A COMPARATIVE ANALYSIS OF VEGAN HONEY WITH NATURAL HONEY COMPOSITION

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Abstract:

Natural honey is well known for its antioxidants, antibacterial, antifungal properties, heals wounds, phytonutrient powerhouse, helps for digestive issues, soothe a sore throat and cough and brain benefits. Its uses for all this purpose and as sweetening agent and replacement of refined sugar for a healthy lifestyle. But it's an animal product and due to its health benefits people are exploiting honey bees to get natural and pure honey. Vegan honey is plant-based honey which is made from fruit juices, spices and jaggery. They all having vitamins, minerals and other health benefits. Which vary according to fruit to fruit and spices to spices compositions. But overall, it's having similar health benefit like vegan honey.

Keywords: Vegan Honey, Natural Honey, Comparison, Health Benefits, Analysis, Nutraceutical, Fruit Juice, Jaggery, Lemon, Spices, Flavors

Introduction

The consumption of honey has a very long history among human beings. It has been utilised as a sweetening and flavouring agent in a variety of foods and beverages. Honey has been prized for its nutritional and medicinal properties since ancient times. Honey is a product that is produced all over the world. (Bogdanov and colleagues, 2008). Carbohydrates, such as monosaccharides, fructose, glucose, and disaccharides, maltose, isomaltose, maltulose, sucrose, and turanose, are the most essential constituents in honey, and they are responsible for its sweetness. It also contains anderose and panose oligosaccharides, as well as enzymes such amylase, oxidase peroxide, catalase, and acid phosphorylase. Amino acids, trace vitamin B, vitamin B6, vitamin C, niacin, folic acid, minerals, iron, zinc, and antioxidants are among the many nutrients found in honey (David, 2007; Fatimah et al., 2013).Honey is a well-known anti-inflammatory, antioxidant, and antibacterial agent (Noori et al., 2014).The inclusion of various metabolites such as folic acid, thiamine, biotin, niacin, tocopherol, polyphenols, phytosterols, enzymes, and co-enzymes, as well as enzymes and co-enzymes, contributes to bee's health-promoting properties. The scientific literature frequently contains favourable information on anti-oxidant, anti-bacterial, anti-fungicidal, and hepato-protective properties. Honey is a beneficial component for a healthy population in concept (Denisow-Pietrzyk, 2016).

Veganism, as defined by Donald Watson in 1944, is a way of life that is free of all forms of exploitation and cruelty to animals. Plants, fruits, and roots are used to make vegan honey. This technique does not include any bees. The nectar and pollen were extracted from the plants by us. There are no bees injured in the creation of this method. We use organic plants, fruits,

purified water, alum root, raw sugar/jaggery or other sweetening agents and that's it! We have no added colour, flavouring and no preservatives. What you get is straight from the plants. For enhancing the vegan honey spices are also used as flavouring agent and gives health benefits similar to natural honey.

Vegan honey is an innovation for stopping the exploitation of honeybee and making animal free product. Which is now known as Vegan product. Vegan honey are made up different materials i.e. maple syrup, Blackstrap molasses, Barley malt syrup, Brown rice syrup, Date syrup many more types are available. It have properties antioxidant, vitamin, minerals and anti-inflammatory etc. According to the raw material it have different health benefits.

2. Materials and Methods

2.1 Collection of raw material- Fruits (Apple, Pineapple &Grapes), Jaggery, Lemon, Cinnamon, Arjuna tree bark (***Terminalia arjuna)*** and Ginger were bought from local market of Lucknow, Uttar Pradesh, India.

2.2 Preparation of raw material- Fresh fruit juice, lemon juice and ginger juice was extracted for making honey. For different nutraceutical benefits in vegan honey powder is prepared from Cinnamon and Arjuna tree bark.

2.3 Preparation of product- Apple-cinnamon honey (T1), Pineapple-arjuna tree bark honey (T2), and Grapes-ginger honey (T3) were made vegan honey samples with the addition of jaggery and lemon juice and boiled at high temperatures until the combination reached thread stage consistency.

Apple-cinnamon honey, for example, has equal amounts of apple juice and jaggery, as well as a little amount of cinnamon powder. Pineapple juice and jaggery are blended in a 2:1 ratio with a little amount of arjuna bark in the pineapple-arjuna tree bark honey. Grapes juice and jaggery are mixed in a 2:1 ratio in grapes-ginger honey, comparable to pineapple-arjuna tree bark honey with a tiny amount of ginger juice.

2.4 Equipment- Equipment's such grinder, gas stove, hot air oven, muffle furnace, desiccator, refractometer and pH meter.

2.5 Packaging of product- After preparation of product .Its packed in a sterilized glass container and stored at room temperature.

2.6 Chemicals- Different food grade chemicals were obtained from BBAU Department of Food and Nutrition of food science and technology laboratory to be used in following study.

2.7 Method-

1. Physico-chemical analysis

a. Determination of moisture

The oven drying method was used to determine the moisture content. The sample was carefully weighed 2g of material into the tared dish and dried to a constant weight in an oven at 100°C.

The sample was weighed again after cooling in the desiccators. Moisture content was used to track the weight decrease.

Moisture (%) = $\frac{100(M1-M2)}{M1-M}$

Where,

M1 is the mass of the dish's contents before drying;
M2 is the mass of the dish's contents after drying;
M is the empty dish's mass in gram.

b. Determination of total ash

The total ash content of the sample was calculated using the muffle furnace's direct-heating method.
Weigh 5 g of honey into a silica or platinum dish, add a few drops of pure olive oil to prevent spattering, and slowly heat over a moderate flame until swelling stops. Ignited in a muffle furnace at 600 + 20°C till white ash is obtained. I weighed the dish after cooling it in a desiccator. To maintain a steady weight, the incinerator was set to a constant temperature.

Ash (%) = $\frac{100(M2-M)}{M1-M}$

Where, M_2 = mass, in g, of the dish with the ash;
M = mass, in g, of the empty dish; and
M_1 = mass, in g, of the dish with the material taken for the test.

c. Determination of Acidity

Reagents-

1. Standard Sodium Hydroxide Solution 0.05 N.
2. Phenolphthalein Indicator Solution Dissolve 0.5 g of phenolphthalein in 100 ml of 50 percent ethyl alcohol (v/v).

Procedure-

In an appropriate titration flask, dissolve 10 g of the sample in 75 ml of carbon dioxide-free water. Thoroughly combined. 4 to 6 drops of thoroughly neutralised phenolphthalein solution were used to titrate against a standard sodium hydroxide solution (pink colour of indicator should persist for at least 10 seconds).
Corrected the volume of standard sodium hydroxide solution used by determining the blank on water and indicator.

Acidity (as formic acid), percent by mass = $\frac{0.23\times V}{M}$

Where,
V = corrected volume of 0.05 N sodium hydroxide solution required for titration; and
M = mass, in g, of the sample taken for the test.

d. Determination of Optical Density of Honey

In a small beaker, weigh 2 g of honey and dissolve it in distilled water in a 10-ml measuring cylinder, then dilute the solution to 10 mL. Set the colorimeter to 'O' absorbance or 100 percent transmittance at 660 nm using distilled water in a cuvet. Using the honey solution in the cuvet, measure the absorbance directly or as a percent transmittance at the same wave length (24).

If the colorimeter only has a transmittance scale, calculate the optical density using the formula below:

Optical density= 2 - Log percent transmittance.

e. Determination of pH Value

pH is the measurement of H^+ ion activity; it measures active acidity. pH is determined by measuring the electrode potential between glass and reference electrodes; pH meter is standard pH buffers.

Used homogenized sample for the determination of pH.

f. Determination of soluble solids (TSS)

Refractometer Brix was used to determine the soluble solid. Brix of Sugar used have range of 0 to 85% brix, 0 to 80°C (32 to 176°F), resolution:0.1%Brix; 0.1°C(0.1°F), accuracy: ±0.2%Brix; ±0.3°C(±0.5°F).

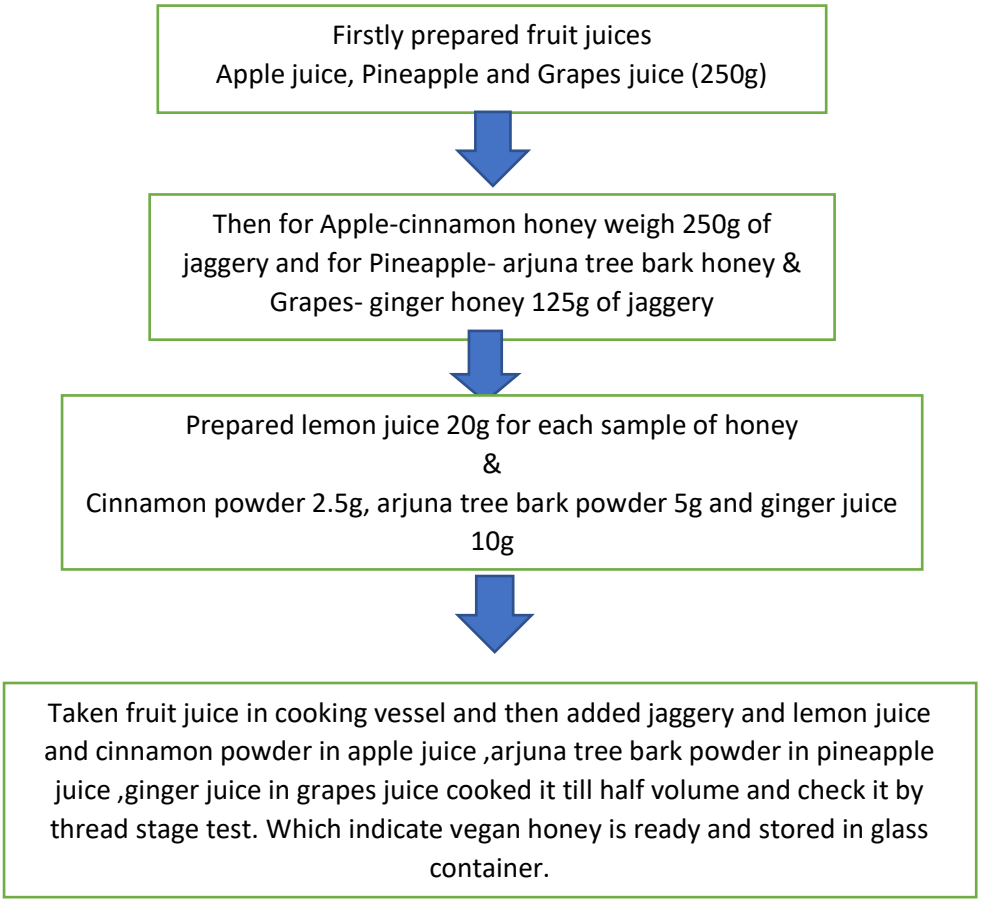
g. Sugar content estimation

The sugar content of honey samples was tested using a spectrophotometer in accordance with AOAC (2000), albeit with minor changes. In a beaker, 0.5 ml honey was weighed, and 1 ml ethanol in 2 ml sterile distilled water was added. The mixture was agitated, then 10 ml of ethanol that had been cooked to 100 °C was added and mixed evenly. For the analysis, 10 mL of this solution was centrifuged for 10 minutes to get a clear supernatant of free sugar. The supernatant was decanted into a volumetric flask and sterile distilled water was added to make up to 100 ml. In a test tube, 1ml of solution was created after adding 0.5 ml of 5 percent phenol and 2.5 ml of concentrated H2SO4. For colour development, a blank was made using 1 mL sterile distilled water, 0.5 mL phenol, and 2.5 mL concentrated H2SO4. With sterile distilled water, the spectrophotometer was calibrated. A standard with varied concentrations of glucose ranging from 0 to 50 mg/ml was also created at a wavelength of 490 nm.

2. Organoleptic evaluation

The organoleptic evaluation in respect of colour, flavour, consistency, taste, absence of defects & overall acceptability was evaluated by semi-trained judges using Composite Scoring Test.

3. Processing technology for Vegan honey



3. Results

	Control	Sample T1	Sample T2	Sample T3
Moisture content (%)	19.59±0.3581	19.56±0.2101	22.11±0.1206	20.70±0.4000
Ash content (%)	1.463±0.04163	1.810±0.1513	2.963±0.09019	2.913±0.2421
Absorbance/ Optical density	0.3678±0.0008505	1.260±0.006760	2.964±0.008184	2.668±0.0006657
Total Soluble Solids	80.50±0.4000	84.53±0.4041	82.47±0.4163	80.70±0.3606
pH	3.937±0.03215	4.243±0.02517	3.950±0.05000	4.170±0.04000
Titratable Acidity (%)	0.01173±0.0002517	0.0965±0.0004583	0.1935±0.0004163	0.1426±0.0003512

Table -1 Physico-chemical of vegan honey samples.

Sugar Content Estimation

Control	3.692±0.008083
T1	3.694±0.006557
T2	3.781±0.009292
T3	3.475±0.005291

Table-2 Sugar estimation values of Vegan honey sample

Standard/Conc.	Sucrose	Standard/Conc.	Glucose
5ml	0.2233±0.005774	5ml	0.1667±0.0115
10ml	0.3067±0.01528	10ml	0.04667±0.01528
15ml	0.3433±0.01155	15ml	0.02667±0.01528
20ml	0.2733±0.01155	20ml	0.1400±0.01000

Standard/Conc.	Fructose
10ml	0.2023±0.004163
20ml	0.1783±0.003055
30ml	0.3210±0.002000
40ml	0.5337±0.003055

Table -3 Standard value of Glucose, Sucrose and Fructose on different concentration

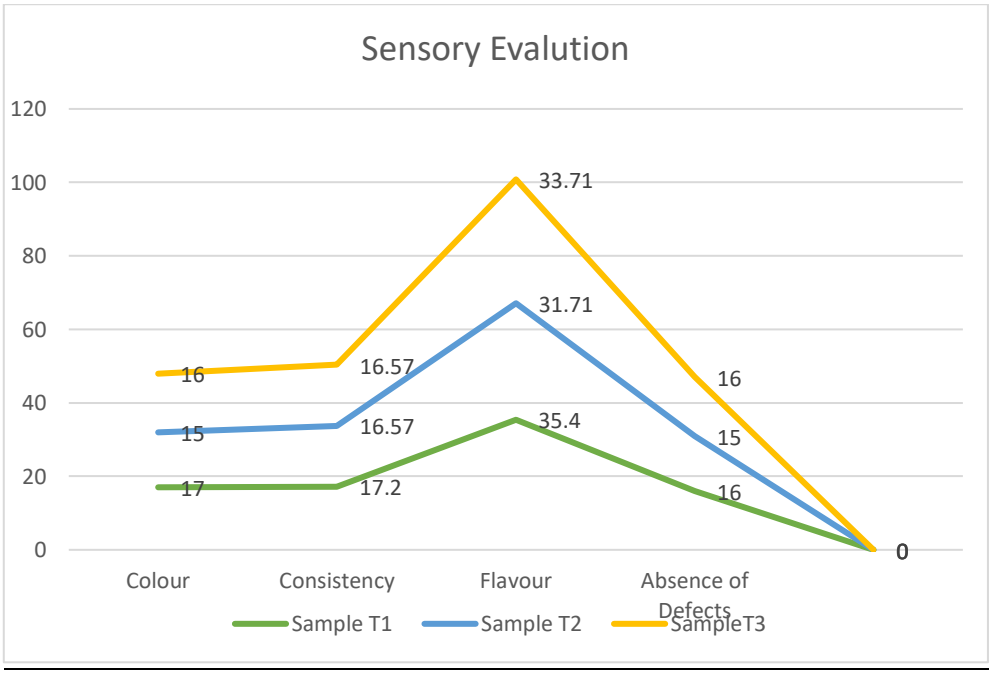


Fig-1 Sensory profile of vegan honey samples

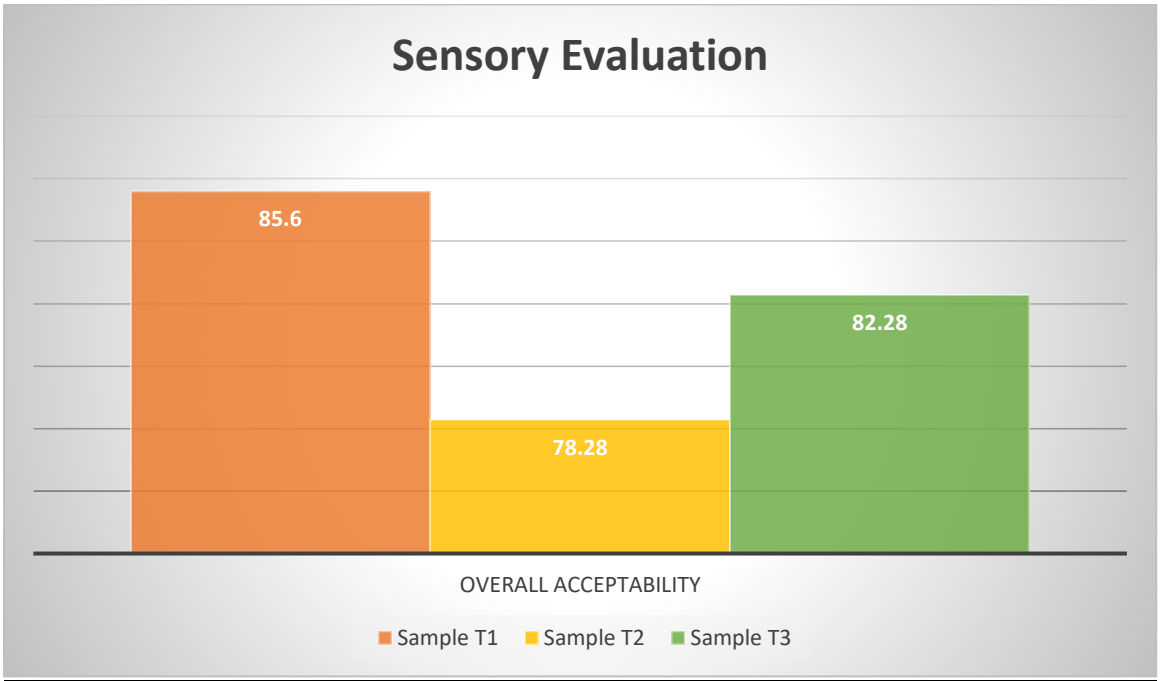


Fig-2 Sensory profile of vegan honey samples for overall acceptability

4. Discussion

The vegan honey samples T1-T3 for values of moisture content, ash content, titratable acidity, optical density, pH value and TSS are shown in Table1. Moisture content is ranging from 19-22 %. The control sample of honey is 19.59%, T1 sample is 19.56%, T2 sample is 22.11%, and T3 sample is 20.70% of moisture content.

Ash content of control sample is 1.463%, T1 sample is 1.81%, T2 sample is 2.963% and T3 sample is 2.913%. It's ranging from 1to3%.

Optical Density of vegan honey is ranging from 0.36 to 3 in which control sample is 0.36, T1 sample is 1.260, T2 sample is 2.964 and T3 sample is 2.668

pH value of vegan honey sample is ranging from3 to 4.5 pH where, control sample is 3.937, T1 sample is 4.243, T2 sample is 3.950 and T4 sample is 4.170 Ph.

TSS of vegan honey sample is between 80 to 85 % or °BRIX where, control sample is 80.50°Brix, T1 sample is 84.53°Brix, T2 sample is 82.47°Brix and T3 sample is 80.70°Brix.

Titratable acidity of honey is from below 1%. Where control sample is 0.01173 %, T1 sample is 0.0965 %, T2 sample is 0.1935 % and T3 sample is 0.1426 %.

Sugar content estimation is done by spectrophotometer at 490 nm. Which is compared with Glucose, Sucrose and Fructose Standard with different concentration prepared at 490 nm. Which mentioned in table 2(Sugar estimation values of Vegan honey sample) and 3(Standard value of Glucose, Sucrose and Fructose on different concentration). The reading of control is 3.692, T1 is 3.694,T2 is 3.781& T3 is 3.475.

Sensory evaluation of vegan honey samples –

The organoleptic evaluation of developed vegan honey samples were assessed by a panel of 20 semi- trained judge. The scores for sensory properties (colour, consistency, flavor, absence of

defects and overall acceptability) by composite scoring test method of sensory evaluation .Its represented by Fig 1&2.

In composite scoring test method scoring is given out of 20 in colour, consistency and absence of defects whereas flavor is an important aspects in which scoring is given out of 40. By all this scoring evaluation overall acceptability is shown out of 100.

Its observed in Fig-1 colour score out of 20 for T1 sample is 17, T2 sample is 15, T3 sample is 16, score of consistency out of 20 for T1 sample is 17.2, T2 sample is 16.57, T3 sample is 16.75, score of flavor out of 40 for T1 sample is 35.4, T2 sample is 31.71, T3 sample is 33.71, score of absence of defects out of 20 for T1 sample is 16, T2 sample is 15, T3 sample is 16.

In Fig -2 overall acceptability for T1 sample is 85.6%, T2 sample is 78.28%, T3 sample is 82.28%.Which interprets that sample T1 (Apple-cinnamon honey) is having acceptability after that T3 (Grapes-ginger honey) sample is acceptable and at last T2 (Pineapple-arjuna tree bark honey) sample is having low acceptability than other two.

5. Conclusion

Form the analysis of vegan honey with natural honey on various parameter i.e. Phyisco-chemical properties and Organoleptic evaluation shows similar properties of Vegan honey with natural honey. It can be concluded that Vegan Honey can be used as replacement of natural honey. As it is made up from different-different fruits and combination given with spices as flavouring agent as well as gives health benefits of that spices. Both combinations of fruit and spices show a specific flavour of vegan honey, i.e. Apple-cinnamon, Pineapple-arjuna bark, and Grapes-Ginger. Sugar content estimation is an important comparison of vegan and natural honey.

Organoleptic evaluation is showing consumer acceptability with a great acceptance of consumers for Vegan honey. Now-a-days people are aware of exploitation of animals and supporting plant-based product. This evaluation can be considered another factor of comparision of vegan honey with natural honey.

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