

Study and development of edible plates for domestic use

Bopanna k d, Venkatesh*, Sandesh#

*#mechanical Department, new horizon college of engineering
New horizon college of engineering marathalli 560103 India*

Abstract - Edible plate is a ready to eat product that can be eaten without any further preparation. In this project the advantage of using the edible plates is studied. The plates can be used for human use as well as for feeding the Cattles. Plates can be made from cotton seed cake, groundnut seed cake and mixture of different types of flour wheat, jowar, ragi etc.)The edible binder will be used to make the plate so that Cattles can eat the plates As a results, plates are eco-friendly and are made on the basis of zero waste. Rapid industrialization and urbanization has caused the production of enormous amount of solid wastes. This aim of this project is to review the bits and pieces of work being done on edible plates in various parts of the world. This project is done using groundnut de-oiled cake and edible binder. Where the process includes heat pressing using hydraulic force with certain temperature on the dyes. these process plates are ready to be used for serving then can also be bio-degradable or can be fed to cattles.

Keywords- edible plate, groundnut, edible binder, cattles.

I. INTRODUCTION

In these days certain things have become part of our daily routine life which play very important role in our busy schedules from morning till night. With increased use of various carcinogenic, toxic and harmful chemicals present in everything which we eat, drink or use and with increased cases of cancer, dermatological, cardiovascular and other diseases, it is very important to keep ourselves fit and avoid the use or contact of such harmful contaminants in what we eat, drink or use. Worldwide focus has shifted towards coming closer to the nature and various natural practices like yoga and meditation are being adopted to keep oneself fit. In addition to that, use of various organic food materials which claim to be produced using natural fertilizers and herbal pesticides without any harmful chemicals and synthetic materials, is also growing very rapidly. However, in-spite of taking precautionary measures discussed above, it has not been possible for everyone and more precisely for anyone, to safeguard himself from use or contact of these harmful chemicals. However, one should keep trying to minimize the use of such contaminants in his routine life to the possible extent. Further use of various non-biodegradable materials, more particularly, plastic materials, has generated a new worldwide challenge to handle and dispose such plastic materials which are polluting the world environment and

affecting the balance of eco-system. These plastic materials, being non-biodegradable, remain in the environment unaffected and in-turn pollutes the environment. This project intends to the design and develop new bio-degradable plates which can be used for human use. With increased urbanization women are also stepping out for jobs, they have hardly any time for cooking and washing utensils. The use of plastic utensils is harmful to the human body because of presence of toxins and carcinogens. Edible plates is the trending way to overcome all these problems. Edible plates can be used as utensils and also solids and semi solids items can be served in it, they do not get soggy quickly. These are eco-friendly as they are easily discard able and eaten by animals The production of these plates reduces open dumping and open disposals of waste in open areas. There is a belief that usage of these plates could be a potential source of reducing the plastic utensils.

II. RAW MATERIALS

All the materials used are naturally degradable which doesn't require any chemical mixture to degrade the materials.

1. Groundnut de-oiled cake

Groundnut Oil Cake is made by extracting the oil completely from the groundnut seeds. The left over is then processed to produce high quality Groundnut Oil Cake. The product is highly nutritious and widely used in as cattle feed. It maintains the health of Cattles and increases milk production as it is rich with protein and fat. The thickness of the cake is around 0.5mm to 1mm. The cost of ground nut seed cake is Rs 42/kg. The oil content is more in reddish-brown groundnut seed cake.



Ground nut de-oiled cake

Advantages

Ground nut cake can be used as an organic fertilizer in our home kitchen garden/terrace farming.

Groundnut cake is a great fertilizer as it promotes healthy growth of the plant and provides lush, velvety leaves and high yield.

Groundnut De oiled cake has been used as a protein supplement in Cattle Feed, Poultry Feed, Piglet Feed, Aqua/Fish Feed. Groundnut Oil Cake has several health benefits and serves as the perfect balanced diet for the cattle.

Nutritional values

PROTEIN : 45g /100g
ENERGY : 386 Ecals
MOISTURE : 7g
FAT : 8g
MINERALS : 2g
FIBRE : 3g
CARBOHYDRATE: 39g
CALCIUM : 213mg
PHOSPOROUS :548mg

2. Wheat bran

The bran is the hard outer layer of the wheat kernel, which is jam-packed with various nutrients and fiber. During the milling process, the bran is stripped away from the wheat kernel and becomes a by product. Wheat bran has a sweet, nutty flavour. It can be used to add texture and a full-bodied taste to bread, muffins and other baked goods.

**Advantages and health benefits**

Like any dietary fiber, wheat bran can play a key role in losing and maintaining weight by staving off your hunger pangs. Wheat bran regulates your appetite and leaves you feeling full and satisfied. Including wheat bran in your daily diet keeps you regular. If you are often constipated, adding more of wheat bran to your diet can get things moving. High blood pressure causes excess strain and damages your arteries. Consuming wheat bran has shown significant reductions in blood pressure.

Nutritional values

CALORIES : 63g
FAT : 1.3g
PROTEIN: 4.5g
VITAMIN B6 : 0.4mg
CARBOHYDRATES : 18.5g
RIBOFLAVIN : 0.15g
THIAMINE : 0.15g
DIETARY FIBRE : 12.5g
POTASSIUM : 343
IRON : 3.05mg

III.BINDERS

The selected binders are naturally edible and does not harm in any manner.

1. CELLULOSE GUM OR CARBOXYMETHYL CELLULOSE.

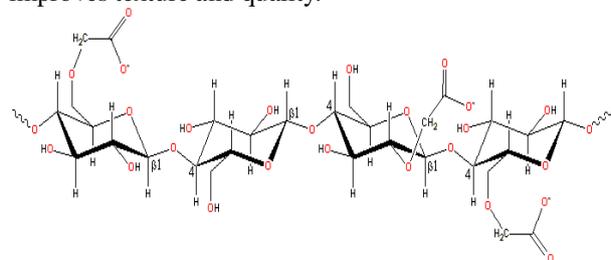
Carboxy methyl cellulose (CMC) or cellulose gum[1] is a cellulose derivative with carboxy methyl groups (-CH₂-COOH) bound to some of the hydroxyl groups of the gluco pyranose monomers that make up the cellulose backbone. The functional properties of CMC depend on the degree of substitution of the cellulose structure (i.e., how many of the hydroxyl groups have taken part in the substitution reaction), as well as the chain length of the cellulose backbone structure and the degree of clustering of the carboxymethyl substituent's.



CMC (POWDER FORM)

USES

CMC powder is widely used in the ice cream industry, to make ice creams without churning or extreme low temperatures, thereby eliminating the need for the conventional churners or salt ice mixes. CMC is used in preparing bakery products such as bread and cake. The use of CMC gives the loaf a much improved quality at a reduced cost to the baker, by economizing on the fat component. CMC is also used as an emulsifier in high quality biscuits. By dispersing fat uniformly in the dough, it improves the release of the dough from the moulds and cutters, achieving well-shaped biscuits without any distorted edges. It can also help to reduce the amount of egg yolk or fat used in making the biscuits, thus achieving economy. Use of CMC in candy preparation ensures smooth dispersion in flavour oils, and improves texture and quality.



STRUCTURAL UNIT

2. CORN STRACH

Corn starch, maize starch, or cornflour (British English) is the starch derived from corn (maize) grain. The starch is obtained from the endosperm of the kernel. Corn starch is a common food ingredient, often used to thicken sauces or soups, and to make corn syrup and other sugars. Corn starch is versatile, easily modified, and finds many uses in industry such as adhesives, in paper products, as an anti-sticking agent, and textile manufacturing.

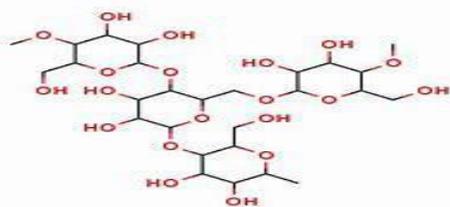
Food energy 381 kcal (1595 kJ)
(per 100 g serving)

Nutritional value Protein 0.3 g
(per 100 g serving) Fat 0.1 g
Carbohydrate 91 g



Chemical Formula: C₂₇H₄₈O₂₀

Molecular Weight: 692.65802 g/mol



STRUCTURAL UNIT

USES

Corn starch is used as a thickening agent in liquid-based foods (e.g., soup, sauces, gravies, custard), usually by mixing it with a lower-temperature liquid to form a paste or slurry. It is sometimes preferred over flour alone because it forms a translucent, rather than opaque mixture. As the starch is heated, the molecular chains unravel, allowing them to collide with other starch chains to form a mesh, thickening the liquid (Starch gelatinization). It is usually included as an anti caking agent in powdered sugar.

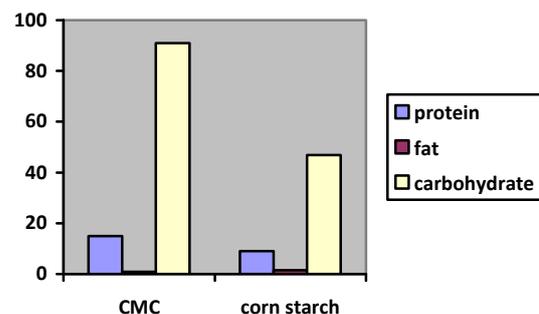
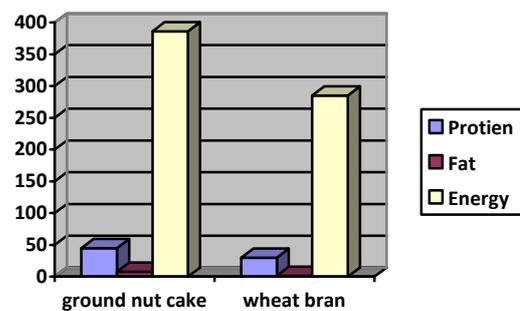
COMPARISON

RAW MATERIAL		
	Nutritional content	Eco-friendly
Groundnut de-oiled cake	high	yes
Wheat bran	Comparatively low	yes
BINDERS		
CMC	high	moderate
Corn starch	low	yes

SELECTION OF RAW MATERIAL AND BINDER

Raw material and binders are selected based on their nutritional content and based on effects on environment.

High nutritious content material are highly selected for the process so, when used we utilized total energy from the materials. Binder are selected based on the chemical composition in it.



EDIBLE PLATE MACHINE

The automation in the work process in the manufacturing industries is expanding constantly with each passing day. There have been a lot of up gradations in the working of automatic manufacturing machines over a recent couple of years. That change was astounding which led even the paper plate making machines towards mechanical skill.

As the edible plate making machine manufacturers we have observed many benefits of fully automatic edible plate making machines. In this, we would be sharing some of the major advantages of the new generation of these machines which were not there earlier. Refer the following points for further information.



Edible plate making machine

TYPES OF MAKING MACHINE

- I. SINGLE DYE
- II. DOUBLE DYE

Cost Savings: With the ultimate level of precision, consistency, minimal human-interaction and low maintenance, you would be able to save a huge amount of money over time. These fully automatic machines allow producers to proactively manufacture and deliver bulk requirements of paper plates more rapidly. If you've picked the right solution for your paper plate manufacturing unit, you will undoubtedly yield an incredible ROI.

Adaptability: A well-structured Fully Automatic Paper Plate Making Machine permits the production of new orders and has the capacity to deliver the previous requirements within ample time. These fully automatic machines are made to withstand challenging conditions with ease. Such adaptability of machines enhances productivity.

Consistency: Bulk requirements and constant production are typical elements for manufacturing units. Nonetheless, with fully automatic paper cup making machines, you will not need to hold production for a long span. These machines are innovatively designed to deliver constantly without altering the quality standard of the outcomes. The quick turn-around time makes it simple to attain consistency in production.

Easy to operate and low maintenance: The Fully Automatic Paper Plate Making Machine features well-defined controls to enable easy operation. Their streamlined design makes it simple to produce the desired amount of paper cups and paper plates with no issue. As it needs minimal human interference, it saves incredible labour and applicable labour-cost. This makes it simple for the owners to build proficiency and attain an ideal production level.

PROCESSING OF EDIBLE PLATE

➤ Taking appropriate amount of wheat flour and mix with 0.5% of jiggery with respect to the total quantity of wheat flour used. After mixing dry the composition in room temperature for half a day for removal of odour. Using groundnut oil prepare the mixture to form a smooth dough. Take a small quantity from the prepared dough and place it to the centre of the dye present in the machine. Start the machine to get heated up to certain temperature required. Using the hydraulic motion both the dyes are made to press the dough from opposite direction and the dough is made to compress along the dye. After few second the dye is reversed to its position forming the dough in plate form. Usage of groundnut oil makes the mixture or dough non sticky to the dye. The plate produced is removed from the dye and the process is continued.

CONCLUSION

Since the factor of reducing the use of plastics has picked up in the last few years. It is observed that the consumers are aware of edible cutlery being eco-friendly and also that they are biodegradable hence could bring a change by not using disposable plastic cutlery in day to day life. Many of the consumers feel that they would like to buy edible cutlery but not on regular basis but for trying out something new or fancy that is available in the market. It is observed that edible cutlery could become an option or an alternative for disposable cutlery for which a lot of manufacturers need to start mass production in order to reduce the prices and making availability of such edible cutlery easy for the consumers. The consumers also feel that edible cutlery cannot be an alternative for that metal cutlery that is being used currently in all the households owing to the life and durability of metal cutlery. Consumers still have a doubt in their mind regarding the ease in handling and using edible cutlery as it is new in market and most people not using it on regular basis. Although edible cutlery that is available currently is durable to consume any type of food like hot soups to bhel puri, salads to ice-cream, it does not wear down easily. They also believe that it is a matter of time that the doubt of durability may also minimize. Plastic disposable cutlery being economical and easily available, are used almost for every occasion and function. They use of edible cutlery is very rare as its availability in the local market is unknown.

REFERENCES

- 1) Eco-Friendly and Edible Waste Cutlery for Sustainable Environment by N. Natarajan, M. Vasudevan, V. Vivekk Velusamy, M. Searalvj International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-9, Issue-1S4, December 2019
- 2) Development and Quality Evaluation of Edible Plate by Sangita Sood, Deepshikha Food Bioprocess Technol DOI 10.1007/s11947-010-0434-1
- 3) Eco-friendly and biodegradable edible utensils including cutlery and chopsticks and methods of making them (10) International Publication Number (43) International Publication Date 26 July 2012 (26.07.2012) WO 2012/098448 A1
- 4) Development of Edible Films and Coatings with Antimicrobial Activity by Carmen Campos
- 5) A study on 'use of edible cutleries in hotels and street food stalls' by Ms. Yogita Baghel & Mr. Aniket Mathare