



Honey

How good are these 10 brands?

Come to think of it, the colour itself enchants – as if it is conveying the magic of flower nectar transformed into a sweet, golden potion. But there is more to honey than its tempting colour and flavour. In its pure form, honey is a powerhouse of health benefits – from fighting ulcers and cancers to treating coughs and cuts. And in its not-so-pure form? That is what this report aims to cover – whether the various brands of honey meet the basic requirements. This becomes all the more crucial in view of the claim made by several studies that much of the honey sold in retail stores is not exactly what the bees had produced.

A Consumer Voice Report

Honey has been for a long time a target for adulteration. Dishonest traders started making money by adding cheap components to honey and sold them at high prices in the market. Different types of honey vary in terms of composition, shelf life, cost and packing. The aim of the present work is to

test the quality of 10 brands of Indian honey. The test programme was developed as per parameters listed in the national standards like FSS Rules, Indian Standard and Agmark. It may be noted that as per Bureau of Indian Standards (BIS), honey has been categorized into three grades: Special, Grade A and Standard. The tests were conducted in an NABL-accredited laboratory.

As per the World Health Organization (WHO) Codex Alimentarius (CA) for honey, “Honey is the natural sweet substance produced by honeybees from the nectar of plants or from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in honeycombs to ripen and mature.”

Honey is comprised of 17%–20% water, 76%–80% glucose, and fructose, pollen, wax and mineral salts. Its composition and colour are dependent upon the type of flower that supplies the nectar.



CV RECOMMENDATION/ Top Performer

Dabur

Value for Money

Patanjali

BRANDS TESTED

Rank	Total Score out of 100 (Rounded off)	Brand	Standard Mark/Grade	Best Before (Months)	Net Weight (Grams)/MRP (Rs)	Manufactured by
1	87	Dabur		18	500/190	Dabur India Ltd, Solan
2	86	Easy Maxx		18	500/139	Bharti Retail Ltd, Delhi
2	86	Patanjali	Green Dot not marked	12	500/130	Patanjali Ayurved Ltd, Haridwar
3	84	Nature Pure		18	250/111(buy one get one free)	Nature Pure Bio Products Pvt. Ltd, Dehradun
4	83	Reliance		12	400/219(buy one get one free)	Reliance Retail Ltd, Thane
4	83	Khadi	Grade A & Agmark	18	500/170	Paras Dukh Bhanjan Arurveda Ashram, Dehradun
5	82	Fresh & Pure		18	500/240 (buy one get one free)	Prakruthi Health Products, Bangalore
6	72	Organica		12	400/249	Organica Pure Farm Products, Noida
7	71	JeevanAmrit		18	500/155	Sai Agro Industries, Rewari
8	68	Hitkary	Agmark	18	500/222	Hitkary Pharmacy Pvt Ltd, Sonipat

Score Rating: >90: very good*****, 71–90: good****, 51–70: average***, 30–50: poor**, up to 30: very poor*

KEY FINDINGS

- Based on the overall test findings, Dabur is the clear topper followed by Easy Maxx and Patanjali.
- Hydroxymethylfurfural (HMF) content was found beyond the specified limit of 80 mg/kg in Hitkary (182), Jeevan Amrit (244) and Organica (424), which may be due to inadequate storage, adulteration with sugar, or severe heat treatment. However, the fructose–glucose ratio was more than 1 in these brands, thus meeting the requirement of the national standard. On the other hand, Dabur achieved full score on this parameter.
- Fiehe’s test was positive in Hitkary, Jeevan Amrit and Organica
- Total reducing sugar in Fresh & Pure, Hitkary, Khadi, Reliance and Easy Maxx was found to be less than the minimum requirement of 65 per cent.
- Sucrose contents in Hitkary and Khadi were found to be beyond the limit of 5.0 per cent.
- Total plate counts were highest in Hitkary and lowest in Khadi.
- All the brands were found to be free of antibiotics.
- Hitkary and Khadi carry Agmark certification.
- Patanjali has no Green Dot mark on the label.

TEST RESULTS

FOR PHYSICO-CHEMICAL PARAMETERS

Fructose–glucose ratio | Hydroxymethylfurfural | Total reducing sugar | Sucrose | Fiehe’s test | Energy value | Moisture | Diastase activity | Ash | Acidity | Specific gravity at 27 degrees Celsius | Water-insoluble matter | Optical density

◆ Fructose–glucose ratio, % by mass

Requirement: If Fiehe’s test is positive and hydroxymethylfurfural (HMF) content is more than 80 milligrams/kilogram, then fructose-to-glucose ratio should be 0.95 minimum as per FSS Rules and more than 1.0 as per Indian Standard.

Fructose/glucose ratio indicates the ability of honey to crystallize. When the fructose/glucose ratio is high, honey remains liquid.

However, because honey contains others sugars (sucrose, maltose, etc.) and insoluble substances (dextrin, colloids, etc.) that can influence the crystallization process, the glucose/water (G/W) ratio is considered more appropriate than the fructose/glucose (F/G) ratio for the prediction of honey crystallization.

Even though honey has less glucose than fructose, it is the glucose that crystallizes when honey granulates because it is less soluble in water than fructose.

- All the brands meet the minimum requirement mandated by FSSAI. The highest ratio is in Khadi followed by Organica, Dabur and Patanjali.

◆ Hydroxymethylfurfural

Hydroxymethylfurfural, or HMF, is often used as an indicator for the quality of honey. It occurs naturally in most honeys; however, high levels of HMF may be the result of inadequate storage, adulteration with sugar additives, or severe heat treatment. Although HMF is not thought to be a harmful substance, food standards in many countries regulate the levels of HMF in honey because it indicates the freshness of honey.

- Dabur achieved full score on this parameter.
- Hitkary, Jeevan Amrit and Organica had high HMF and did not meet the quality requirement limit of 80 mg/kg.

◆ Total reducing sugar

Requirement: 65% minimum as per FSSAI, 70% minimum (special)/65% minimum (Grade A) as per Agmark and Indian Standard

Reducing sugars are capable of reducing other compounds. The most common reducing sugars are glucose and fructose.



- Total reducing sugar in Fresh & Pure, Hitkary, Khadi, Reliance and Easy Maxx was found to be less than the required minimum percentage.
- Dabur performed on top followed by Patanjali.

◆ Sucrose

A key concern about honey quality is possible adulteration with sucrose (just like honey can be adulterated with table sugar, etc.). While sucrose is generally present in small quantities in honey, a high percentage can point towards deliberate adulteration. The Bureau of Indian Standards (BIS) and the Food Safety and Standards Authority of India (FSSAI) have specified that sucrose content in honey should not be more than five per cent by mass.

- Patanjali performed on top followed by Fresh & Pure, Easy Maxx and Dabur.

◆ Fiehe's test

Requirement: Should be negative

Fiehe's test checks if commercial invert sugar has been added to honey for adulteration. As per Indian Standard requirement, if Fiehe's test is positive and hydroxymethylfurfural content is more than 80 milligrams/kilogram, then fructose-to-glucose ratio should be 1.0 or more.

- Hitkary, Jeevan Amrit and Organica were found positive in this test. Testing positive in Fiehe's test also indicates that the honey is 'over-mature'. When honey is heated for longer duration, it becomes susceptible to testing positive in Fiehe's test. Honey is heated to kill any yeast that may spoil it. However, it is believed that there is a real danger of honey losing its

beneficial properties and actually becoming harmful for consumption if it is over-heated.

◆ Energy value, kcal/100g

Honey contributes a good amount of energy towards our daily requirement.

- All the brands performed well on this parameter.

◆ Moisture

Higher moisture content can lead to undesirable fermentation of the honey during storage. The action of osmotolerant yeasts can result in the formation of ethyl alcohol and carbon dioxide.

Both FSSAI and Agmark have set the permissible limit for moisture at 25 per cent. BIS prescribes that the best-quality honey (Special grade) should not have more than 20 per cent moisture in it. Moisture content for Grade A honey is a maximum 22 per cent by mass.

- All the tested brands had less than 20 per cent moisture content. Khadi had the least percentage at 14.98.

◆ Diastase activity

Diastase activity helps to determine if the honey has been extensively heated during processing. Heating of honey causes the loss of thermolabile, aromatic substances.

- All the brands passed in this test.

All the brands are within the specified limit on the parameters of ash, acidity, specific gravity (at 27 degrees Celsius), water-insoluble matter, and optical density.

COLOUR BY PFUND SCALE

The colour of honey varies naturally, ranging from light yellow to amber, dark amber and black in extreme cases and sometimes even green or red hues. Honey usually darkens with age. Exposure to heat and storage time may affect honey's colour.

The colour of honey can be graded on a continuous scale called the Pfund scale. A Pfund colour grader is a standard amber-coloured glass wedge that goes from light to dark and provides continuous readings over the entire colour range of honey. The honey is placed in a wedge-shaped container and compared to the scale, and the place where the colour matches is measured from one end of the wedge.

As per Indian Standard and Agmark requirements, the colour of honey may vary from light to dark brown.



PHYSICO-CHEMICAL

	Weightage %	Dabur	Easy Maxx	Patanjali	
Fructose–glucose ratio	12	9.30	8.64	9.30	
Hydroxymethylfurfural (HMF)	10	10	9.85	8.46	
Total reducing sugar	8	6.62	4.92	6.42	
Sucrose	6	5.31	5.89	6.00	
Fiehe's test	6	6	6	6	
Energy value	5	4.46	4.63	4.53	
Moisture	4	3.73	3.82	3.77	
Diastase activity	4	3.55	3.55	3.19	
Ash	3	2.59	2.76	2.54	
Acidity	3	2.70	2.76	2.76	
Specific gravity at 27 degrees Celsius	3	2.37	2.49	2.49	
Water-insoluble matter	2	1.62	1.90	1.87	
Optical density	2	1.48	1.85	1.66	

FOR MICROBIOLOGICAL ACTIVITY

At present, the national standards have not specified the limit for microbiological contamination. The Consumer Voice team conducted the 'total plate count/gm' test on the 10 brands of honey to check if the samples were prone to microbial spoilage.

- Total plate count was found between 10 and 4,300 cfu/gm. Hitkary had the highest TPC and Khadi the lowest.

Antibiotics

The national standards have set no requirement for antibiotics. In 2010, Centre for Science and Environment (CSE) found antibiotics in their study of honey. In this context, we decided to verify the presence of antibiotics in honey and conducted tests to determine the presence of six antibiotics – namely oxytetracycline, chloramphenicol, ampicillin, enrofloxacin, ciprofloxacin and erythromycin. None of these six antibiotics was detected in any of the brands.



SCORES

	Nature Pure	Reliance	Khadi	Fresh & Pure	Organica	Jeevan Amrit	Hitkary
	9.3	9.12	11.22	8.34	9.9	8.46	8.82
	9.88	9.74	7.34	9.29	1.50	2.0	2.5
	6.20	4.88	4.27	4.77	6.22	6.08	4.59
	4.24	4.32	0.84	5.9	4.28	4.34	1.92
	6	6	6	6	1.2	1.2	1.2
	4.39	4.55	4.99	4.45	4.48	4.61	4.34
	3.70	3.78	4.00	3.72	3.74	3.80	3.65
	2.92	3.55	3.76	3.85	3.55	3.19	3.85
	2.38	2.64	2.83	2.64	2.54	2.90	2.68
	2.76	2.76	2.88	2.76	2.76	2.76	2.82
	2.43	2.49	2.55	2.37	2.43	2.37	2.31
	1.71	1.57	2.00	1.89	1.74	1.90	1.90
	1.50	1.67	2.00	1.59	1.49	1.44	1.84

FOR SENSORY ATTRIBUTES

Sensory evaluation enables us to identify and quantify certain defects (fermentation, impurities, off-odours and flavours). For this report, sensory tests were conducted in the food-and-nutrition department of a reputed college of Delhi University, under the guidance/supervision of professors and technical experts.

The panellists judged the following parameters on a five-point scale where 5 stood for excellent, 4 for

good, 3 for average, 2 for poor, and 1 for very poor. The average score for each parameter is shown in the given table.

- Colour and appearance:** The colour of honey shall be uniform throughout and may vary from light to dark brown. It shall be clear. When visually inspected, the honey shall be free of any foreign matter such as mould, dirt, scum, pieces of beeswax, fragments of bees and other insects, and any other extraneous matter.

Comparative Test

- **Aroma/Flavour:** The honey should have an appealing flavour and should be free from any objectionable flavour due to overheating, fermentation and smoke.
- **Taste:** The honey should have acceptable taste.
- **Aftertaste:** The aftertaste should be appealing and acceptable.

OVERALL SENSORY SCORES

Weightage %	Dabur	Easy Maxx	Patanjali	Nature Pure	Reliance	Khadi	Fresh & Pure	Organica	Jeevan Amrit	Hitkary
12	8.72	8.09	8.22	8.54	7.88	9.11	6.70	8.06	8.19	9.17

FOR GENERAL QUALITIES

◆ Packaging

The honey shall be packed in hygienically clean, wide-mouthed glass containers or in acid-resistant, lacquered tin containers, or in other suitable containers. With glass-bottle packaging, one does not have to worry about harmful substances from plastic leaching into the honey, or the plastic not being food-grade. The screwed caps for the glass containers shall be of non-corrosive and non-reactive material and shall be provided with washers to avoid spillage.

- All the brands were packed in a sealed container.

◆ Marking

Each container should be legibly and indelibly marked with these details: a) name of the material and grade designation; b) name of the packer; c) batch or code number; d) date of packing; e) net weight; f) standard mark (Agmark), if any; g) best before; h) storage instruction; i) nutritional information; (optional) and j) Green Dot.

- The Green Dot was not marked on Patanjali despite being a requirement for vegetarian products.
- Khadi claimed to be Grade A.

Storing Your Honey

Store honey at room temperature – your kitchen counter or pantry shelf is ideal. If you keep it in the fridge it will become too thick and it is then likely to crystallize. However, even at room temperature the honey can crystallize over time. It has a tendency to absorb moisture, which contributes to crystallization. Always close the lid tightly. (Crystallization is the natural process of glucose sugar molecules aligning into orderly arrangements known as crystals. It is not an indicator of spoilage, impurity, age or quality.)

If your honey crystallizes and if you don't like its rather gritty mouth feel, simply place the honey jar in warm water and stir until the crystals dissolve.

Alternately, place the honey container into near boiling water that has been removed from the heat. Here are the steps:

1. Bring a pan of water to a boil.
2. Turn off the heat.
3. Place the honey container in the water with cap open.
4. Leave until both have cooled.
5. Repeat as needed.

Source: National Honey Board, United States

RESPONSES OF MANUFACTURERS

As a matter of policy, before publication the test results of the brands are shared with their respective manufacturers/marketers inviting their views/comments. We reproduce here the responses in brief:

Manufacturer (Brand Name)	Manufacturer's Comment	Consumer VOICE
Nature Pure	Some tests in the report contravene each other.	A retest was carried out for sucrose percentage and total reducing sugar, which came out to be 4.91 and 70.35 respectively.
Organica	<p>a) Organoleptic tests are subjective and a panel consisting of 35 PG students may not be appropriate.</p> <p>b) Fiehe's test is unreliable and is not considered of any importance these days. We keep getting varied results in each repeated test for the same batch.</p> <p>c) The HMF value in your test report is showing a high value, while our own report for the same batch shows a much smaller value.</p> <p>d) The test is incomplete as it has not taken into account heavy metals and pesticide residue, which are very important.</p>	<p>a) From the consumers' point of view, organoleptic tests are necessary to judge the overall acceptability of a product in terms of taste, flavour, odour, defects (if any), etc. The procedure was approved by the expert committee.</p> <p>b) We had conducted tests as per parameters (including Fiehe's test) listed in the national standards like FSS Rules, relevant Indian Standard and Agmark. The test programme was approved by an expert committee.</p> <p>c) The samples of honey were collected from big shops in Delhi NCR. All these stores display their products in indoor conditions. The testing was conducted in an NABL-accredited laboratory recognized by government bodies. The laboratory has confirmed the test results.</p> <p>d) We have carried out the tests as per the test programme approved by the expert committee. Since this is a time-bound project, testing of other new parameters may not be possible at this stage.</p>
Hitkary	For the same batch, we found the HMF content to be 29.38 mg/kg; as per your test report, it is 182.4 mg/kg. Please conduct all the tests once more.	The test laboratory has confirmed the reported results, especially for the HMF test. The FG ratio is more than 1, which is within the required limit.
Dabur	For the same batch, the FG ratio is 1.14 as per data available at our end. This is much higher than the value reported by you. Please revalidate your results.	The FG ratio was retested in the designated lab and found to be 1.15.

Some Health Benefits Worth Knowing

The possible health benefits of consuming honey have been documented in early Greek, Roman, Vedic and Islamic texts, and the healing qualities of honey were referred to by philosophers and scientists all the way back to ancient times, including by Aristotle (384–322 BC). Over four thousand years ago, honey was used as a traditional ayurvedic medicine, where it was thought to be effective at treating material imbalances in the body.

Modern science is finding that many of the historical claims that honey can be used in medicine may indeed be true. Honey has anti-viral, anti-microbial and anti-parasitic effects. Its capacity to inhibit the growth of microorganisms and fungi is well documented.

Heals wounds and burns

There have been some cases in which people have reported positive effects of honey in treating wounds. A review published in *The Cochrane Library* indicated that honey may be able to help heal burns. The lead author of the study said that “topical honey is cheaper than other interventions, notably oral antibiotics, which are often used and may have other deleterious side effects.”

In numerous studies, honey has been found effective in treating wounds. In one study, 59 patients suffering from wounds and leg ulcers – of which 80 per cent had failed to heal with conventional treatment – were treated with unprocessed honey. All but one of the cases showed remarkable improvement following topical application of honey.

Soothes coughs

A study published in *Pediatrics* included 270 children aged one to five with night-time cough due to simple colds. The children who received two teaspoons of honey 30 minutes before bed coughed less frequently and less severely, and were less likely to lose sleep due to the cough when compared to those who didn't get honey.

May relieve seasonal allergies

There is some research to suggest that honey may be useful in minimizing seasonal allergies. As honey has anti-inflammatory effects and is known to soothe coughs, it may not seem like much of a stretch. Some experts say that honey can contain traces of flower pollen, and exposure to small amounts of allergens works as good treatment to combat reactions.

Overall, while there are numerous health benefits that can be gained from honey, the extent of such benefits greatly depends on its quality. Not all honey is created equally and hence the various types do not necessarily provide the same benefits.

Sources: www.medicalnewstoday.com; www.mnn.com





How to Tell One Honey from the Other (Adulterated) One

Here are a few simple tests you can do at home to check if your honey is high-quality and pure, or impure and with a high water content.

Read the label

The first thing you should do before buying a jar of honey is read the label and check that the ingredient list doesn't contain 'high-fructose corn syrup' or commercial glucose, two additives that are frequently used to 'stretch' the honey and keep it from solidifying.

Solidification of the honey

All honey is liquid, but with time they tend to solidify, or 'crystallize' into a substance resembling grains of sugar. If you buy a jar of honey that is already crystallized, it is pure. If your honey is liquid, you can wait a few days to see if it solidifies or throw it in the fridge to accelerate the process. If the honey never crystallizes, there is a high probability that it is adulterated honey.

Some Tricks

Take a tablespoon of honey and put it in a glass of water. If the honey dissolves, then it is not pure. Pure honey should stay together as a solid when submerged in water.

Take a bit of honey and mix it with water. Then place four or five drops of vinegar into the solution. If it turns foamy, the honey might have been adulterated with gypsum.

Scoop a bit of honey into a spoon and let it fall from the spoon. Honey with high water content will fall quickly. Mature honey of good quality will stay on the spoon or fall very slowly.

Light a match and try to burn some of the honey. If it lights and burns, then it is pure. Impure or low-quality honey often contains extra water that keeps it from burning.

If you have iodine at home, take some honey, mix it with water, and add a few drops of iodine. If the solution turns blue, then the honey has been adulterated with some sort of starch or flour.

Take a small piece of old, hard bread and submerge it in the honey. If, when you remove it 10 minutes later, the bread is still hard, then the honey is pure. If there is a lot of water in the honey, the bread will soften.

Source: steptohealth.com