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# Management of Floral Waste by Conversion into Sugar Syrup

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**Abstract -** *Solid waste disposal is major problem in the world. Agricultural residues, temple waste, domestic waste, non-edible oil cakes waste are enriched with carbon content. Landfilling remediation approach is used for disposal of organic waste. Floral waste is one of the major concern. Flowers have applications in many industries viz; perfumes, cosmetics, food, liquor and textile industries. Disposal of flowers in rivers, oceans, etc. leads to water pollution as well as affects the living organisms present in the waters. This miniproject deals with Guruvayoor where a large consist of many temples and large amount of floral waste has been generated. This review describes the management of floral wastes by solid state fermentation for the conversion into different value-added products viz; cpigments; dyes; food products; sugar syrup. The floral waste is also a source for handmade paper production. These value-added products will have different applications; viz; food products as nutrients and additives. The dyes and pigments from floral wastes will have applications in various textile industries. The waste can thus be converted into wealth. The review highlights the industrial applications of value-added products obtained from the floral wastes. The review also focuses on important application of floral wastes in biosorption which will help in the treatment of waste waters and other industrial effluents. This will resolve the problems of disposal of floral waste and ultimately the water and environmental pollution will cause.*

***Key Words***: Value-added products, Floral waste ,Solid state fermentation ,sugar syrup

## 1. INTRODUCTION

Waste disposal is a major concern in the world. Diversity in the content of waste create problem in its reduction. Safe disposal of floral waste has been a cause of concern for the temple management. The floral waste is directly disposed into the rivers, oceans, etc. which has bad impact on the water quality as well the living organisms present in the waters. Flowers come as waste from hotels, wedding ceremony gardens, worship places and various civilizing and sacred ceremonies, which make them a usual source of floral waste. Flowers are considered as holy entities and hence are offered by pilgrims to their idols. Every day country, has no policy for the disposal of the tones of waste. Every day waste material weighing 3.0–4.0 ton is left behind in the city of temples. Here we take example is of floral waste generation in the temples of Guruvayoor. Every day many devotees offer flowers in the temples of Guruvayoor.

### 1.1 Scope of the Project

Solid waste disposal is major problem in the world. Agricultural residues, temple waste, domestic waste, non-edible oil cakes waste are enriched with carbon content. Landfilling remediation approach is used for disposal of organic waste. Floral waste is one of the major concern. This project describes the management of floral wastes by solid state fermentation for the conversion into different value-added products. The waste can thus be converted into wealth. This project highlights the industrial applications of value-added products obtained from the floral. So here we are going to find out how much floral waste produced in Guruvayoor locality and how we can reuse and utilize it by making sugar syrup from flowers.

### 1.2 Objective of the Project

After the detailed study of literature review, here we list out the objects of the project. The project aims are, To collect flower samples from main shops in Guruvayoor and making out of sugar syrup from that flowers. Comparison of flower sugar syrup with cane sugar syrup by sugar analysis.

## 2. MATERIALS AND METHODOLOGY

Guruvayoor is a pilgrimage town in the southwest Indian state of Kerala. It's known for centuries-old, red-roofed Guruvayoor temple, where Hindu devotees make offerings of fruit, spices or coins, often equivalent to their own weight. Nearby, Mammiyoor Mahadeva temple contains shrines to the deities Vishnu and Shiva. South of town, St.Thomas Church is believed to have been established by the apostle St. Thomas in 52 AD.

### 2.1 Flowers their Production and Composition

The data relating to the nectaries and nectar secretion in invasive Brassicacean taxa are scarce. In the present project, the nectar production and nectar carbohydrate composition as well as the morphology, anatomy and ultrastructure of the floral nectaries in Bunias orientalis were investigated. Nectary glands were examined using light, fluorescence, scanning electron and transmission electron microscopy (Images are not available due to corona pandemic issue from

laboratory). The quantities of nectar produced by flowers and total sugar mass in nectar were relatively low. Total nectar carbohydrate production per 10 flowers averaged 0.3 mg. Nectar contained exclusively glucose (G) and fructose (F) with overall G/F ratio greater than 1. The flowers have four nectaries placed at the base of the ovary. The nectarium is intermediate between two nectary types: the lateral and median nectary type (lateral and median glands stay separated) and the annular nectary type (both nectaries are united into one). Both pairs of glands represent photosynthetic type and consist of epidermis and glandular tissue. However, they differ in their shape, size, secretory activity, dimensions of epidermal and parenchyma cells, thickness of secretory parenchyma, phloem supply, presence of modified stomata and cuticle ornamentation. The cells of nectaries contain dense cytoplasm, plastids with starch grains and numerous mitochondria. Companion cells of phloem lack cell wall ingrowths. The ultrastructure of secretory cells indicates an eccrine mechanism of secretion. Nectar is exuded throughout modified stomata.

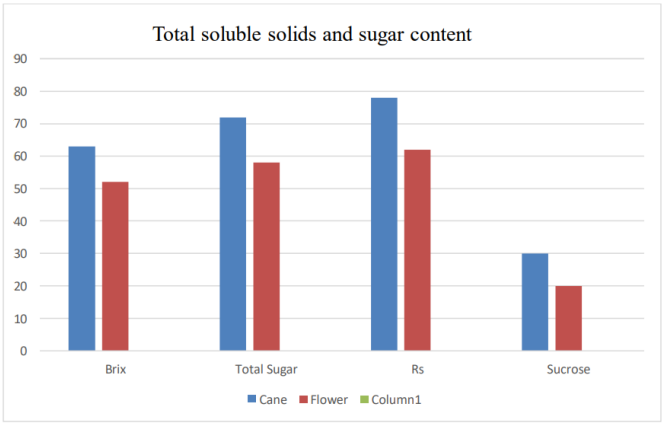


**Chart -1**: Graph analysis of cane and sugar syrup

shows comparison of flower sugar syrup from cane sugar syrup based on refractive index, PH, acidity and moisture content. So it is clear from the observation that Refractive index and Acidity content is less in flower sugar syrup. There is little variations in Moisture content. The values of flower sugar syrup is slightly higher than cane sugar syrup. PH values shows same in both the syrup. So we can conclude that both flower and cane sugar syrup is shows almost equal values.

### 2.2 Solid State Fermentation

SSF is the fermentation process occurring in the absence or near-absence of free water. SSF processes employ a natural raw material as carbon and energy source. Solid substrates generally provide a good dwelling environment to the microbial flora comprising bacteria, yeast and fungi. SSF has been used for the production of value-added compounds viz., enzymes, organic acids, biopesticides, biofuel and flavours. In the last years, new applications of SSF in the environmental control have been developed including bioremediation and biodegradation of hazardous compounds and the detoxification of agroindustrial There are various types of fermentation viz., ethanol, lactic acid, propionate, mixed acid and butanediol, butyrate and acetone–butanol and homolactate fermentation. Various substrates are used which are agroindustry by-products; sugars; organic acids; polyols; etc. Flower wastes have many distinct advantages for use as fermentable substrate, viz., high content of sugars; available freely everywhere on earth and economical. SSF include Food products.

**Fig -1**: Flower sugar syrup

Some of the flower sample is collected from the shop for further procedure. Rose and chrysanthemum used for making sugar syrup.Shows the images of collected flowers and they placed under sunlight for drying. Lay the petals in a single layer as you gather them. They can start to become mushy and break down in minutes if you make the mistake of placing them in a hot and dark place, like an herbal harvest bag. Dry the rose petals in the shade, as the direct sun will quickly fade the petal color..After one complete week the flowers were dried out then water extracted completely. Fig shows water extracted flower petals. Then all the power petals crushed into powder form then decolorized using decolorizing agent like charcoal and slacked lime. Fig shows some pieces of charcoal. Fig 3.4 shows sugar syrup before mixing it with decolorizing agent. Decolorizing carbon. Decolorizing carbon, also called activated charcoal, is finely divided carbon often used to decolorize a solution. The small particles of decolorizing carbon provide a large surface area to which large colored molecules may become adsorbed.

Then after one day we get the exact syrup. So it will then examined for further sugar analysis in laboratory.

### 2.3 Making of Sugar Syrup

There are reports on preparation of sugar syrup from dry flowers. The production of sugar syrup from floral waste is represented below.

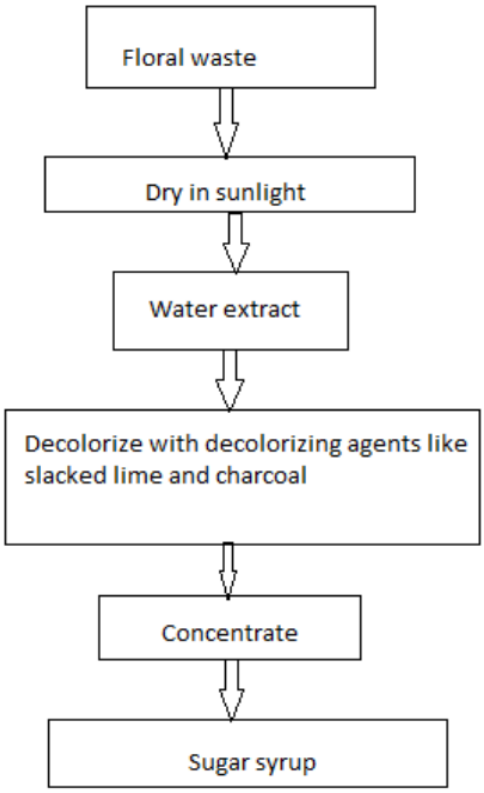


**Fig -1**: Making of Sugar Syrup

### 3. RESULT AND DISCUSSIONS

The most widely used chemical methods for sugar analysis are chromatography and reducing sugars, which are based on the reducing properties of free carbonyl group in reducing sugars, reacted with a copper solution in alkaline medium. Longer chains of sugars are categorized as either oligosaccharides or polysaccharides, depending on the number Laboratories provides sugar analysis by Ion Chromatography with Pulsed Amperometric Detection. Sugar syrup is most popular in the UK, Canada, South Africa, and Australia (countries in which it is manufactured).

It is a high-Brix (77–82 °), partially inverted syrup, filtered several times over bone charcoal to give it a special golden color, very mild flavor, and high clarity. The syrup is generally inverted with sulfuric acid and neutralized with calcium carbonate, so that no soluble salt will remain as a reaction product to affect the special flavor. Typical analysis ( is as follows: invert, 50%; sucrose, 32%; ash, 1.4%, and solids, 82.6%. The syrup is used directly on cereals, breads, and baked goods, and in home baking, e.g., in syrup pudding or tart. Golden syrup tends to crystallize on storage and is therefore usually sold in cans. The obvious advantages, in many applications, of handling sugar in dissolved form have led to the extensive distribution and use in bakery products of sucrose and invert sugar syrups. Liquid sugars can be roughly classified into sucrose types, invert (or mixed) types, and refinery syrups or liquid brown sugars. Sucrose is available at 66.5–68% solids content. This is the limit of solubility of sucrose at ordinary temperatures. Two or three grades, varying for the main part only in color, are usually available. If part of the sugar is inverted, the resulting syrup will retain higher concentrations of solids in solution. Common commercial types are syrups of 73% or 76% solids with 30% or 60% invert. Totally inverted syrups contain 72–73% solids, of which perhaps 5% is sucrose. Management of Floral Waste by Conversion into Sugar syrup. M.Tech Project 2020 Department of Civil Engineering 21 Malabar College of Engineering and Technology Because of the low water content, all of these syrups are quite resistant to microbiological spoilage. The invert syrups are probably somewhat superior in this regard because of their lower water activity. Excess added sugar consumption is tied to poor health outcomes in children. The sugar content of beverages and foods children are exposed to is mostly unknown, yet this information is imperative for understanding potential risks from overconsumption of sugars in early life. We determined actual sugar content by conducting a blinded laboratory analysis in infant formulas, breakfast cereals, packaged baked goods and yogurts. One hundred samples were sent to an independent laboratory for analysis via gas chromatography. Sugar content and composition was determined and total sugar was compared against nutrition labels. Of the 100 samples analyzed, 74% contained ≥20% of total calories per serving from added sugars. Nutrient label data underestimated or overestimated actual sugars and ~25% of all samples had actual total sugar values that were either 10% of labeled total sugar. Many products that are frequently marketed to and consumed by infants and young children contain sugars in amounts that differ from nutrition labels and often in excess of recommended daily levels.

These findings provide further support for adding more comprehensive sugar labeling to food and beverage products, specifically those marketed to, or commonly consumed by, children. Edible flowers and floral syrup are a trendy and fancy way to elevate any dish or drink to something more flavorful and perfect. Flower syrup though they seem expensive and high□brow are actually very easy to make and will last you a long time. We know that flowers are very healthy so we can use their parameters here.

### 4. CONCLUSIONS

The project describes the management of floral wastes by conversion into different value□added products like sugar syrup. The floral waste also have other applications viz., making of incense sticks; handmade paper production; etc. The value added products obtained from floral wastes compost can be used for various plant growth; biogas for electricity generation and food products as nutrients and additives. The dyes and pigments from floral wastes will have applications in various textile industries. Here we concentrate only in making of sugar syrup. After completing whole project we can conclude that some of the factors

Flower sugar syrup have more values than cane sugar syrup in sugar analysis. We cannot predict which one is better from this because values are almost same. But we can also assure that most of the content flower sugar syrup shows same percentage of cane sugar syrup. The results obtained were remarkably close to the results expected.

This concludes that the overall assays undertaken were a success due to the results obtained and discussions made. So one thing we can clearly observe from this project is that we can use flower sugar syrup in food products. It does not make any damages and it is edible. By making further laboratical test and analyse we can get more usefull usage from wasted flowers. The waste can thus be converted into wealth. This will resolve the problems of disposal of floral waste and ultimately the water and environmental pollution will also be reduced. Further research should be carried out for the conversion of waste flowers into wealth.The significance of the review is that it describes.The management of floral waste and also how the waste can be converted to wealth. The significance. The exploitation of the floral waste will have benefit in bioeconomy as the floral waste will be converted to different value-added products which will have different applications.

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**REFERENCES**

[1] Mishra M, “Design and Optimization of Unholy mess, Temple waste a concern,” Science, vol. 8, Dec. 2017.

[2] Teli M, Valia S, Kolampikar D, Flower Waste from Temple for Dying of Cotton and Cottonsilk: University Science,waste to product 2016.

[3] Grote wold E, “The Genetics and Biochemistry of Floral Pigments,” J.Dry technol 2016

[4] Gandia herraro F, “Floral Purification and Antradical Properties of the Flower,” 2012.

[5] Castaneda Ovando, “Chemical Study of Anthocaynes,”Food chem 2017.

[6] Patel M, Naik S “Flowers of Maduca Indica Present Production,” 2016.

[7] Bhattacharya, “A Novel Application of Flowers for argument protease production,” 2012.

[8] Perumal, K Sambanda, “Characterisation of essential oil from Offered Temple Flowers,” 2017.

[9] www.google.com