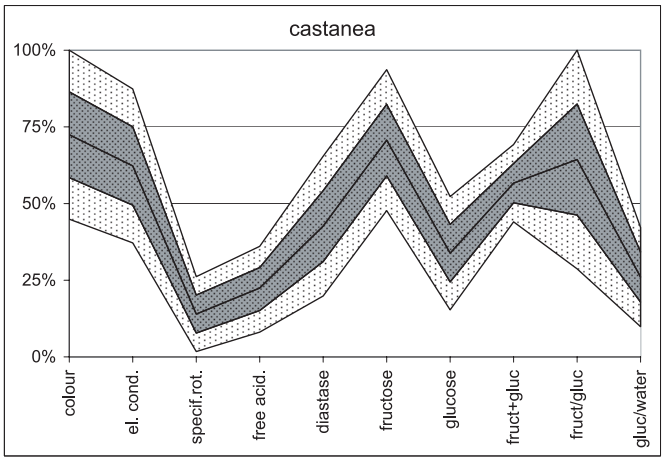

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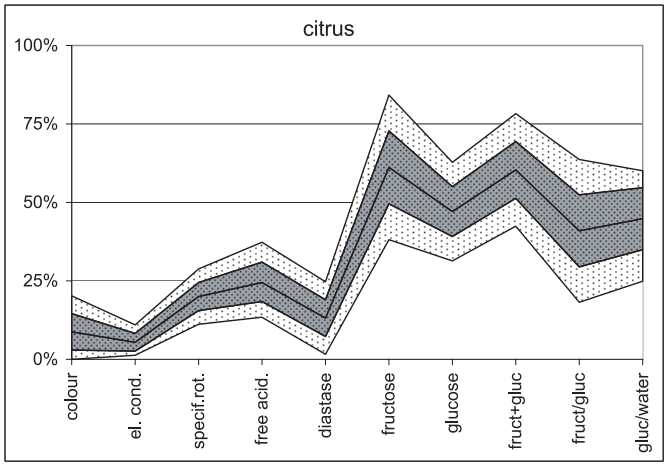
Gluc. / Water ratio



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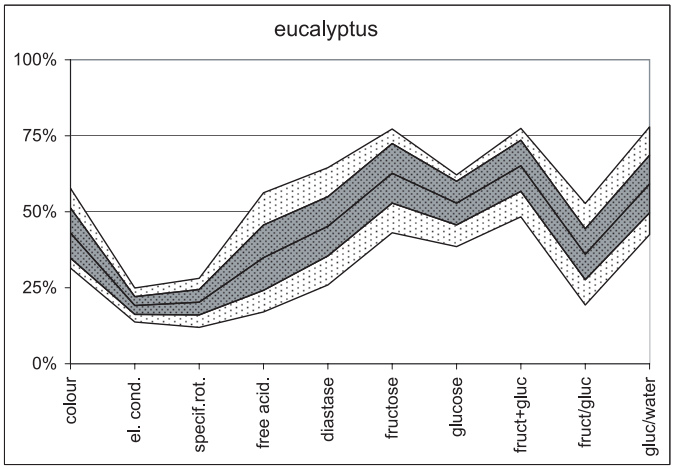
Fruct./ Gluc. ratio
Gluc. / Water ratio



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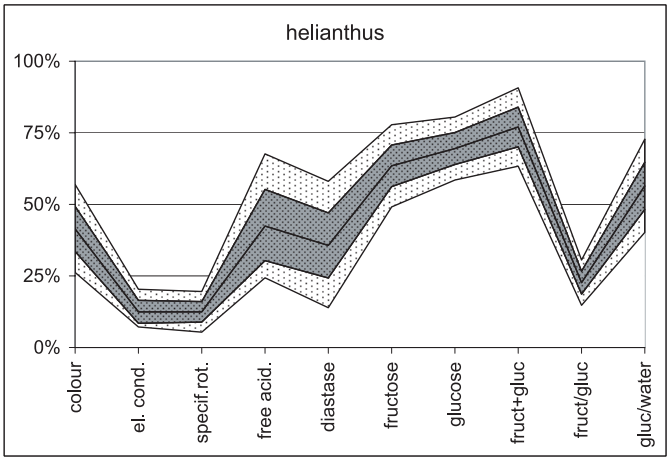
Fruct./ Gluc. ratio
Gluc. / Water ratio



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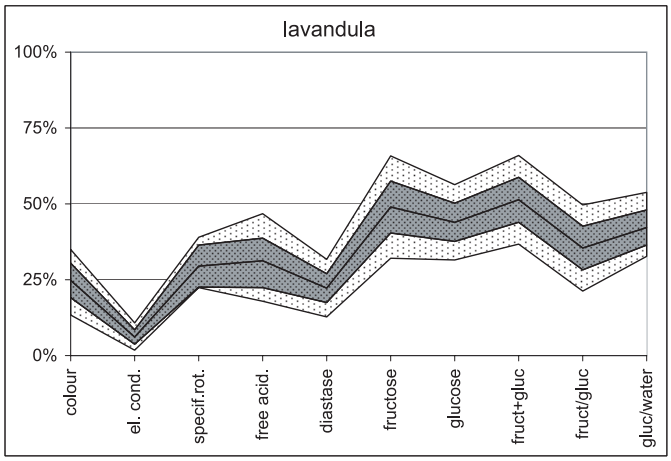
Gluc. / Water ratio



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specific rotation $[\alpha]_D^{20}$
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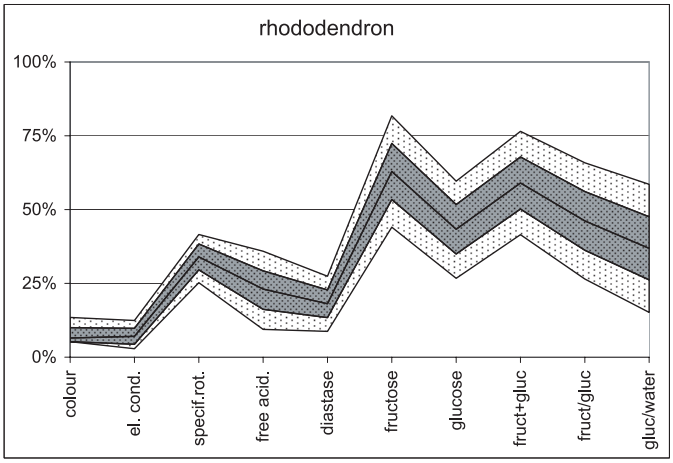
Fruct.+Gluc. (g/100g)
Fruct./ Gluc. ratio
Gluc. / Water ratio



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free acidity (meq/kg)
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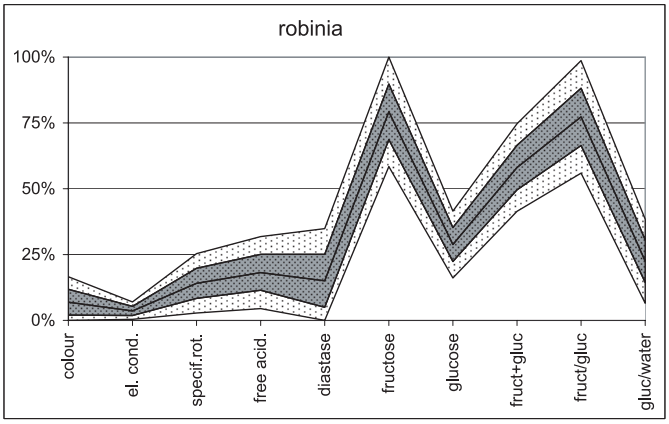
Fruct./ Gluc. ratio
Gluc. / Water ratio



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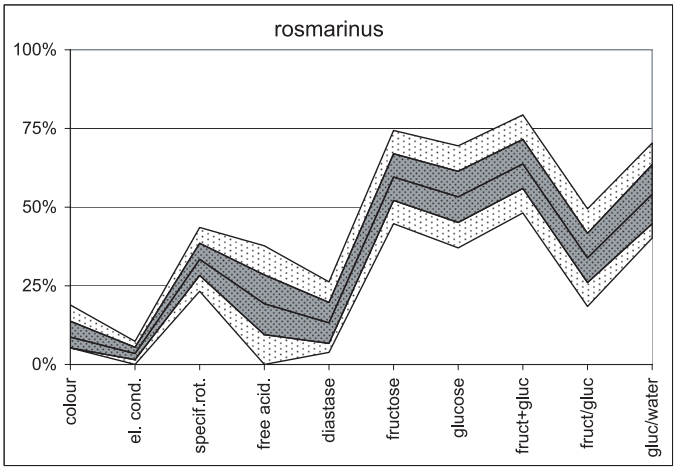
Gluc. / Water ratio



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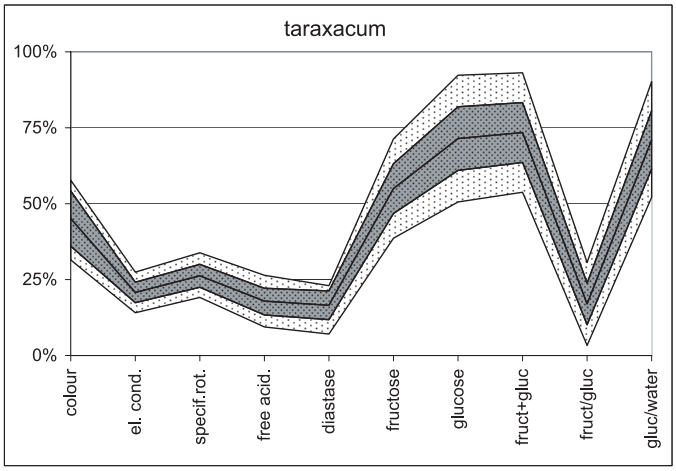

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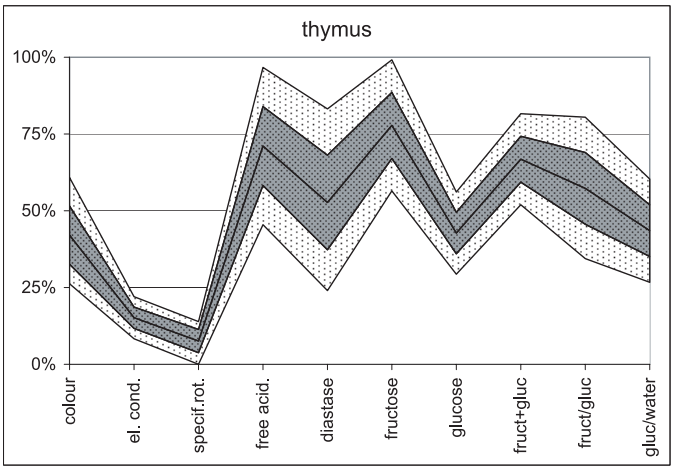
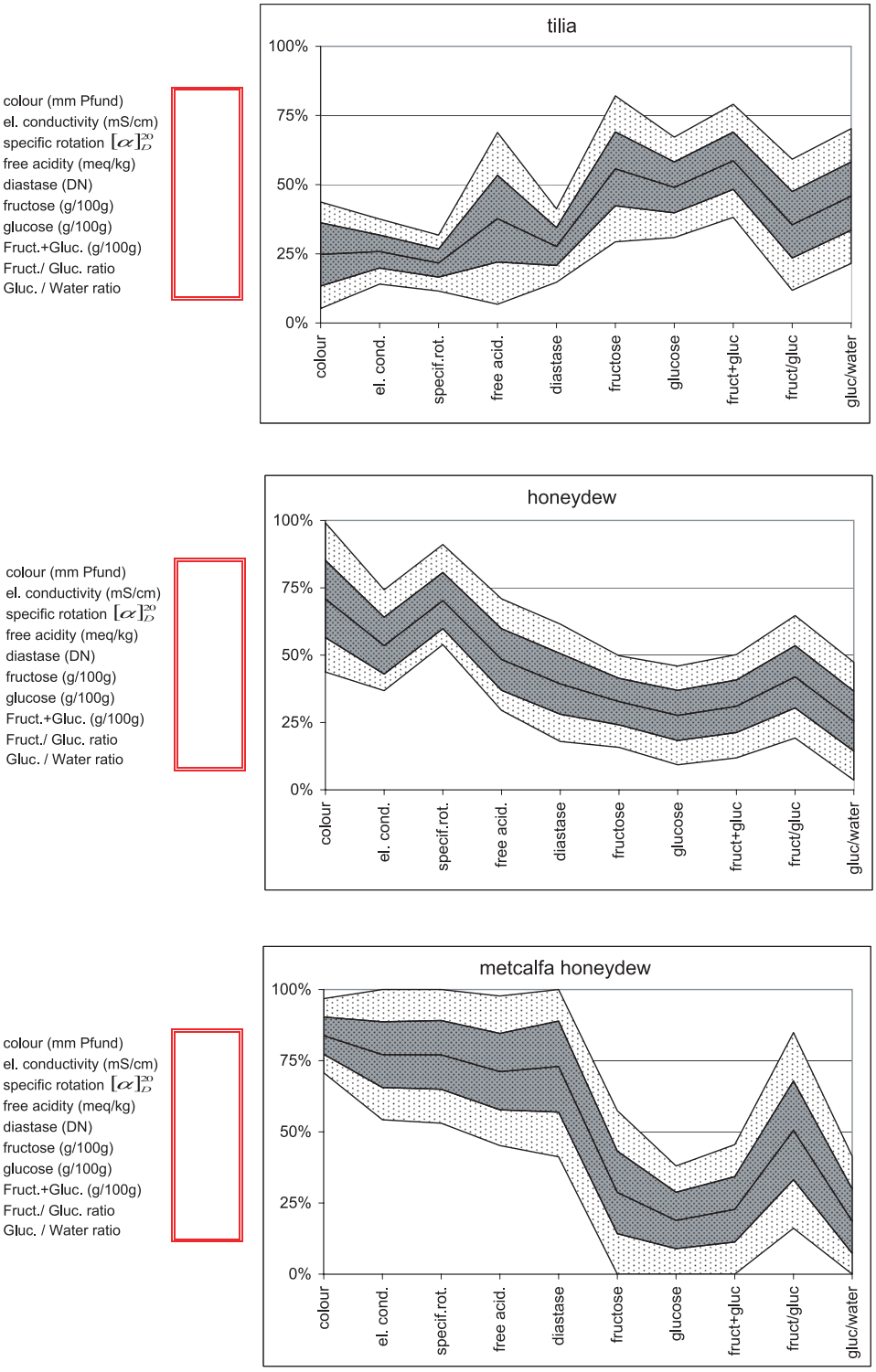
Gluc. / Water ratio

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honeydew
metcalfa honeydew
100%
75%
50%
25%
0%
colour
el. cond.
specif.rot.
free acid.
diastase
fructose
glucose
fruct+gluc
fruct/gluc
gluc/water
colour (mm Pfund)
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free acidity (meq/kg)
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