

## QUALITY EVALUATION OF INDIGENOUS HONEY

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Twenty five samples of honey were analysed for honey. Twelve samples of honey conformed to the standard specifications. The remaining samples were of inferior quality.

*Key words.* Honey, Hydroxymethyl, furfural, diastase.

### INTRODUCTION

Honey has been used by man as a sweetening agent since time immemorial. It is considered to be a rich source of carbohydrates, minerals, vitamins and an antibacterial agent. Honey is also reported to be a cure for many diseases in the Holy Qur'an.

Several criteria have been proposed for checking the purity of honey. Diastase activity is one of the oldest measures for the assessment of the quality of honey. Hydroxy methyl furfural (HMF) and diastase activity have been considered for the evaluation of honey by Hardon and Kovacs [1].

Various factors (moisture, pH, a buffering action, processing and storage conditions) affect the quality of honey. Heating of honey to prevent fermentation by sugar-tolerant yeast increases the HMF content and decreases the diastase activity to a considerable extent. A 20 % decrease in enzymic activity and a 100 % increase in HMF have been reported by Hardon and Zurcher [2] when honey was heated at elevated temperature. Duration of storage and temperature have also been reported to reduce diastase activity and to increase HMF content [3].

The present studies were conducted to evaluate the honey available on the market in Pakistan.

### MATERIALS AND METHODS

Seven samples of honey were supplied by M/s Paradise Honey Bee Farm, Wah Garden, Rawalpindi; three samples each were from Changa Manga Forest and Agriculture University, Faisalabad and twelve were purchased from the local market.

### EXPERIMENTAL

Carbohydrates, acidity, water-insoluble solids and ash contents were determined by the A.O.A.C. Methods [4].

Moisture was determined from refractive index using the Chataway tables. Diastase activity was determined by the Schede *et al.* method [5] and the results were calculated as diastase number on Gothe scale.

HMF was determined by Winkler's Method using barbituric acid and *p*-toluidin [6].

### RESULTS AND DISCUSSION

Composition of the samples of honey supplied by M/s Paradise Honey Bee Farm, Changa Manga Forest Farm and Agriculture University are reported in Table I. It is evident from the results that the moisture content of these samples with the exception of Trifolium honey were within the prescribed limits. The invert sugar contents of citrus honey and two other samples exceeded the maximum permissible limit. However, ash, water-insoluble solids, acidity, sucrose, diastase number and HMF contents of the samples conformed to the standards laid down for the honey acceptable for table use. The diastase number of citrus honey although lower (3.0 and 3.7) than that of other samples was comparable with the prescribed standard. Citrus honey is reported to have a low enzyme content [7].

Results of the analysis of honey available on the market are reported in Table 2. Moisture and ash contents of 33 % of the samples were more than the prescribed limit. HMF contents of all samples were higher while their diastase numbers were lower than the prescribed limits. Sucrose contents were also found to be out of range.

Exceedingly higher HMF contents and lower diastase numbers of the samples of honey purchased from the market seem to be the results of improper heating during processing and longer storage period. Honey has been reported [8] to accumulate significantly high amount of HMF when heated at elevated temperature for longer time. Similarly storage period and temperature have also been

Table 1. Composition of various types of honey

Quality parameters	Paradise honey bee form							Changa Manga Forest			Agriculture University Faisalabad			Maximum permissible limits %
	Trifolium honey	Rose honey	Blossom honey	Loquat honey	Mustard honey	Citrus honey	Wild honey	Wild honey			Rose honey	Citrus honey	Trifolium honey	
								1	2	3				
Moisture (%)	24.7	17.4	13.9	18.9	16.8	12.4	10.8	21.2	13.8	15.1	16.2	13.5	23.0	23.0
Ash (%)	0.44	0.54	0.52	0.60	0.61	0.56	0.54	0.61	0.68	0.59	0.55	0.58	0.40	1.0
Water Insoluble solids (%)	0.40	0.50	0.15	0.15	0.40	0.20	0.15	0.49	0.21	0.32	0.50	0.50	0.50	0.5
Acidity (Meq./kg)	14.6	16.8	13.5	9.0	13.6	12.7	13.0	15.2	13.2	13.0	16.2	13.0	13.8	40meq/kg
Invert sugar (%)	56.7	58.0	66.6	64.5	70.2	71.4	50.7	52.5	62.2	62.2	58.1	69.2	57.2	65.0
Sucrose (%)	6.4	10.0	6.7	2.8	2.3	1.2	9.2	9.8	3.3	4.2	9.8	2.2	1.1	10.0
Diastase number	8.4	13.0	15.0	10.0	16.2	3.7	10.0	12.0	8.1	8.6	11.8	3.0	9.7	Minimum 8 (3)*
HMF (mg/kg)	30.3	1.6	27.6	26.1	15.8	13.2	13.2	14.4	15.2	14.2	6.7	14.0	2.2	Maximum 40.0mg/kg. (15.0mg/kg)*

\* For citrus honey.

Table 2. Composition of market honey.

Quality parameters	Honey samples											
	1	2	3	4	5	6	7	8	9	10	11	12
Moisture (%)	18.6	21.0	19.4	19.6	19.0	20.1	22.2	23.4	19.5	18.2	24.5	25.5
Ash (%)	0.48	0.45	0.58	0.65	0.68	0.78	0.76	0.88	1.11	1.00	1.75	1.21
Water-insoluble solids (%)	0.45	0.38	0.58	0.78	0.70	0.65	0.55	0.39	0.44	0.32	0.38	0.49
Acidity (Meq./kg)	25.0	15.0	37.5	40.0	22.0	36.0	38.2	39.3	40.0	38.5	36.2	25.9
Invert sugar (%)	75.3	70.6	65.5	66.8	75.2	65.8	68.7	72.3	61.4	60.2	67.1	72.5
Sucrose (%)	10.4	11.9	13.5	11.5	13.0	10.5	11.0	10.9	12.2	13.5	11.2	10.3
Diastase number	5.5	7.10	3.71	2.63	3.57	2.55	2.25	5.81	1.32	2.81	2.20	5.10
HMF (mg/kg)	718	275	473	1567	154	1250	1350	1410	1712	1150	1128	108

reported to increase the HMF and to decrease the diastase activity to a considerable extent [9].

Increasingly high contents of sucrose determined in market honey seem to be due to feeding of molasses to honeybees during lean period. It may also be the result of adulteration with quasi honey.

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