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"Formulation of Millet Based Ragi Ice-Cream"

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ABSTRACT

India is one of the major millet's producers in the world. The globe is home to several millets crop producers. Small-sized millets like finger millets require a bigger cultivable area in order to produce the harvest. Because finger millet has a higher nutritional value than other significant grains like barley, rye, etc., it is regarded as a unique food supplement. It is mostly composed of essential amino acids, dietary fiber, and minerals. Finger millet (Eleusine coracana), also referred to as ragi, is the main diet for the rural population in many parts of our nation, particularly in South India. Of all the grains, ragi has the highest amount of calcium as well as antioxidants and phytochemicals. Among other cereal grains, finger millet has a high percentage of total dietary fiber, which is very helpful in regulating blood glucose levels in diabetes patients. Additionally, people with cancer, heart disease, and other cognitive disorders can benefit from it. Ragi can be processed using a variety of techniques to provide a food supplement with a pleasing look, flavour, and consistency. Ragi flour was combined with standard ice cream ingredients such milk, cream, sugar, and stabilizers to create the recipe for the ragi ice cream. To maximize the ice cream's texture, flavour, and appearance, several ragi flour ratios were used into the experimental design. The sensory evaluation was carried out by a group of skilled judges utilizing a hedonic scale to rate characteristics such as taste, texture, colour, and general enjoyment. Using a varied sample of customers, a sensory assessment was used to gauge consumer acceptance of the ragi ice cream. Statistical tools were used to analyse data from the consumer acceptance study in order to find any meaningful relationships between sensory qualities and consumer preferences. The study's conclusions demonstrated the effective creation of an ice cream made from ragi that has pleasing texture characteristics and potential health advantages. The ragi ice cream had a pleasing appearance, a creamy texture, and a tasty flavor.

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INTRODUCTION

In today's market cautious planning and a good product strategy are essential to succeed in the market. Companies everywhere are competing more than ever to develop new and unique products and gain a higher position in the market.
Companies everywhere are competing more than ever to develop new and unique products and gain a higher position in the Food items made from milk are commonly referred to as dairy goods. They are abundant energy sources. Cows are often the source of raw milk needed for processing, while goats, sheep, and water buffalo can also provide it. Water makes over 90% of the substance in milk. People all throughout the world consume large amounts of milk and milk products in their diets. They are made from the milk of several different animals, primarily cows, but also goats, sheep, buffalo, and camels. Here are some broad details about milk and products associated with it. Dairy products are manufactured from milk, typically from cows, although they can also be made from other animals like goats, sheep, or buffalo.

The following list of typical dairy products includes:
• Milk: Milk is the primary dairy product and the source of many other dairy products. There are numerous types of milk available, such as skim milk, reduced-fat milk, low-fat milk, and whole milk (full fat).

• Cheese: The process of making cheese involves coagulating milk, separating the curds, and allowing them to age or mature.

• Yogurt: Yogurt is made by fermenting milk with live bacterial cultures. It has a cream texture and an acidic taste.

• Butter: Churning cream or fermented milk until butter fat and buttermilk separate is the method of creating butter. It can be spread, baked, and cooked with.

• Cream: Cream is the term for the fatty layer that forms on top of milk. It is extracted from milk and used in many different cooking recipes.

• Ice Cream: Ice cream can be made with milk, cream, sugar, and flavorings as ingredients. It is churned while freezing to provide a smooth and creamy texture. There are endless varieties and forms of ice cream to choose from. Ice cream is usually made with milk or cream. Vanilla, chocolate, butterscotch, blueberry, pista, strawberry, mango, and black current are just a few of the flavors of ice cream.

ICE-CREAM

Ice cream has a centuries-long history that has changed over many cultures and eras. Although the precise beginnings of ice cream are unknown, frozen sweets have been around since ancient times. This is a quick synopsis of ice cream's past: Cold desserts were a favourite of the ancient Greeks, Romans, and Persians. Fruits, sugars, and snow or ice were combined to create the first frozen treats. As per the narrative, Nero, the Roman emperor, sent messengers to the hills to collect ice and snow, which he later blended with honey and fruit. In the Middle Ages, the Arabs began to enjoy ice desserts. They figured out a way to mix ice, sugar, and fruit liquids to make a delicacy that looked like sorbet. These recipes travelled across the Mediterranean and eventually reached Europe. During the Renaissance, frozen sweets gained popularity in Europe. An Italian noblewoman named Catherine de' Medici, who married the future Emperor of France in the sixteenth century, introduced the frozen dessert known as "sorbet" to the French court. Rich people began to wear it.

It is believed that the real ancestor of contemporary ice cream first arose in Italy in the late 17th century. The technique of combining cream, sugar, and flavourings to create creamy frozen desserts was created by Italian chefs. It was referred to as "gelato." In the 18th century, gelato recipes

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spread across Europe. As a treat, ice cream became popular among the English nobility. During this time, ice cream makers were developed, increasing production productivity. And ice cream made its way to America. Quaker immigrants introduced the ice cream recipes to Us in the 1700s. In 1777, ice cream made its public debut in a New York newspaper. The industrial revolution and the invention of mechanical refrigeration in the 19th century revolutionized the production and distribution of ice cream. It was more easily accessible to the general public, and ice cream stores and other vendors started to spring up. When Jacob Fussell opened the nation's first commercial ice cream business in 1851, mass production got underway. Ice cream is a staple food at fairs, carnivals, and social events. The 20th century saw several technological advancements that improved the production of ice cream. Automated manufacturing processes and continuous freezers have simplified large-scale ice cream production. The release of new flavours including chocolate chip, cookies and cream, and mint chocolate chip drew in a larger consumer base. Cones, popsicles, and sandwiches made with ice cream are examples of novelty foods that are becoming more and more popular. It's still a popular treat whether it's made at home using modern ice cream equipment, bought from supermarkets, or enjoyed at ice cream shops.

To make commercial ice cream, liquid ingredients (milk, cream, syrups, etc.) are combined and stirred continuously. These hot liquids are combined with the dry ingredients (milk, sugar, stabilizers, or dried eggs) to make a combination that is subsequently homogenized and pasteurized. The mixture is allowed to ripen for several hours in a refrigerated vat before being combined with finely chopped fruit, nuts, or other solids. The liquid is swirled while it freezes to incorporate air and control the size of the ice crystals that are formed. After partially freezing, the ice cream is taken out and put in containers to solidify, or harden. The idea of "soft-service" ice cream originated in 1939.

INGREDIENTS USED FOR PREPARATION OF ICE-CREAM:

1. Milk: The most important step in producing ice cream is adding milk. Milk is one of the primary ingredients needed to manufacture ice cream and is crucial to the overall quality, flavour, and texture of the finished product. Since milk gives ice cream its foundation, texture, and flavour—all of which we adore—it is an essential ingredient. When added to other components like sugars and flavourings, it creates a delightful treat that appeals to individuals of all ages.

2. Fat: Ten to fifteen percent of an ice cream mixture's fat content might come from either milk or vegetable sources. By stabilising the air cell structure, the fat stabilizes the ice cream's structure, adding smoothness and bolstering its resistance to melting. There are several types of milk fat that are utilized, including whole milk, cream, butter, and anhydrous milk fat (AMF). Milk fat can be substituted with vegetable fat; refined or hydrogenated (hardened) coconut oil and palm kernel oil are the most widely utilized options.

3. Sugar: Sugar is added to the ice cream to increase its solids content and give it the desired sweetness level for the consumer. The usual range of sugar concentration in ice cream mixtures is 12–20%. Saccharides are usually referred to as sugar. They include glucose/fructose syrup, high fructose syrup, and glucose/dextrose and fructose monosaccharides; sucrose and lactose (milk sugar) disaccharides; and starch derivatives. The consistency of the ice cream can also be altered by utilizing different sweeteners.

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4. Emulsifiers: Emulsifiers are substances that facilitate emulsification by reducing the surface tension between two phases. There are many different kinds of emulsifiers used in the making of ice cream, but the most popular and probably most efficient ones are fatty acid mono- and diglycerides. Despite being a well-known emulsifier, egg yolk is more costly and ineffective than the most often used varieties.

5. Stabilizers: A substance that may bind water while dissolved in a liquid phase is called a stabiliser. Stabilisers are added to the mixture to increase viscosity and give the finished product body and texture when producing ice cream. They also prevent the production of ice crystals and improve melting resistance.

6. Flavours: The flavors, which can be added either during the mixing procedure or after pasteurization, have a significant impact on the customer's ice cream selection. Vanilla, chocolate, and strawberry are the top three flavors. The three types of flavors recognized by the EU (European Union) are artificial, nature-identical, and natural. The flavors that are closest to nature are the most well-liked. The most commonly accessible flavors of ice cream include vanilla, nougat, chocolate, strawberry, and nut.

RAGI ICE-CREAM

Ragi is an important staple food in India. It is one of the less well-known grains and among the earliest known millets in India. It is well known for its many health benefits because of its high calcium content and abundance of dietary fiber. By raising the iron and fiber content, ragi (finger millet) enhances the nutritious value of ice cream. By adding finger millet to ice cream, stabilizer was used less frequently and the ice cream's fat was successfully replaced. There is a growing interest in finger millet (Ragi) because of its exceptional nutritional worth and health advantages. Finger millet has both therapeutic and nutritional qualities.

A popular and wholesome substitute for regular ice cream is finger millet (ragi) flour, which is used to make ragi ice cream, a frozen treat. In addition to other vital components, ragi, a grain free of gluten, contains dietary fiber, calcium, iron, and amino acids. In addition to enhancing the nutritional profile of ice cream, ragi flour gives it a unique nutty flavour and texture. The custard-like texture of the ice cream foundation is aided by the ragi flour paste, which is prepared by mixing ragi flour with either milk or water.

The cooled ragi paste is combined with a concoction of milk, cream, and sugar to make ragi ice cream. Additionally, flavourings like cardamom powder or vanilla essence are commonly utilized. To create a creamy frozen dessert, the blended mixture is then either frozen in a container or churned in an ice cream maker. Studies show that ragi ice cream retains a significant amount of the nutrients included in ragi flour, making it an exceptional source of fiber, calcium, and iron. Its reduced glycaemic index in comparison to regular ice creams further suggests that it might be beneficial for diabetics or anyone searching for a healthier dessert option.

OBJECTIVE

- To incorporate ragi into the ice-cream.
- To make people understand the importance of millets (ragi) with the help of ice-cream
- Promote Nutritional Awareness
- Tap into Health and Wellness Trends
- Product Innovation
- Market Growth and Profitability

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- Customer Loyalty and Brand Recognition

CONCEPTUAL BACKGROUND

Ragi ice cream, which uses finger millet (ragi) as its main component, is a creative and healthy take on the classic ice cream. Rich in vital minerals like calcium, iron, fiber, and other vitamins, ragi is a nutrient-dense, gluten-free grain. It is a staple cuisine in many African and Indian regions.

The underlying ideas of millet-based ragi ice cream probably center on the following important points:

1)Nutritional Value: Ragi is renowned for having a lot of nutrients. It offers essential elements like calcium, iron, fiber, and B vitamins and is a wonderful source of energy. When ragi is added to ice cream, it improves the overall nutritional profile of the product and becomes a healthier alternative to regular ice cream.

2)Gluten-Free and Allergen-Friendly: Ragi is suitable for people with celiac disease or gluten sensitivity since it is naturally gluten-free. This implies that ragi ice cream made from millet can serve a larger range of people, including those with gluten dietary requirements.

3)Culinary Innovation: It's innovative and creative of the chef to use ragi as the main component in ice cream. It demonstrates how adaptable ragi is and how it can be utilized to make tasty and nourishing food items in unconventional ways.

4)Sustainable Agriculture: Ragi and other millets are regarded as crops that are good for the environment. Compared to certain other cereal crops, they typically require less water and are more resilient. It promotes sustainable farming techniques by encouraging the use of millets in food products like ice cream.

5)Targeting Health: Conscious Consumers- As people's attention turns more and more toward their health and wellness, there is a rising need for delicious foods that also have nutritional value. Ragi ice cream made from millet is a healthy option for consumers who are searching for treats that aren't as heavy on the sugar and more on health.

6)Cultural Significance: In some places, especially in South India and some parts of Africa, ragi has a significant cultural and traditional significance. One method to honor and promote the cultural legacy connected to this grain is by adding ragi to ice cream.

7)Market Trends: The food business is always altering to accommodate shifting dietary trends and customer preferences. Offering novel goods such as ragi ice cream made from millet is in line with the current trend of providing a wider variety and healthier dietary options.

All things considered, the idea behind millet-based ragi ice cream blends aspects of nutrition, inventiveness in the kitchen, sustainability, and cultural importance to produce a product that gives customers a distinctive and healthful dessert choice.

REVIEW OF LITERATURE

Millets are extremely low water-consuming crops. Finger millet, also called ragi, is gaining popularity due to its superior nutritional value and health benefits. It is traditionally used in some parts of India to make porridge because of its excellent thickening properties. The US National Research Council states that finger millet grain is more nutrient-dense than most cereal grains in terms of minerals, dietary fiber, and essential amino acids. Additionally, ragi has the highest quality protein of any grain.

Finger millet is becoming more popular due to its hypoglycemic qualities, which are among its health benefits. additionally, its polyphenols' antioxidant and antibacterial properties.

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RAGI

By raising the iron and fiber content, ragi (finger millet) enhances the nutritious value of ice cream. A functional starch-based ingredient with some promise for usage in lower-fat recipes is ragi starch, which is fairly bland. It has reignited consumer and scientific interest in developing "natural, functional, and nutritional" prepared products. Because finger millet has high thickening and water binding properties, it is thought that adding it as a functional component to ice cream can eliminate the need for stabilizers and effectively replace fat in the ice cream. Dietary fibers offer several beneficial properties. Fiber addition helps to alter and improve the texture, sensory qualities, and shelf life of meals because of its ability to bind water, produce gels, mimic fat, and have anti-stick, anti-clumping, texturizing, and thickening effects.

One way to improve the nutritional content and utility of ice cream is to incorporate ragi, a meal that is very high in nutrients, into it. Ice cream with a high fat content (12–14%) is problematic. This offers an opportunity to develop and produce low-fat ice cream in large quantities that can easily be incorporated into the dietary guidelines for those with cardiovascular diseases. About 61.8% of the grain in finger millet is starch and between 70 and 76 percent is carbs. Comparing finger millet to most other cereal grains, its total dietary fiber content is 22%, compared to 13.4%, 4.5%, 12.8%, and 12.6% for wheat, rice, maize, and sorghum, respectively. Dietary fibers are beneficial in a lot of ways.

FINGER MILLET (RAGI)

Scientific Classification:

- **Scientific name:** *Eleusine coracana*
- **Kingdom:** *Plantae*
- **Division:** *Magnoliophyte*
- **Class:** Liliopsida
- **Order:** *Cyperales*
- **Family:** *Poaceace*
- **Genus:** *Eleusine*
- **Species:** *coracana*

ORIGIN OF FINGER MILLET

Africa and India are major producers of finger millet, a tropical African cereal. Around 5000 years ago, during the start of the Iron Age, it is thought to have been domesticated from wild, weedy species in the highlands of Eastern Africa, ranging from western Uganda to Ethiopia. About 800 years ago, it moved from eastern Africa to southern Africa and then to South-East Asia. It is common throughout warm temperate climates, ranging from Australia and Japan to Africa. Finger millet cultivars cultivated in lowland African and southern Indian regions are physically identical.

Studies indicate that finger millet was brought to India approximately 3000 years ago after it was cultivated in eastern Africa, most likely Ethiopia, some 5000 years ago. The closest wild relative of finger millet is coracana subsp. Africana, a native of Africa.

Finger millet, the most important micro millet in the tropics, is grown as a staple food grain in more than 25 countries in Asia and Africa. It makes up 12% of the millet acreage worldwide. These days, the Indian subcontinent, eastern and southern Africa, and other tropical locations are where it is most commonly grown. Its small-scale farming in South-East Asia keeps it from being commercialized. The southern regions of India are the only places where finger millet is grown extensively.

HEALTH BENEFITS OF FINGER MILLET

1. Finger Millets helps to control diabetes.
2. It reduces diabetes.
3. It reduces cholesterol.
4. It increases bone strength.
5. It increases lactation.
6. It helps to improve digestion.
7. It boosts immunity.
8. Repairs injured muscle tissue.

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Nutritional Composition of Finger Millets per 100gm is:

Composition	Value
Protein	5-8%
Carbohydrates	65–75%
Dietary fibre	15–20%
Energy	336 calories
Ether extractives	1–2%
Fat	1-2%
Minerals	2.5-3.5%

Finger millet is noticeably richer in micronutrients like vitamins and minerals when compared to rice and wheat, the other two major grains in the world. With three times the calcium content of milk and ten times that of wheat, maize, and rice, finger millet in particular is the richest source of the mineral. Finger millet contains lipids, minerals, dietary fiber, protein, and carbs.

Carbohydrates

Finger millet contains a significant percentage of carbohydrates (1.04% free sugars, 11.5% non-starchy polysaccharides, and 65.5%). The dietary fiber content of finger millet (11.5%) is notably higher than that of brown rice, polished rice, and all other millets combined, including foxtail, small, and barnyard millet. Starch makes up between 59.4% and 70.2% of the carbs in ragi, making it the main ingredient. The polygonal rhombic starch granules of finger millet are rich in 20–15% amylase 18 and 80–85% amylopectin. Twenty to thirty percent of the total carbohydrates in finger millet are made up of non-starch polysaccharides.

Composition	Value
Energy	63g
Protein	3.4g
carbohydrates	4.6g
Fats	3.6g
Sodium	44mg
potassium	150mg
cholesterol	5mg
Calcium	125mg

Protein

The percentage of protein in finger millet ranges from 4.9% to 11.3%. Finger millet boasts a nutritional profile that is well-balanced when compared to other millets. Finger millet has about 44.7% of the essential amino acids, compared to 33.9% in the FAO standard protein. Finger millet's main protein is incredibly high in cysteine. Tryptophan, methionine, and other aromatic acids—all essential for human growth and development—are absent from other millet grains and cereals.

Vitamins

It is believed that millets have a high potential vitamin B content. Finger millets contain vitamin A, which has a retinol value of six. While other dry millet grains lack vitamin C, finger millets include fat- and water-soluble vitamins such thiamine, niacin, riboflavin, and tocopherols, often known as vitamin E and vitamin C. Soluble in water Finger millet contains an abundance of vitamin B in both the aleuronic layer and germ; however, only lip soluble vitamins are enriched in the germ.

Minerals

Finger millet has more ash than other cereal grains. Regularly adding finger millet to the diet can help treat ailments like bone problems and iron-deficiency anemia that are brought on by a lack of calcium.

Nutritional Composition of Milk per 100gm is:

It is a calcium-enriched source of minerals when compared to other grains. It is rich in iron, magnesium, sodium, phosphorus, copper, and potassium.

MILK

The fluid that comes from a mammary gland in mammals—including humans—is called milk. Because breast milk is well-tolerated throughout the period when their digestive systems are developing and expanding, infants prefer it over other foods. Dairy milk may be introduced later if well tolerated. While dairy milk can be produced by any mammal, the most

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common breeds are sheep, cows, goats, and buffalo.

Water makes up to 87% of the total milk from cows. The remaining 13% is made up of vitamins, minerals, fat, protein, and carbohydrates. Processing techniques result in lower fat variations: "skim" has nearly no milkfat, "low fat" has 1% milkfat, and "reduced fat" has 2% milkfat. Since pregnant cows are often milked, dairy milk contains hormones such oestrogens, progestins, and insulin-like growth factor-1 (IGF-1). Some cows are given more hormones to increase their milk production.

MATERIAL AND METHODOLOGY

Selection of Ingredients

1. Milk
2. Ragi
3. Cornflour
4. Milk powder
5. Sugar
6. GMS (Glycerol monostearate)
7. CMC (Carboxymethyl cellulose)

Pre-processing of Ingredients

The actions completed before to or ahead of the final food preparation are referred to as pre-processing.

Pre-processing includes-

1. Grinding of ragi
2. Sieving of ragi flour
3. Roasting of ragi flour
4. Grinding of sugar
5. Boiling of milk

1. Grinding of Ragi:

Ragi is ground when it becomes a fine powder (sometimes called finger millet). In Asia and Africa, ragi, a nutritious grain, is widely produced. It is commonly used in many different types of baked pastries, rotis, and oatmeal. After the grain has been washed and any pollutants removed, ragi is usually ground. Next, the ragi grains are thoroughly cleaned and let to dry. After drying, the grains are frequently gently roasted to enhance the flavour.

Once roasted, the ragi grains can be pulverized. A mortar and pestle or a stone grinder known as a "chakki" are frequently used to manually grind the grains. Despite this, electric blenders and grinders are still widely used today due to their convenience. In tiny batches, put the roasted ragi grains to an electric grinder and crush them into a fine powder. Prior to use, make sure the blender or grinder is clean and dry to prevent contamination.

The grinding of ragi is important for several reasons:

a. Increased Digestibility: The high dietary fiber content of whole grain ragi can make it difficult to digest. When ragi is crushed into a fine powder form, its fiber is broken down, making it easier for the body to digest and absorb the nutrients included in the grain.

b. Nutrient Availability**:** High in vitamins, antioxidants, and vital minerals including calcium, iron, and potassium, ragi is a very nutrient-dense grain. Grinding the ragi grains increases their surface area, which facilitates better release and absorption of important minerals during digestion.

c. Versatility in Culinary Uses: Powdered ragi increases its gastronomic utility. In a variety of recipes, such as those for porridge, rotis, pancakes, ice cream, cookies, and other baked goods, the powdered form is easy to utilize. It is a simple way to include the nutritional benefits of ragi into a range of dishes.

d. Textural Considerations: Grinding ragi modifies its texture, which may be preferred in some recipes.

2. Sieving of Ragi Flour

One way to further process ragi is to grind it into a fine powder and then sieve the flour. Sieving helps to eliminate any large particles or impurities, giving the flour a smoother and more uniform texture. Here's how to filter ragi flour:

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a. Invest in a fine-mesh sieve or wheat sifter. Make sure everything is clean and dry before using.

b. Transfer the freshly ground ragi flour to a big plate or dish.

c. Over the sieve or sifter, place a clean basin or plate.

d. Permit the ragi flour to gradually pass through the sieve or sifter's mesh.

e. To assist the flour in passing through the sieve or sifter and to get rid of any bigger particles or impurities, give it a light tap or shake.

f. Continue in this manner until the flour has been filtered completely.

g. Check the dirt residue in the sifter or sieve. To achieve even greater fineness, re-grind any larger or coarser chunks or discard them.

h. The ragi flour can now be used in any recipes that you like after it has been sieved.

Sieving ragi flour is important for several reasons:

a. Texture Improvement: Sieving can help remove any large chunks, lumps, or impurities from the ragi flour. The end effect is a smoother texture, which enhances the enjoyment of items like baked goods, rotis, and oats.

b. Even Distribution: By sifting, the flour is more uniformly dispersed and clumps are broken up. By avoiding any uneven distribution of ragi flour with other ingredients in a recipe, potential changes in texture or flavour are minimised.

c. Removal of Foreign Particles: During the grinding or storing procedures, foreign materials such as husk or dirt could get into the ragi flour recipe. Sieving helps to ensure that the flour you use in your recipes is pure and unadulterated by removing these unwanted components.

d. Enhanced Digestibility: By sifting the flour, any big or fibrous particles are removed, which improves the flour's palatability and bioavailability.

3. **Roasting ragi flour:**

Ragi flour is sometimes roasted, which enhances the flavour of ragi recipes and lends the flour flavour and scent. Here's how to roast ragi flour:

1. On medium heat, warm a dry skillet or pan.

2. Fill the hot pan with the ragi flour. For even cooking, it is advised to roast the flour in tiny batches as opposed to all at once.

3. To make sure the flour roasts evenly and doesn't burn, continuously stir it with a spatula or wooden spoon.

4. Roast the ragi flour for a further 5 to 7 minutes, or until you see a colour shift. The flour will gradually darken and start to smell nutty.

5. Watch the flour carefully when roasting because it can burn easily. If necessary, adjust the heat to avoid burning and provide an even roast.

6. Take the pan off the heat when the ragi flour has gotten a little darker in colour and the aroma has been stronger.

7. Pour the roasted ragi flour into a basin or clean plate to cool. This will stop it from continuing to cook due to the pan's residual heat.

8. Before using the roasted ragi flour in your preferred recipes or keeping it in an airtight container, let it cool fully.

The roasting of ragi is important for several reasons:

a. Flavour Enhancement: Roasting brings out the earthy, nutty flavours that ragi flour naturally has. The heat activates and amplifies the flavour components in the flour, giving the meal a richer, more robust flavour. The richness and depth of roasted ragi flour enhances the flavour profile of cuisine.

b. Aroma Development: A delicious aroma is released when the ragi flour is toasted.

c. Improved Digestibility: Roasting ragi flour improves its digestibility. Heat breaks down complex carbohydrates and reduces

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antinutritional components, making the nutrients easier for the body to absorb and digest.

d. Extended Shelf Life: Ragi flour can be made to last longer on the shelf by roasting it to help lower its moisture content. Since the dry, roasted flour is less likely to degrade and attract insects, it can be kept for long periods of time without losing any of its quality.

4. **Grinding of sugar:**

"Grinding sugar" refers to the act of pulverizing granulated sugar crystals into a smoother texture or finer powder. The usual way is to use a food processor or blender. Just add the appropriate amount of granulated sugar to the food processor or blender and pulse a few times to get the right texture. To avoid contamination, it is imperative that the equipment is clean and dry before usage.

Grinding sugar is important for several reasons:

a. Texture Enhancement: Grinding transforms granulated sugar into smaller, more uniformly grained particles. The finer texture makes it easier to dissolve in liquids and incorporate into recipes, allowing for a more uniform consistency across meals.

b. Faster Dissolution: Finely ground sugar dissolves more quickly than granulated sugar because of its bigger surface area. This is particularly useful when creating drinks, syrups, or sauces as the sugar will dissolve more quickly and evenly, avoiding any graininess.

c. Improved Mixing: Once sugar is powdered, it is easier to combine with other ingredients. The finely ground powdered sugar is a smooth addition to batters, doughs, and frostings, enhancing mixing and distributing sweetness throughout the mixture.

Customization: You can customize the texture and coarseness of sugar to your taste by grinding it yourself. You can vary the amount of grinding to get different levels of fineness based on the requirements of the recipe or your personal tastes.

5. **Boiling Milk:**

Boiling milk is an essential first step in making homemade ice cream. When making ice cream, it's important to gradually boil the milk to avoid burning or scorching. Stirring the milk regularly while it's boiling will assist ensure equal heating and help keep it from sticking to the pot's bottom.

Boiling of milk is important for several reasons:

a. Pasteurization: During the pasteurization process, milk is boiled to help get rid of pathogens and dangerous microorganisms. Pasteurization reduces the chance of catching a foodborne illness and ensures that the milk is safe to consume.

b. Flavour Infusion: Boiling the milk adds flavour to the ice cream base. While the milk is boiling, you can flavour it with additional ingredients like cinnamon sticks, vanilla beans, or other spices. Because of the heat's assistance in flavour infusion into the milk and extraction of flavour from these ingredients, an ice cream base with more flavour is created.

c. Texture and Stability: The stability and smoothness of ice cream are enhanced by boiling milk. The heat's capacity to denature milk proteins improves the consistency and texture of the ice cream base. It also facilitates the dissolution of any other ingredients or sugars, producing a smooth and homogenous combination.

d. Emulsion Formation: Boiling the milk aids in the formation of an emulsify in the ice cream base. The lipids and proteins in milk combine to create an emulsion that stabilizes the liquid and keeps its constituent parts from separating once it freezes. This contributes to the finished ice cream's creamy, smooth texture.

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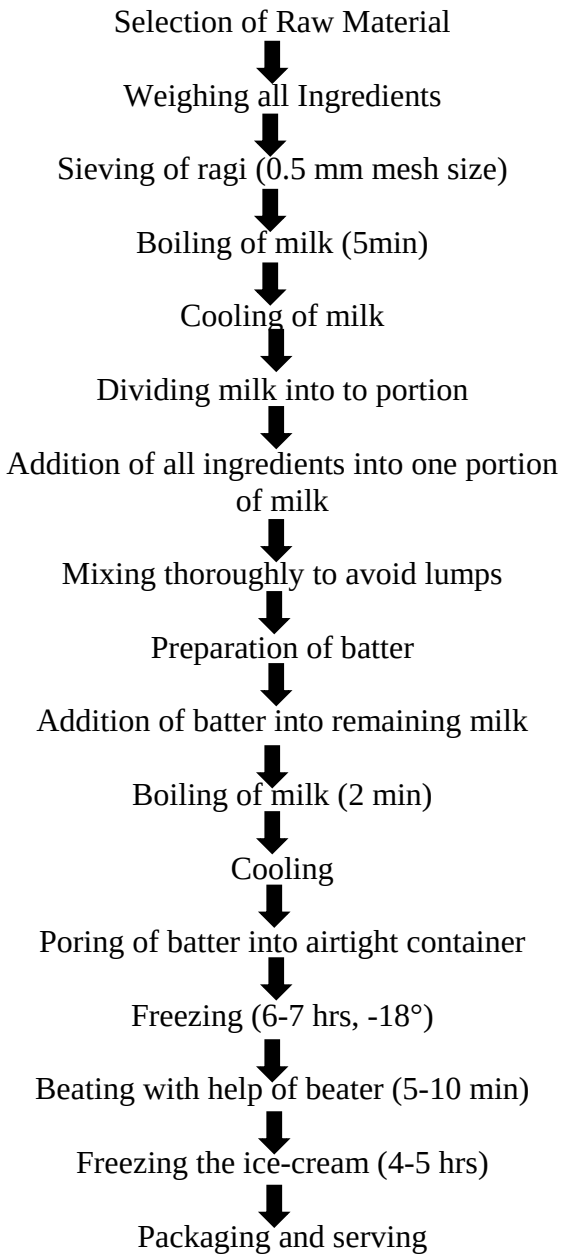
FLOWCHART OF MILLET BASED RAGI ICE- CREAM



BUSINESS ENVIRONMENT ANALYSIS

A business environment analysis of ragi ice cream made from millet would look at a number of variables that could affect a company's capacity to succeed and remain viable in this market. Here are some important things to think about:

1)Market Trends and Demand: Examine the most recent developments in the ice cream market as well as the larger health and wellness space. Find out if there is a rising market for healthy substitutes, such as items made from millet. To learn about consumer preferences and readiness to try new ice cream flavours, conduct market research.

2)Competitive Landscape: Determine who the market's rivals are, both current and potential. Examine their market share, pricing policies, distribution methods, and product offerings. Comprehending the advantages and disadvantages of rival products can facilitate the strategic placement of the millet-based ragi ice cream.

3)Regulatory and Compliance Issues: Look into any regulations pertaining to the manufacture and distribution of food, particularly those pertaining to items made from millet. Make sure that all applicable laws, regulations, and standards for food safety, including those pertaining to labelling, are followed.

4)Supply Chain Management: Examine the supply chain's dependability and availability for essential components like ragi. Think about things like sourcing, processing, storing, and shipping. A reliable and effective supply chain must be established in order to maintain a constant level of product availability and quality.

5)Distribution Channels: Ascertain the best distribution channels to use in order to reach the intended audience. Direct-to-consumer sales, internet platforms, specialty food stores, supermarkets, and retail stores are a few examples of potential choices. Analyze the expenses and logistics related to every channel.

6)Consumer Preferences and Behaviour: Recognize the inclinations, actions, and purchasing habits of the intended market. Think about things like brand loyalty, desire to spend for high-end products, dietary limitations, and taste preferences.

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7)Marketing and Branding Strategy: Create a well-defined marketing plan to advertise ragi ice cream made from millet. Think about how to convey the product's distinctive selling characteristics, nutritional value, and health advantages. Create a compelling brand identity that appeals to the intended market.

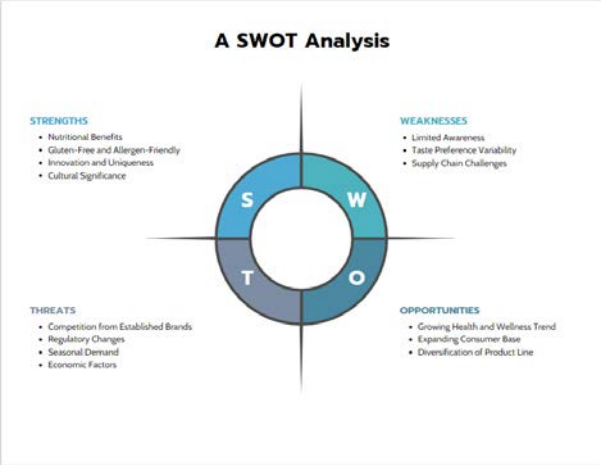
8)Financial Viability and Budgeting: To ascertain the necessary initial investment, anticipated revenue streams, and profitability estimates, perform a financial analysis. Think about things like projected sales volume, price strategy, and production costs.

9)Risk Assessment: Determine the dangers and difficulties that might affect the company. This could involve elements like supply chain interruptions, market saturation, seasonality (ice cream demand can fluctuate with the seasons), and regulatory changes.

10)Sustainability and Social Responsibility: Think about integrating socially conscious and sustainable methods into the business plan. This can involve limiting waste, procuring ingredients ethically, and supporting regional communities.

11)Innovation and Product Development: Keep abreast of new developments in the food sector and look for chances to diversify or innovate your product line. Keeping up a competitive edge can be achieved by extending and upgrading the product line continuously.

Recall that creating a successful business plan and making well-informed judgments for millet-based ragi ice cream require a thorough understanding of the business environment. It assists in identifying advantages to capitalize on and possible drawbacks to avoid.



CONCLUSION

To sum up, the creation of millet-based ragi ice cream is an exciting endeavour that capitalizes on the health advantages and adaptability of ragi, a nutrient-rich grain. This creative take on ice cream meets the growing need for more varied and healthful dietary options. This product's cultural importance, allergen friendliness, and nutritional value make it a unique value proposition for consumers who are health-conscious.

However, in order to effectively handle issues like low awareness and possible variances in taste preferences, product development and marketing tactics must be employed. Furthermore, maintaining a steady and effective supply chain for vital ingredients like ragi will be necessary to guarantee the availability and quality of the final product.

With the growing popularity of health and wellness, there are plenty of chances and a market for millet-based ragi ice cream. There are other opportunities for expansion, such as focusing on particular demographics and possibly expanding the product line.

While regulatory issues and rivalry from well-known brands are still possible dangers, they can be lessened with careful planning for marketing and distribution, adherence to food safety regulations, and an emphasis on product differentiation.

All things considered, the creation of millet-based ragi ice cream has the potential to carve out a place in the ice cream market and satisfy the changing tastes of health-conscious consumers with careful planning, market research, and a dedication to quality. This project supports the promotion of sustainable and culturally significant food sources in addition to providing a tasty and healthy dessert choice.

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