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Development of (*Hylocereus undatus*) Dragon Fruit Wine and Waste Utilization of Dragon Fruit Seeds and Peel

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ABSTRACT

Wine was made by using Natural Fermentation process by using only sugar but not yeast. Natural juices are a common source of sugar, and sugar is one of the most fixings required to create Alcohol (liquor). After maturation is total, strain the liquor from the natural product juice employing a muslin cloth, cheesecloth or coffee channel, and appreciate your custom-made alcoholic refreshment. Dragon fruit is selected according to the grade size and it is harvested fresh from the farm & it is kept at room temperature. Peel is removed from the fruit and it is kept for sun drying at the neat and clean place. After complete mashing of fruit add sugar as a culture according to the 3 prepared samples into the pulp/juice which is present into the porcelain jar. *i.e.* airtight container for 21 days at room temperature with dry and dark condition. After completing 21 days of fermentation open the container and observe the color, flavor, smell, odor of the juice. After filtration of the juice, store it in the sterilized glass bottles. After this wine is chemically analyzed with the important parameters like alcohol content present in naturally fermented wine, its pH, Titrable Acidity, Residual Sugar present in wine and market survey is done to prove the taste of developed wine with market wine (Port Wine) which is made up of grapes. After this cost is estimated of developed wine and compared it to market wine whether it is affordable or not.

Keywords : Pitaya, Dragon Fruit, Natural Fermentation, Wine, Market Survey

INTRODUCTION

According to Zee *et al.* (2004) Dragon Fruit is scientifically known as (*Hylocereus undatus*) and commonly known as pitaya fruit. Some have referred to the fruit as the most exquisite member of the cactus family. In India the dragon fruit farming was introduced in the Andra Pradesh. In Gujarat for the first time, dragon fruit, often referred to as kamalam, has been exported to Bahrain, London, and the United Kingdom. originating in West Bengal and Gujarat. India's export of exotic fruits has increased as a result of the export, and the Ministry of Agriculture hopes to raise farmer prices. Gujarat, India, has chosen to rename the dragon fruit because they believe it has Chinese origins. The fruit has been dubbed kamalam in Sanskrit because of its lotus-like shape. The modification was made in response to Prime Minister Narendra Modi's commendation of farmers in a radio interview for raising dragon fruit in Gujarat's desert Kutch region. The government was chastised by the opposition Congress for using the name change as a publicity stunt and for ignoring more pressing matters. Northeastern India and the neighboring state of Maharashtra are also growers of the fruit. The opposition Congress has denounced the government's attempt to deflect attention from pressing concerns and dubbed the name change a farce. Farmers cultivate varieties, with prices varying in Mumbai, Pune, and Surat markets according to the Quality and variety of the fruit. Dragon Fruit plantation in 1 acre of land require 650 poles and one pole can hold 4 plants

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of fruit *i.e.* 2600 plants per acre.1 plant gives average of 7 Dragon Fruit per lot and during season 1 plant gives average of 5 lots, then per lot 28 fruits are harvested from 1 plant and 112 fruits from 1 pole. Total 72,800 Fruits are harvested per lot of harvesting. During 1st Season lots average is low but after 2-3 years lots average becomes 7-8 and production of the fruits also increase. The dragon fruit farming is done in the rocky soil for the better production of the fruits. The main reason behind the use of the rocky soil is to decrease the holding of water as black soil holds the water in the farm. As dragon fruit is variety of the cactus family and cactus does not require bulk of water to grow. The main precaution during the summer season taken regarding the dragon fruit farm is to protect the plants from the sunlight. As dragon fruit plants are in green color and due to sunlight, it turns into yellow color and turns dry and it affects the production of the fruits also. The fruit is presently becoming more popular in India, but it is originally grown in Thailand, Sri Lanka, Israel, and Vietnam. Indian farmers have been lured to dragon fruits because of its great profitability and low maintenance requirements. Dragon fruit is mostly farmed in the North Eastern states of India, along with Maharashtra, Karnataka, Andhra Pradesh, West Bengal, Odisha, Telangana, Gujarat, Uttar Pradesh, Madhya Pradesh, Kerala, and Tamil Nadu. Approximately 12,000 tons of the fruit are produced annually in India. India exports the fruit to Dubai and UAE. The era of wine required one imaginative advance and made a contrast to bring forward others. The key need for wine era was stoneware. In show disdain toward of the reality that animal skins or shallow wooden holders might have been utilized, at some point as of late pots were made there was likely no secure way of containing huge volumes of juice for long adequate for maturing to require put. The essential wine would have owed its nearness to a woman (as they tended to be the gatherers of wild normal item). Likely a couple of portion grapes were cleared out for a few days in a pot and went through an outline of partial carbonic maceration (where development utilizing chemicals rather than yeast takes put interior unbroken grapes, as well as standard yeast-based maturing which happens in juice). When the pot was recuperated after a little while the juice was intoxicated and found to have changed. It had less sweetness, but additionally acted as a steady on the person who drank it. From there it was a direct step to pulverize grapes intentionally and take off them for the (misconceived) development to happen. In this interpretation wine is the result of a chance occasion - in show disdain toward of the reality that others suggest that, within the occasion that wine was gone some time recently by the disclosure of mead, an alcoholic drink made from nectar, it may have been deliberately made (Phillips, 2000). In any event the coming approximately wines would have had an intermittent era, with changing flavors and dangers of all sorts of deterioration. lean the tropics. Wine is making a more vital commitment than ever a few times as of late to a creating number of economies, tallying those of a number of making countries. It is against this foundation that the commitments to this volume appear a number of considers inside the history and culture of wine from unmistakable countries and assorted times up to the show day (Fe and Tepora, 2018; Karunakaran *et al.,* 2014; Karunakaran and Arivalagan, 2019 and Tamanna *et al.,* 2018).

Objectives:

This study aims to attracts the market of dragon fruit in India and develop the New Product from our Indian origin dragon fruit.

- To develop wine by natural fermentation process.
- Waste Utilization of Fruit (Seeds and Peel).
- To study cost of production of dragon fruit wine.
- Market survey of marketed grape wine and dragon fruit wine.

METHODOLOGY

Natural Fermentation:

Natural fermentation is carried out by Self decomposition of fruits which are fermented for the beverages and other edible products. Fruit is just washed, peeled, mashed and fermented in airtight container in absence of oxygen. Natural fruit product and juices are a common source of sugar, and sugar is one of the most fixings required to create Alcohol (liquor). The maturation prepare that turns sugar into liquor requires yeast, and yeast can be found actually on the skins of natural products. The coming about alcoholic refreshment will be less sweet than the initial juice, and it'll have a lower liquor substance than drinks made from refined spirits. To form liquor from natural product juice, you may require natural product juice seal the holder firmly and store it in a warm put for 3-5 days, until the maturation prepare is total. After maturation is total, strain the liquor from the

natural product juice employing a muslin cloth, cheesecloth or coffee channel, and appreciate your custom-made alcoholic refreshment.

Fruit (Pink Dragon Fruit):

Fresh pink colour Dragon fruits are harvested from farm and it is further followed by weighing (according to size) as each and every fruit doesn't weigh the same. The average weight of the fruit is (65-95 grams Sample 1) (150-210 grams Sample 2) (325-450 grams Sample 3). Further weighing, Sorting and Grading process is followed according to condition of fruit whether if the peel is damaged or fruit is unripe or not matured. After this all we have to observe the appearance of pulp whether it is fresh or rotted or we can say that if there is any contamination in fruit. Observation of seeds over pulp whether less or more in quantity.

Washing and Peeling :

Fruits are then washed with the water in which salt is added for removal of the waste or any pesticides sprayed on the fruit and plant during harvesting. Washing is done with normal portable water as we use in our house and farm. Fruit peel is removed by our hands. Peeling is done by 2 methods, hand peeling and mechanical peeling. For home scale we don't need peeler machine to remove the peel of the fruit. Dragon fruit consist of 65% of pulp and remaining 35% peel. Peel also contains nutrients value so we are not going to count it as a waste, we will utilize that peel as a powder in another product.

Mashing :

Mashing is a process in which fruit pulp is crushed and it is converted into the soft mass. In mashing of fruit, the pulp is crushed into the porcelain jar and allowed for the fermentation.

Addition of Sugar:

Sugar is added as a culture instead of yeast. Usually yeast act as a food for microorganisms but sugar is also responsible for the fermentation and fruit sugar is also present in pulp so fruit will start fermenting itself.

Fermentation:

It is a natural process of conversion of sugars into alcohols. Usually yeast act as a food for microorganisms but sugar is also responsible for the fermentation and fruit sugar is also present in pulp so fruit will start fermenting itself. Dragon fruit contains antioxidants like polyphenols, betacyanin's and so on. Fruit has its unique taste and flavor so according to taste the sugar is added for fermentation.

Fermentation is done in the porcelain jar which is made up of porcelain materials or we can say China dish like material which is used in the laboratory for chemical analysis. Fermentation is done in the airtight condition to avoid the contamination which will occur in wine. Carbon dioxide will play very important role in the in self-decomposition of the fruit and fermentation will occur till 14 days. After 14 days the fermented juice is filtered out and processed further.

Filtration:

Filtration is done with the help of muslin cloth to remove the seeds of the fruit for further processing of different product. Filtration is carried out by two different ways, firstly we will filter out the juice and remove the seeds and other pulpy material through the muslin cloth and after that we will use Nylon filter paper (food grade) with mesh size xx to remove the fine particles from the wine. After filtration of wine, it is kept for aging in the glass bottles to increase the taste and flavor of the wine.

Aging:

Aging is the process of storing of the wine in the wooden barrels or glass bottles which is packed and airtight. Aging is responsible for the improvement the taste and flavor of the wine and it gives a rich aroma and odor to the product. In aging the particles present in the final product settles down and clear and fine liquid we pour into the glass bottles.

Bottling and Storage:

Bottles are sterilized properly to reduce the microbial load of final product. Bottles are filled with the wine and sealed with the rubber cork which is heated first to kill the microorganisms present at the cork and after air tight sealed and no contact of oxygen and final product so the product will remain microbes free.

Procedure:

- Dragon fruit is selected according to the grade size and it is harvested fresh from the farm and it is kept at room temperature.
- Peel is removed from the fruit and it is kept for sun drying at the neat and clean place.

- After sun drying peel is grinded and used for the new product to be processed.
- Fruit is taken into the porcelain jar and it is mashed with the help of hand or we can do it by mechanically.
- After complete mashing of fruit add sugar as a culture according to the 3 prepared samples into the pulp/juice which is present into the porcelain jar.
- Mix the pulp and culture and allow it to ferment in anaerobic condition *i.e.* airtight container for 21 days at room temperature with dry and dark condition.
- After completing 21 days of fermentation open the container and observe the color, flavor, smell, odor of the juice.
- After observation filter out the juice with the help of muslin cloth and remove the seeds from the juice and other materials included in the pulp.
- Seeds are dried into the cabinet dryer for the further process.
- After filtration of the juice, store it in the sterilized glass bottles for the aging purpose to improve the color and flavor of the wine.
- After aging fill it into the bottles according to the quantity to be sell or stored.
- After bottle filling analysis is done of the wine for the consumption.

Waste utilization:

The waste which is utilized are peel and seed of the dragon fruit is removed as a waste and it is utilized for the further studies.

Dragon Fruit Peel

Peel consists of antioxidants and various contents related to our health. Usually, peel is discarded as a waste but the following are the uses of dragon fruit peel: -

- Anthocyanin, which is connected to anti- obesity ponders and might lead to a diminish in weight pick up. Anthocyanins seem play a part in anticipating heart malady.
- Dietary fiber, which may stifle nourishment desires and might lead to you losing weight.
- Boosting vitality levels, making strides your outline of intellect and invigorating your inspiration.
- Being a source of solvent and dietary fiber.
- Being wealthy in anti-oxidants, moo in calories and tall in fiber that will keep you full for longer time.
- It lowers the blood sugar level.
- Used in a fortification with its vitamin C and anti-oxidants.

Dragon Fruit Seeds:

Seeds are the second waste which is removed from the pulp. In dragon fruit the seeds are compacted with the pulp itself and it is very difficult to remove it from pulp so we need to mash the pulp of fruit and after fermentation we separate it out with the help of muslin cloth.

- Usually seeds contains an assortment of supplements and vitamins12. They are wealthy in vitamin A, vitamin C and niacin. Vitamin A is required for the arrangement of solid skin, vision and bones. Vitamin C makes a difference in building modern cells, gives insusceptibility to the body and bolsters great absorption.
- The seeds moreover contain prebiotics, which back numerous angles of human wellbeing, counting upgraded absorption, improved resistant framework work, and a lower hazard of intestinal diseases.
- Dragon Fruit is accepted to have anti-inflammatory and antimicrobial properties, which can offer assistance to decrease torment and swelling within the body and battle off diseases caused by microscopic organisms and infection

Methods of Analysis :

Alcohol Content:

IS 3752:2005 Alcoholic Drinks, Methods of Tests.

Alcohol content by volume (alcohol/volume) it is a standard degree of how much alcohol (ethanol) is contained in a given volume of an alcoholic refreshment (communicated as a volume %). It is characterized as the number of milliliters (mL) of immaculate ethanol in 100 mL of wine. It is measured by pycnometer. A hydrometer is a direct gadget that measures the thickness of a fluid comparing it to water. The easiest way to utilize a hydrometer is to gather a test of the must (wine) or wort (brew) employing a disinfected and washed wine cheat (pipette), and a trial bump.

$$\text{Sepcific gravity} = \frac{W_1 - W_2}{W_2 - W_1}$$

W : Weight of Empty Pycnometer
W_1 : Weight of Empty Pycnometer with wine sample
W_2 : Weight of Empty Pycnometer with water

Procedure :

1. Transfer exactly 200 mL of alcoholic drink into a 500 mL distillation flask containing about 25 mL of distilled water and a few pieces of pumice stone.
2. Distil the contents in about 35 min and collect the distillate in a 200 mL volumetric flask till the volume almost reaches the mark.
3. Bring the distillate to room temperature 20 °C and make up to volume with distilled water and mix thoroughly.

Find out the specific gravity of the distillate as follows:

4. Take a clean and dry pycnometer and weigh it empty along with the stopper at 20 °C (W).
5. Fill it with the liquor sample distillate to the brim and insert the stopper gently.
6. Wipe the Liquid that spills out using water absorbing filter paper and weigh at 20 °C (W_1).
7. Next remove the liquor sample distillate and wash it with distilled water.
8. Fill the pycnometer with distilled water in the same manner as described above and at 20 °C take the weight (W_2).

Sensory Evaluation:

For all the three trials, the sensory evaluation for wine was recorded. Five semi-trained panelists from the Department of Food Technology of Parul University Vadodara, conducted the sensory evaluation using a 9-point hedonic scale ranging from 1 (extremely dislike/ most undesirable) to 9 (extremely like/most desirable). A test proforma was also sunline to the panelists at the time of evaluation. It's given here, 9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like nor dislike, 4 = dislike slightly, 3 = dislike moderately, 2 = dislike very much, 1 = dislike extremely. for various parameters, including appearance, texture, taste, consistency and overall acceptability. All panelists were Asst professors and P.G. students and Industrial Employees were in between the ages of 25 and 40.

pH of Wine :

1S 7585: Wines-Method of Investigation: Bureau of Indian Measures.

The pH of the tests was evaluated utilizing 1S 7585: Wines-Method of Investigation: Bureau of Indian Measures. The PH of the tests was evaluated utilizing IS 7585: Wines-Method of Examination:

A pH meter may be a logical instrument that measures the hydrogen particle action in arrangements, showing its corrosiveness or basicity (alkalinity) communicated as pH esteem. The standard of pH meter is the concentration of hydrogen particles within the arrangement e.g. it is the negative logarithm of a hydrogen particle. The pH extend of arrangements shifts between 1 to 14, where 1 is the most elevated in acidic nature, and 14 is the most elevated in alkalinity.

Titrable Acidity:

IS 7585: Wines-Method of Analysis: Bureau of Indian Standards.

The Titrable acidity of the wine was assessed using IS 7585: Wines-Method of Analysis:

Bureau of Indian Standards. IS 7585 is a standard method for the determination of Titratable acidity of wine, The founder of this method is the Bureau of Indian Standards (BIS). The method is as follows:

Principle:

The Titratable acidity of wine is determined by titrating the wine sample with standardized sodium hydroxide (NaOH) solution using phenolphthalein as an indicator. The Titratable acidity is expressed as tartaric acid (g/L).

Apparatus:

1. Analytical balance, 2. Burette, 3. Pipette, 4. Conical flask, 5. Volumetric flask, 6. Beakers, 7. Magnetic stirrer, 8. pH meter

Reagents:

1. Sodium hydroxide (NaOH) solution (0.1N)
2. Phenolphthalein solution (1% w/v)
3. Distilled water

Procedure:

1. Weigh accurately 25 ml of wine into a 250 ml conical flask.
2. Dilute the wine sample with distilled water to about 100 ml.
3. Add 3-4 drops of phenolphthalein solution and

titrate the solution with 0.1 N NaOH solution until the pink color persists for at least 30 seconds.
4. Record the volume of Sodium Hydroxide (NaOH) solution used.
5. Repeat the above procedure with distilled water as a blank.

Calculation:

Calculate the Titratable acidity of wine as follows:

$$\text{Titratable acidity (g/L)} = \frac{(V_2 - V_1) \times N \times 7.5}{W}$$

Where:

V_1 = Volume of NaOH solution used for blank (in ml)

V_2 = Volume of NaOH solution used for wine sample (in ml)

N= Normality of NaOH solution

7.5= Factor for conversion of tartaric acid equivalent

W= Weight of wine taken for analysis (in g)

Note: The result obtained should not exceed the limit specified by BIS for Titratable acidity in wine.

Residual Sugar :

The residual sugar of the wine was assessed using Hydrometer.

A residual sugar test using a hydrometer is a way to determine the amount of sugar left in a fermented beverage such as wine, beer, or cider. The test involves taking a sample of the fermented beverage and measuring its specific gravity using a hydrometer. To perform the test, the hydrometer is first calibrated by placing it in a sample of pure water and adjusting it so that it reads 1.000 at the correct temperature. Then, a sample of the fermented beverage is taken and placed in a test jar. The hydrometer is then placed in the sample and the specific gravity is read.The specific gravity reading is then compared to the original specific gravity reading taken before fermentation. The difference between the two readings is used to calculate the alcohol content of the beverage. If the specific gravity reading is higher than expected, it means that there Is Still Sugar left in the beverage, indicating that the fermentation process is not yet complete. The amount of residual sugar in the beverage can be calculated using a conversion chart based on the specific gravity reading. This information can be important for determining the sweetness level of the beverage and for making adjustments to the fermentation process if necessary.

Market Survey:

Market study is the study inquire about and investigation of the showcase for a specific product/ service which incorporates the examination into client slants. A ponder of different client capabilities such as venture traits and buying potential. Showcase studies are devices to straightforwardly collect criticism from the target gathering of people to get it their characteristics, desires, and necessities. Marketers create unused and energizing methodologies for up-and-coming products/ services but there can be no affirmation approximately the victory of these techniques. For these to be effective, marketers ought to decide the category and highlights of products/services that the target gatherings of people will promptly acknowledge. By doing so, the victory of a modern road can be guaranteed. Most showcasing supervisors depend on advertise overviews to gather data that would catalase the advertise inquire about handle. Moreover, the criticism gotten from these overviews can be contributory in item promoting and highlight upgrade. Showcase studies collect information around a target showcase such as estimating patterns, client prerequisites, competitor investigation, and other such subtle elements. Research investigation of the advertise for a specific product/service which incorporates the examination into client slants. A think about of different client capabilities such as speculation qualities and buying potential. The most objective and objective of a market study is to gather information encompassing a target showcase such as competitor analysis, estimating patterns, and client desires. Whether you're driving a start- up company or a tenured commerce, it is critical to get it the wants of your clients. This advertise study is carried out by Survey Strategy. A survey could be a list of questions or things utilized to accumulate information from respondents around their states of mind, experiences, or suppositions. Surveys can be utilized to gather quantitative and/or subjective data. Surveys are commonly utilized in showcase investigate as well as within the social and wellbeing sciences.

Market Study is an organized exertion to accumulate data almost target markets and clients know approximately them, beginning with who they are. It is a critical component of commerce methodology and a major calculate in keeping up competitiveness. Showcase inquire about makes a difference to recognize and

examine the requirements of the advertise, the showcase estimate and the competition. Its strategies envelop both subjective strategies such as center bunches, in-depth interviews, and ethnography, as well as quantitative strategies such as client studies, and investigation of auxiliary information. It incorporates social and supposition research, and is the precise gathering and elucidation of data about individuals or organizations utilizing measurable and expository strategies and strategies of the connected social sciences to gain insight or back choice making.

RESULTS AND DISCUSSION

The chemical characteristics such as pH, alcohol (ethanol) % titrable acidity, residual sugar, and Market survey of wine were analyzed by different methods.

Sr. No	Name of Sample	Result
1.	Wine	4.2
2.	Wine	11.7%
3.	Wine	0.9%
4.	Wine	23.24mg/100ml

- Here we conclude that the pH of wine is 4.2 at 25 ^{0}C.
- Here we conclude that the Alcohol Content of wine is 11.7%.
- Here we conclude that the Titrable Acidity of wine is 0.9%.
- Here we conclude that the Residual Sugar present in wine is 23.24 mg/100ml

Sensorry Evaluation of Wine:

The sensory analysis of Wine involved the assessment of various attributes such as Color, Taste, Texture, Consistency and overall acceptability, and the mean sensory scores were documented in Table 1 and Fig. 1. The findings from the sensory evaluation indicated that sample T_3 exhibited higher consumer acceptability compared to sample T_1 and T_2. Sample T_3 received the highest ratings in Color (9), Taste (8.0), Texture (7.0), Consistency (8.0), and overall acceptability (8.0). The

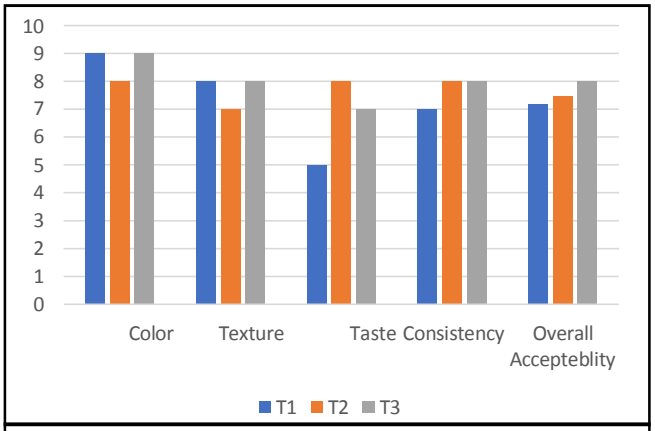


Fig. 1 : Sensory Evalulation

sensory scores play a crucial role in the selection and optimization of the final composition of the wine, ensuring that the product met the desired sensory attributes and consumer preferences.

Market Survey:

This market survey was done with Market Grape Wine (Port Wine) and Dragon Fruit Wine which was developed in Parul University and this survey was carried out in Maharashtra State Baramati City and nearby villages which is situated in Pune District. I have carried out this survey with different age groups of people which consume alcohol once in week or daily.

Results of Market Survey:

Age Group: 18-25 Years

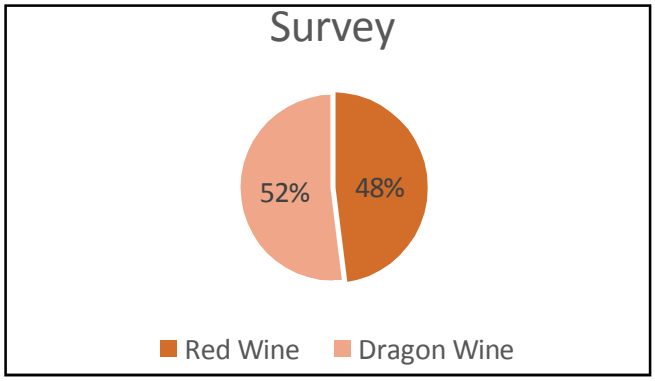
In this survey I conclude that the 52% people from 18-25 years age like Dragon Fruit Wine and 48% people like red wine.

Table 1 : Sensory Evaluation of Wine

Sample	Color	Texture	Taste	Consistency	Overall Acceptability
T_1	9	8	5	7	7.2
T_2	8	7	8	8	7.5
T_3	9	8	7	8	8.0

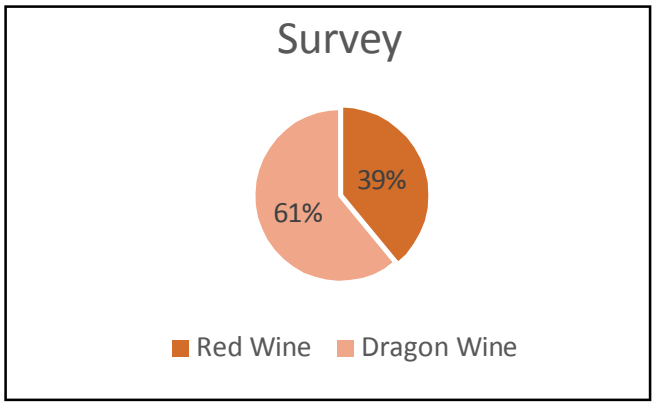
Age Group: 26-40 Years

In this survey I conclude that the 61% people from 26-40 years age like Dragon Fruit Wine and 39% people like red wine.



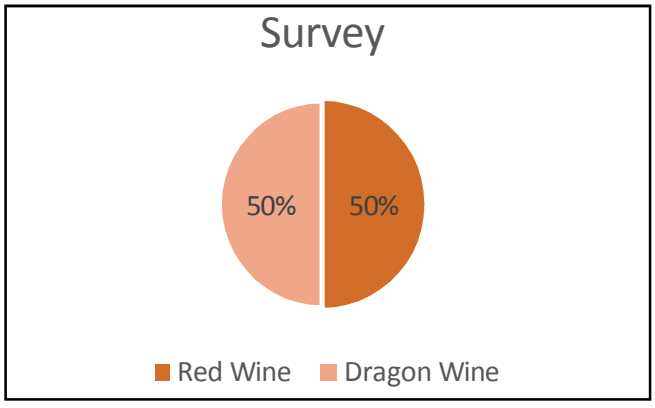
Age Group: 41-55 Years

In this survey I conclude that the 50% people from 41-55 years age like Dragon Fruit Wine and 50% people like red wine.



Age Group: 55 and Above

In this survey I conclude that the 21% people from 55 and above years age like Dragon Fruit Wine and 79% people like red wine.



Sr. No.	Age Group	Red Wine	Dragon Fruit Wine
1.	18-25 Years	48%	52%
2.	26-40 Years	39%	61%
3.	41-55 Years	50%	50%
4.	55 & Above	79%	21%

Conclusion:

The conclusion of my project on dragon fruit wine is quite significant, suggesting several key findings that merit further exploration and consideration. The pink color of the dragon fruit wine, attributed to betacyanin, adds to its visual appeal. This natural pigment not only enhances the aesthetic quality of the wine but also reflects its original source, the dragon fruit itself.

Consumer Preference: Despite a general disinterest in wine among Indian consumers, there was a notable positive response to the dragon fruit wine. This indicates potential market acceptance and suggests that the unique qualities of the wine, including its natural fermentation process, resonate with consumers.

Health Benefits: Your project highlights the potential health benefits of dragon fruit wine compared to other fruit wines available in the market or wine shops. These benefits encompass a wide range of health aspects, including the following:

Blood Pressure: The wine may contribute to lowering blood pressure levels, potentially reducing the risk of hypertension and related complications.

Appetite Issues: It may play a role in regulating appetite, which could be beneficial for individuals experiencing appetite-related issues.

Migraine Relief: Its consumption might serve as a natural remedy for migraines, offering relief from associated symptoms.

These health benefits underscore the potential of dragon fruit wine as a functional beverage with therapeutic properties. Further research and clinical studies could provide valuable insights into the specific mechanisms underlying these effects and their efficacy in promoting health and well-being. In conclusion, my project highlights the multifaceted appeal of dragon fruit wine, encompassing its visual appeal, consumer acceptance, and potential health benefits. This underscores its potential as a unique and valuable addition to the beverage market, offering both enjoyment and potential wellness benefits to consumers.

Future Prospect:

In 2020-2021, there was high demand for dragon fruit in India, leading to increased production. During this period, the price of dragon fruit ranged from 270-300 rs per kg. However, in the current year, 2023-24, the price has decreased significantly to 80-110 Rs per kg. This drop in price could be due to various factors such as changes in demand, increased competition, or changes in production costs.

It's true that wine has properties such as alcohol content and pH levels that make it inhospitable for most human pathogens to survive. However, the taste of wine can still be affected by factors such as oxidation, microbial spoilage (while most pathogens won't survive, some spoilage organisms might), and improper storage conditions. While wine can generally be stored for extended periods, it doesn't mean that it will always taste good. Proper storage conditions, including temperature, humidity, and light exposure, are essential for maintaining wine quality over time.

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