

# Study on Material Selection for Preparing Edible Plates

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**Abstract** – Edible plates play a most important role in our day-to-day life. Using of plastic and steel plates in today's world is increasing and which may lead to global warming. In this project we have studied about the different types materials which can be used to prepare edible plates and finally based on the different parameters of the material we have finally selected the best materials to prepare the plates. Cups and spoons can also be made with the help of this material. Some materials which cannot be consumed by human beings but, only by cattle were also studied while doing the project. The main materials selected after concluding are waste flour from flour mill, jaggery, groundnut oil etc.

**Key Words:** edible plate, flour, jaggery, ground nut oil cake.

## 1. INTRODUCTION

Certain items have become part of our daily routines in recent years, and they play an important role in our hectic schedules from morning to night. With an increase in the use of various carcinogenic, toxic, and harmful chemicals present in everything we eat, drink, or use, as well as an increase in the number of cases of cancer, dermatological, cardiovascular, and other diseases, it's critical to stay fit and avoid exposure to such harmful contaminants in what we eat, drink, or use. The global focus has turned toward becoming closer to one's inner self, and various natural techniques such as yoga and meditation are being used to keep fit. In addition, there to, use of varied organic food materials which claim to be produced using natural fertilizers and herbal pesticides with none harmful chemicals and artificial materials, is also growing very rapidly. Furthermore, the use of various organic food products that claim to be produced using natural fertilisers and herbal insecticides without the use of dangerous chemicals or artificial materials is fast increasing. Despite implementing the precautionary measures outlined above, it has not been possible for everyone, or more specifically, anyone, to protect themselves from the use or contact of those dangerous chemicals. However, one should make every effort to reduce the use of such contaminants in one's daily life to the greatest extent possible. Increasing the usage of various nonbiodegradable materials, particularly plastics, which are polluting the planet environment and affecting the balance of eco-system.

Which pollute the planet's ecology and disrupt the eco-equilibrium systems, Because, these plastic materials are non-biodegradable, they linger in the environment untouched, polluting it. The goal of this project is to create and develop new biodegradable plates that can be used by humans. Women are heading out for employment in greater numbers as cities grow, and they have little time to prepare or clean utensils. The presence of chemicals and carcinogens in plastic utensils is damaging to the human

body. Edible plates are the newest approach to solve all of these issues. Edible plates can be used as utensils and can also be used to serve solid and semi-solid foods because they don't get soggy easily. They're environmentally friendly because they're easy to throw away and animals consume them. The manufacture of these plates helps to decrease open dumping and rubbish disposal in public spaces. It is thought that by using these plates, plastic utensils could be reduced.

## I. RAW MATERIALS

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

### 1. Cotton seed cake

Cottonseed cake is a by-product obtained after oil extraction from cotton seeds. It has long been used as a highly economic protein concentrated food for animal feeding. Cotton seed oil cake has 6-8% oil content in general and greater the oil% in cotton seed oil cake better is the quality. The cost of cotton seed cake is Rs 28/kg and the rate of the cake keep on increasing and decreasing depending upon the seasons. The thickness of the cake is around 2mm to 5mm. If the cake is greenish in color than oil content is more and good for cattle feeding.



Cotton seed cake

### 2. Groundnut oil cake

Ground nut oil cake is a by-product obtained after extraction of oil from ground nuts. It Contains 51% Protein and 4% Oil in it. 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 groundnut seed cake is Rs 56/kg. The oil content is more in reddish-brown groundnut seed cake. cake has several health benefits and is the right diet for the cattle.



Groundnut oil cake

### 3. Ragi flour

The Ragi scientifically called Eleusine coracana, is an annually cultivated cereal crop, vastly found in the tropical regions of Africa and Asia, such as in Ethiopia, India and Sri Lanka. The price of the ragi is Rs 40/kg.



Ragi seeds

### 4. Cattle feed pellets

Like Cattle feed pellets can be prepared from oil cakes, agriculture residues such as peanut seedling, grass, maize straw, wheat straw, grain, wheat bran etc. Pelleted type of feed can be digested well and improve the performance of cattle. Pellet's size is around 2mm to 8mm. The price of the pellets is around Rs 18-20/kg.



Cattle feed pellets

### 5. Maize leaves

All the materials above when soaked in water, they absorb the water and become soft and will lose their hardness property. Maize leaves or outer covering of the seed does not absorb water, so these can be used as an outer covering for the plates.



### 6. Sabu dana or Sago

It is small in size and white in color, upon boiling it acts as a glue for joining maize leaves and edible plate. The material is very sticky and also it is edible for Cattles. The price of Sabu dana is Rs 65/kg in the market.



Sabu dana or Sago

### 7. Waste flour obtained from flour mill

Normally in flour mill all types of grains flour are mixed and remained at the bottom of the machine where grains like wheat, jowar are converted into flour. This waste flour which is not fit for human use is used as cattle feed. The Cost of this flour is Rs 12/kg. The flour has property of two or more grains in it.



Waste flour obtained from the flour mill

### 8. Jaggery

It is used as gum to hold the particles of the plates and to increase the hardness of the plates. It is mixed with water and is heated to around fifteen minutes so that it can bind the particles of material more effectively.



Jaggery

## II. Edible Plate making machine

Edible plate machine is similar to the paper plate machine but only a few alterations should be done in the machine. The max size of the plate will be 4 inch. The voltage required for the machine is 220v. The number of plates produced must be 4500 pieces/10 hr. The machine is made up of stainless steel and mild steel. It requires a single-phase frequency of 50-60Hz. The power requirement is 3 kw.



Edible plate making machine

### Procedure for making edible plate

**Type 1(by cotton seed cake or ground nut oil cake or cattle feed pellets)**

- first the material obtained after the removing of the oil from the seed is taken and made in the form of dough.
- dough is pressed in the form of plate with the help of the machine.
- The obtained plate is kept in the heating furnace for drying.
- If the obtained plate is soaked in water than the material easily reacts with water and the material losses its hardness.
- To avoid it maize leaves can be used as outer covering for plate which does not allow water to react with the material
- Sago or Sabu dana is used as gum between the plate and maize leaves.
- Thus, the plate produced can be used by human beings for having food but, it cannot be consumable by the humans.
- The plate after its use is used to feed the cattle so it is eco-friendly.

#### Type 2(by waste flour obtained by flour mill)

- First jaggery is mixed with water and is boiled for five to ten minutes.
- Flour is mixed with jaggery water and is made in the form of dough.
- Dough is pressed in the form of plate with the help of machine
- The obtained plate is kept for heating in a cooker which contains salt at the bottom for 25 to 30 minutes.
- Thus, the plate is ready for human use and it can also be consumed by the human beings as well as cattle's.

#### Comparison

#### Nutrition information

	Per utensil
Energy	34.86 kcal
Proteins	1.06 g
Fat	0.12 g
Minerals	0.13 g
Fibre	0.19 g
Carbohydrates	7.64 g
Iron	0.56 mg
calcium	2.13 mg
Carotene	3.97 mg
Thiamine	0.003 mg
Riboflavin	0.01 mg
Niacin	0.28 mg
Folic acid	1.33 mg

#### Five reasons to use edible plates

Sl no	features	Type 1	Type 2
1)	Number of materials used	More	Less
2)	Eco-friendly	Yes	Yes
3)	Consumable by humans or cattle's	Only by cattle's	Both
4)	Cost estimation for production	High (Rs10.5/plate)	Low (Rs 3.28/plate)
5)	Hardness of the material	Comparatively less	More
6)	Nutritional content	More	Less

- They are eco-friendly. They help limit plastic waste and are completely biodegradable. Plastic cutlery is usually made of polypropylene and polystyrene, which can take over 400 years to photodegrade. Producing just one pound of plastic cutlery can take up to 78 litres of water and release 2.5 lbs of CO<sub>2</sub>!
- They're functional. They come in the shape of forks, spoons and chopsticks. They can last up to 18 months, and if you don't finish eating it by the expiration date, just pour water on it or compost it - it degrades within 3 days.
- They are delicious.

#### 3. EDIBLE PLATES



Type 1



Type 2

#### 4. CONCLUSIONS

The issue of minimising the usage of plastics has been more prominent in recent years. Consumers are aware that edible cutlery is eco-friendly and that they are eco-friendly, so they might make a difference in their daily lives by not using throwaway plastic silverware. Many customers believe that they would prefer to purchase edible cutlery on occasion, rather than on a regular basis, in order to test out something new or exotic that is available on the market. It has been reported that edible cutlery may become an option or an alternative to disposable cutlery, for which many producers must begin mass manufacturing

in order to lower prices and make edible cutlery more widely available. Consumers also believe that edible cutlery cannot be a viable alternative to the metal cutlery that is currently in use in all households due to its long life and durability. Because edible cutlery is new to the market and most people do not use it on a regular basis, consumers still have reservations about how easy it is to handle and use. Although edible cutlery currently available is sturdy enough to eat anything from hot soups to bhel puris, salads to ice cream, it does not wear out quickly. They also feel that the doubts about the endurance of the product would fade over time. Because plastic disposable cutlery is inexpensive and readily available, it is a popular choice.

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