



Honey: The sweet liquid gold

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Honey is a sweet, viscous food substance produced by bees and some related insects. Bees produce honey from the sugary secretions of plants (floral nectar) or from secretions of other insects (such as honeydew), by regurgitation, enzymatic activity and water evaporation. Bees store honey in a wax structure called as honeycomb. The variety of honey produced by honey bees (the genus

Apis mellifera) is the best known due to its worldwide commercial production and human consumption. Honey is collected from wild bee colonies or from hives of domesticated bees, a practice known as beekeeping or *apiculture*. Major Honey producing countries are China, India, Mexico, USA, Argentina, Ukraine, Turkey and Russia. In India, it is

produced in many states like Uttar Pradesh, Punjab, Jammu and Kashmir, Southern Rajasthan, Maharashtra, Tamil Nadu and Gujrat. Estimates of the year 2017-18 reflect that about 30-32 lakh bee colonies produced 94000 to 95000 metric tons of honey in India. Honey is collected in the form of nectar from various types of flora like Rapeseed, Mustard, Eucalyptus, Litchi, Sunflower, Karanj / Pongamia, Apple, Nashpati and wild flora like *Neem*, Karipatta and Sheesham etc. Honey bee helps in pollination, increases fruit set in various crops, enhances fruit quality and reduces fruit drop.

Rearing honey bees:

– Different Species of Honey Bees are found in India like Indian bees (*Apis cerana*), Little bees (*Apis florea*), Rock bees (*Apis dorsata*) and European bees or Italian bees (*Apis mellifera*).

– Three types of bees *viz*; Queen Bee, Female Workers and Male Drones are present in the colony.

– The main equipment required for Beekeeping include ten-frame, wooden langs, troth hives, bee veil, hive tool, smoker, uncapping knife, drip tray, comb foundations, queen excluders and honey extractor.

– Suitable period to start Beekeeping depends on the availability of flora but the months of February-March and September-October are the most favourable time.

– Three seasons: Summer (March-June), Monsoon (July-October) and winter (November-February) are most important to examine the bee colonies.

– In summer season, examine the colonies on a clear

sunny day, clean the bottom board, burn the collected debris and then shift colonies to shady places preferably under thick canopy to maintain the temperature in bee boxes. Fresh water is a must near apiary for the honey bees.

– In the monsoon season, the colonies become weak due to scarcity of bee flora and



colonies are more prone to the attack by bee enemies and diseases. In the beginning of this season, clean the hive debris and vegetation growing around colonies and keep the colonies at raised place for proper ventilation. According to the colony strength and need, provide sugar syrup feeding (sugar: water 1:1, w/w) inside the box.

– In winter season, various operations to sustain bee activities are shifting the colonies to flora, examining colonies only on calm and sunny days and providing place for colonies with entrance facing south - east to protect bees from chilly winds and inner packing for weak colonies with dry paddy straw (*prali*) wrapped in newspaper.

Management of Insect Pests and Diseases: The common insect pests that attack the bee- hive are parasitic mite *Varroa destructor*, *Wax moth*, *Wax beetle*, *Brood mite*, *Wasp*, *Tracheal Mite*, *Ants*, *Birds* and *Bee mite* etc. Among these, *Varroa mite*, *Brood mite* and *Wax moth* are the most dangerous ones.

Varroa mite : This mite could be managed by placement of sticky paper in the bottom board and treated with formic acid (85%) @ 5 ml per day continuously for two weeks.

Brood mite : It can be managed by using sulphur dust

powder on top bars of combs @ 1 g/ comb for this mite.
Wax moths : This insect attacks live colonies as well as stored combs. Wax moths can be managed by keeping bottom boards clean and burning the collected debris. Fumigate with sulphur powder @ 250 g/ m³ of chamber space under air-tight condition.

Harvesting of honey:

Good quality Honey can be harvested in the end of flowering season. Harvest only those combs which contain ripened honey with a fine layer surrounded by white bee wax. However, there are many honey extraction equipment available in the market. Acquire a good one and make use of it for honey extraction from super comb. Commercially, the business of Beekeeping is one of the most profitable one that can give rapid income in a very short time.

Nutritional Composition of Honey: Honey is a mixture of sugars and other carbohydrates. A typical honey profile contains Fructose (38.2%), Glucose (31.3 %), Maltose (7.1%), Sucrose (1.3%), Water (17.2%), other sugars (1.5%), Ash (0.2%) and other components (3.2%). According to USDA (United States Department of Agriculture) and its National Nutrient Database, one tablespoon of honey contains 64 calories, 17.3 grams (g) of sugar and 0 g of fibre, fat and protein. Honey also contains trace amounts of several minerals and vitamins like niacin, riboflavin, calcium, copper, iron, magnesium, potassium and zinc. Honey contains a blend of *flavonoids* and *phenolic* acids, the antioxidants that eliminate potentially destructive free radicals in the human body. The slightly acidic pH level of honey is what helps prevent the growth of bacteria while its antioxidant elements clean up free radicals that are linked to diseases. The physical properties of honey vary depending on the specific flora used in its production by the bees as well as its water content.

Health Benefits of Honey: Honey, composed mainly of fructose and glucose, has been recently demonstrated to have antioxidant properties *in vitro*. It also contains some oligosaccharides that escape digestion and thus, support lower gut bacterial growth. These properties support the health-enhancing potential of honey as a component of the diet.

– *Natural Energy Drink:* Honey is known as an excellent source of natural energy as the natural unprocessed sugars present in it enter the bloodstream directly and give a quick boost to the body.

– *Weight Management:* Honey helps in increasing

the metabolism, which in turn helps reducing the weight.

– *Heart Health:* Honey contains organic acids and *phenolic* compounds like *flavonoids* which are linked to reduced risk of heart attacks and strokes and further help in reducing the blood pressure. They also promote eye health and reduce the risk of blood clot formation. Honey seems to have a positive effect on cholesterol levels also. It leads to modest reductions in the “bad” LDL cholesterol while raising “good” HDL cholesterol. Honey can lower triglyceride levels, especially when used as a sugar substitute.

– *Immune System Boost:* Its antioxidants and anti-bacterial properties help to fight against infections caused by viruses, bacteria and fungi.

– *Home Remedy for Cough:* Honey has countless medicinal properties that naturally help in curing a sore throat. Honey is the preferred natural remedy for cough, especially for kids as it helps to relieve nocturnal cough, allowing proper sleep.

– *Natural Healer:* Honey has healing powers because of the antibacterial and anti-inflammatory effects as well as its ability to nourish surrounding tissues. It can be part of an effective treatment plan for burns, wounds and many other skin conditions. It is particularly effective for diabetic foot ulcers.

– *Nourishment for Skin:* Honey has skin moisturizing and nourishing properties for a healthy skin.

Culinary uses of Honey:

– *Honey as Food Ingredient:* Honey can be consumed directly in the raw state as produced by the bees. Sweetness, nutritive value and functional advantages like viscosity, flavour enhancement, colour, hygroscopicity, miscibility and spreadability etc. makes honey a valuable food ingredient. A part from thousands of home-made recipes, honey has been used in many applications, including baking, confectionary, preserves, syrups and meat also.

– *Honey as a Sugar Substitute:* Honey can replace cane sugar in most of the recipes.

– *Honey in Milk Products:* Honey can be combined with dairy products like honey cream, honey cream cheese, honey butter, pasteurized and homogenized milk sweetened with honey which is prepared with dried milk powder plus 25% honey and 10% glucose. In yoghurt, honey is mixed at the rate of (10 to 15) % either before or after fermentation.

– *Honey in Fruits and Nuts:* Sun dried fruits/nuts can be mixed directly into the honey, either whole or chopped. Pasteurization of both honey and fruits improves the hygiene and shelf life and reduces the risk of



Table 1: Source of honey from different flora

Sr. No.	Place of migration	Month of migration	Important bee plants
1	Zone-I	Nov.-May	Brassica, Loquat, Aru, Alucha, Naspatti,
		May-Jun.	Citrus, Litchi, Eucalyptus, Amla, Mulberry, Guava and Berseem
2	Zone-II	Feb.-June	Sarsoo, Berseem, Kikar, Prunus, Rosa,
		Jul.-Sep.	Rubus
		Nov.-Dec.	Maize, Berseem, Sunflower, , Fagopyrum, wild balsam
3	Zone-III	Feb.-March	Citrus and litchi
		Apr.-Jun.	Maize, Berseem vegetables like cucurbits crops, bitter guard, watermelon and muskmelon
		Oct-Dec.	Brassica, Eucalyptus, Sunflower
4	Zone-IV	Feb.-Mar.	Sarson, citrus, Eucalyptus
5	Zone-V	Dec.- Mar.	Sarsoo, Toria, Eucalyptus
		Feb.-Mar	Citrus, Cow pea
6	Plantations/ Social forestry	Dec.- Mar.	Eucalyptus
		Mar.-Apr.	Robinia pseudoacacia (Kikar)

Source: Status Report on “Bee- keeping and Honey Processing” Government of India, Ministry of Micro, Small and Medium Enterprises

fermentation.

– *Honey in Breakfast Cereals*: In the breakfast cereal industry, honey is used either in its liquid or dried and pulverized form. It can be mixed or applied as a component of the sweetening and flavouring film which covers the flakes.

– *Honey in Spreads*: Honey is now being used as the major ingredient or as a substitute for sugar in spreads and fruit preserves.

– *Honey in Bakery Products*: Honey confers uniform baking, improved aroma, spongy consistency and softness. Bakery products that contain honey also dry out more slowly and have a lesser tendency to crack.

– *Honey in Confectionary Products*: Some confectionary products having honey as ingredients are Honey gums, Caramels, Candies and Chocolates.

– *Honey in Non-alcoholic Beverages*: Honey is added for flavour and as a sweetener in many fruit juices. In apple juice it is used to clarify the fresh juice. Ice tea can also be flavoured and clarified with the addition of honey.

Value Added Products of Honey:

– *Fermented Products of Honey*: Honey is used in making alcoholic drinks by fermentation such as honey beer, mead and wine.

– *Honey-Fruit-Vinegar Syrup*: It can be prepared by using fruits, vinegar and honey. Fruits (whole or cut) are placed in the vinegar and soaked for 5 days, occasionally stirring and squeezing more juice out of the fruits. The liquid is then pressed and sieved through a fine cloth and the honey is added. It is then boiled for 5 minutes only and bottled. This syrup is diluted with water (3 tbsp of syrup per glass) for use as a refreshing drink.

– *Honey Jelly*: Honey jelly can be prepared using water (220) ml, pectin (3-4) gm, honey (800) g and tartaric acid (1.5-2) g. The pectin is soaked in the cold water, dispersed by stirring and brought to a boil which is continued until the weight has been reduced to 200 g. Then the honey is added and heated to 60°C. The heating is then stopped and the acid is added. This mix is poured into moulds or other containers.

– *Rose Honey*: It is prepared by using honey (20) gm, red rose petals (4) g and boiling water (5-7) ml. An infusion (tea) of the mashed rose petals in the boiling water is prepared and left for 24 hours. It is then filtered through a very fine cloth. This rose water is mixed with the liquid honey and left in the cold until it reaches the desired consistency.

Received : 27.03.2020

Revised : 10.11.2020

Accepted : 24.11.2020

RNI : UPENG/2006/16373

ISSN : 0973-1547

Accredited By NAAS : NAAS Rating : 4.31

INTERNATIONAL JOURNAL OF PLANT SCIENCES

An International Research Journal

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