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Study on Natural Color Extract and Synthetic Color in Food Preparation

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ABSTRACT

Palash flowers are abundantly available in and around Vidarbha. These are wasted as their importance as colouring agent is not known. Synthetic colour is commonly used in food preparation and is known to have a harmful effect on health. So it was postulated to introduce colour of palash flowers in food preparation in comparison with synthetic colour. Palash flowers were collected dried two methods –sun drying and shade drying. Colour was extracted by simple household method from both the dried sampled. The shade dried sample gave a brighter orange colour and hence was used in the experiment.For comparison between natural colour and synthetic colour three recipes were selected i.e. coconut burfi, Jalebi, Sweet rice, for incorporating the colour and sensory evaluation was done by judges. To see whether there was any difference between acceptance of recipes prepared with natural colour and synthetic colour used recipes statistical't' test was applied for all parameters like colour, taste, texture, acceptability. It was found that there was no significant difference between natural colour and synthetic colour used recipes in their sensory properties. Result of the study thus proved that addition of palash colour extract in recipes did not alter their acceptability and were statistically seen to reflect insignificant difference as compared to recipes prepared with synthetic colour.

Colour is associated with every aspect of our lives and plays an integral role in all our behavioral decisions. From birth, nature teaches us to make value judgments on our environment based in large measure on colour. Since the act of eating represents an extremely personal behavior, in that we take part of our environment into us, it is not surprising that colour conditions our choices. Colour affects our overall judgements on the worth of food from both an aesthetic and a safety point of view. It plays an important role in taste thresholds, flavour identification. Food thus creates problems in a technologically oriented society because numbers cannot be assigned to preference, pleasantness, acceptability and ultimately food choice.

However, its role is elusive and difficult to quantify. a cause-effect relationship, there is a tendency to deny the existence of that relationship. That has often led to a situation where the role of colour is either ignored or minimized which, unfortunately, has placed colour in a secondary role to the other sensory characteristics, a position which is not consistent with the facts. Indeed, the importance of colour in food choices is so unquestionable that is often taken for granted, a situation which must be re-evaluated in view of the need for the creation of new and different foods to feed a hungry world.

The colour of food is a significant factor in determining its acceptance. We expect to see food looking natural; a natural appearance is appetizing, and we become cautious when a food shows an unexpected colour, interpreting it as a possible sign of spoilage, poor processing or as an indication of adulteration. The association of colour and acceptance of foods is universal, ethnical, historical and social factors and habits. What may be attractive to one group may be unappetizing or even repulsive to another.

The main groups of natural colouring substances in food are caretenoids, anthocyanins, porphyrins and chlorophylls. The carotenoids are responsible for many of the brilliant red, orange and yellow colours of edible fruits and berries, vegetables and mushrooms, flowers, and it is thought that the annual natural production of these compounds amounts to about 100 million tons. Although oxygenated carotenoids occur in the largest quantities, the hydrocarbon beta-carotene is of particular interest because of its provitamin A activity.

The first synthetic carotenoid to be marketed, in 1954, was beta-carotene. Other carotenoids which have since become commercially available for food colouring are beta-apocarotenal and canthaxanthin. Natural extracts

containing carotenoids have been used as food colours for centuries: annatto with pigments capsanthin and casorubin; xanthophylls extracts from leaves. The question of what is a natural colour is interesting and capable of a number of answers. In the context of the food additives it is a most important matter that the answer should be correct and very widely agreed. Although very many colours of natural origin are available commercially, for the purposes of this paper the definition has been drawn more finely than usual. The major limitation in the green part of the spectrum proved to be the lack of natural magnesium chlorophyll extracts of high enough purity from the purpose. While the coppered product clearly does not fulfill two of the basic criteria, it has the merit of being allocated the same level of safety. Further, its purity and availability were very good.

Different countries permit different synthetic food colours. The USA permits 7, including fast red; Iran and Australia, 13 each and in the European Union countries, 16 synthetic food colours are permitted. European countries have been harmonizing the regulation, and most of the controls on colourings in foods stick to EU directives. Each country is attempting to review these controls.India permits addition of 8 colours viz, erythrosine, carmosine, ponceau 4R, and indigo carmine in specified food items. In India, the prevention of food adultration (PFA) acts. Which lays down specification on the addition of additives to foods, was amended in 1995 (PFA, 1998) . The use of permitted and non permitted colours in foods in India is being debated after reporting that the use of non permitted colours adversed effects in experimental animal as well as human.

There has been a spurt in the use of synthetic colors in food. However, with the increasing awareness of toxicity of synthetic colors, demand for pigments from natural sources has increased. (Babu and Shenolikar 1995; Khanna and Singh 1975)

The possibility of using the water-soluble flavonoid pigments from Butea frondosa L. flower as a natural food colorant in the yellow-orange range, in place of the synthetic food colors currently being used, was evaluated .Paper chromatography revealed isobutrin as the major component with an intense yellow color. Except for the relatively poor stability in the presence of SO_2 and ascorbic acid, the pigment was stable under varying conditions of pH, heat, and light. At identical concentrations, comparable color intensity was produced by the flower extract and the synthetic coal synthetic coal tar dye. Results suggest that the flower extract could be used as a colorant in place of synthetic coal tar colors. (M. S. Oke et al., 2003)

Natural colorants exempted from certification are either of plant origin or of animal origin. Their use of plant origin or of animal origin in food is consistent with good manufacturing conditions. Recent trend in consumer awareness and growing concern over the safety aspect of synthetic color s have put pressure on food processors to adopt natural colors, which are considered safe by consumers. (Spears, 1998)

Babu and Shenolikar (1995) opined that, with the increasing awareness of toxicity of synthetic colour, demand for pigments from natural sources has increased. Palash flowers are abondantly grown in India and it has good orange-yellow colour which can be used in the food. With the clolouring property of palash flower also has medicinal property. As it is available easily and has colouring and medicinal property, following research project is planned and carried out.

Aim:

Comparative study of natural colour extract (Butea monosperma) and synthetic colour in food preparation.

Objectives:

1 To dry fresh palash flowers by simple technique and extract colour from dried palash flower.
2 Formulate the recipes for experiment
3 To compare and evaluate recipes prepared using extracted natural palash colour and synthetic colour.

Limitation:

1 Selected sample of palash flower was collected from same area around periphery of Nagpur city.
2 Only dried Palash flower (Butea monosperma) was used for colour extraction.
3 Comparison was done between permitted synthetic colour and natural extracted colour from palash flower.
4 Only three recipes were used for conducting the study.

Butea monosperma

A medium sized deciduous tree, very conspicuous when in when in flower, 12-15m in height with gum-containing grey bark exfoliating in irregular pieces, and somewhat cooked trunk, leaves 3-foliate, leaflets coraceaous, obtuse, glabrous above when old, finely silky and conspicuously reticulately veined beneath; flowers bright orange red, large, in rigid recemes; fruits pods thickened at the sutures.

Chemical constituents

The composition of the leaves varies with the place of origin. Analysis of the leaves from Jammu; crude protein crude fibre, ether extr, minerals, calcium, and phosphorus.

Cosmetic uses

Purifying, draining, astringent, cooling, anti-inflammatory. Butea Superba has proven for me to be a safe, side effect free way of raising low testosterone levels. It has helped restore for lost physical strength and stamina.

Medicinal uses

The leaves are astringent, cooling, anti-inflammatory, and anodyne and are useful in pimples, boils, flatulence, colic, worm infestations, inflammations, arthralgia and haemorrhoids. The flowers are astringent, sweet, cooling constipating, aphrodisiac, haemostatic, diuretic, febrifuge, depurative and tonic. They are useful in vitiated condition of pitta and kapha, diarrohea, haemorrhoids, menorrhagia, strangury, fever, leprosy, skin diseases, swellings, hyperdispsia, haemoptysis, arthritis,burning sensation, bone fractures, and are very efficacious in birth control. The seeds are purgative, ophthalmic, anthelmintic, rubefacient, depurative and tonic. They are useful in herpes, skin diseases, ringworm, ophtlamopathy, epilepsy, round worm, arthritis, flatulence, constipation and diabeters. The gum known as bengalkino or buteakino is astringent, constipating, haemostatic, aphrodisiac, depurative and tonic, and is useful in diarrhoes, heamorrhoids, haemoptysis, haematemesis, diabetes, leprosy, skin diseases, ulcer, pharyngodynia general debility, hyperacidity, dyspepsia and fever. The ash of the tender branches is useful in abdominal disorders such as flatulence, colic etc.

It is a small-sized dry-season deciduous tree, growing to 15 m (49 ft) tall. It is a slow-growing tree: young trees have a growth rate of a few feet per year. The leaves are pinnate, with an 8–16 cm (3.1–6.3 in) petiole and three leaflets, each leaflet 10–20 cm (3.9–7.9 in) long. The flowers are 2.5 cm (0.98 in) long, bright orange-red, and produced in racemes up to 15 cm (5.9 in) long. The fruit is a pod 15–20 cm (5.9–7.9 in) long and 4–5 cm (1.6–2.0 in) broad.

Butea monosperma (Fabaceae) commonly called Palash and “Flame of the forest” is a tree growing in abundance in most part of India, Berma, Srilanka and Pakistan is valued in Indian pensula for its religious general and therapeutic applications. It is well known for its folk loric and traditional curative values. The tree possesses aphrodisiac, anti implantation, antistress, antibacterial, antidiarrhoel, anthelmintic, anti inflammatory, antihepatotoxic and wound healing activities which may be due an array of phytoconstituents present in nearly all its plant morphology.

n Folk lone white hot thick dark brown sticky semisolid mass oozing out of burning fresh stem of *B. monosperma* are applied on skin for treating various skin infections. Similarly, the very young leaves are

chewed or taken in paste form during conception and pregnancy period by ladies desirous of healthy child and the thick nodes of trifoliate leaves are chewed by shephard and others roaming in forest areas during acute summer to quinch their thirst. The flower soaked with water is consumed during summer season to avoid summer strokes.

Traditional uses:

Gum:

- The gum found in small, brittle glistening pieces, reddish-black in color. Is odorless with a very astringent taste sticking to teeth when chewed making the saliva bright red. It is almost entirely soluble in alcohol and entirely soluble in ether and partly in water.

- Its gum is useful in hemorrhage of stomach and bladder and is used as an anthelmintic[2].
- Orally it is used in diarrhoea, dysentery, and as gargle in throat infection.
- Locally called Kamarkas meaning thereby fortification of back muscles, the gum is used to strengthen these muscles that are delicate and more elastic. Since females usually experience tiredness and back-ache during menstruation, pregnancy and post delivery, the gum taken orally acts as tonic to pelvic and back muscles, in these conditions. It is used by almost all females in India to recover from problems of weakness, supple delicate muscles and loose skins, and to reshape the body after delivery and to get rid of menstrual problems.

Colour is a vital constituent of food. It is probably one of the first characteristics perceived by the senses. The art of colouring is centuries old and a number of pigments have been employed as food colors.(**Sharma et al., 2001**). Naturl colours are now being considered as an alternative. Many countries have restricted the use of synthetic colors in food products.(**IFT 1998**). Natural food colours also protect food from oxidation by enzymes. Therefore they not only enhance the appearance of the food but also protect them. **(Reddy et. Al., 2005**)

Chaudhuri et. al., 2004, Babitha et. al., 2003 report that purification of natural food colorants for use in the food has been extensively reviewed.

Cai et. al., 2005 state that pigments extracted from Amaranthus have e a great potential for use as natural food colorants. Natural pigments obtained from leaves, flowers, fruits, seeds, bark and rhizome of plants can be carotenoids, chiorophylls, myoglobins, and anthocyanins or their chemical modifications. Annatto, saffron, turmeric, beetroot etc. are being used as natural food-manufacturing viewpoint, color additives are also indispensable. Dyes and pigments are employed to create new food products and to modify the color of established food products, which show color shifts as a result of manufacturing and storage.

Pratima Rao and R. V. Sdershan 2008 conducted a study to assess the risk of selected population to synthetic food colours. Children had high intakes of coloured solid and liquid foods. The study showed the predominant consumption of two colours such as tartazine and sunset yellow mainly from sweetmeats, beverages and fast foods while colours like carmoisine, ponceau 4R and erythrosine were consumed by the take of confectionaries, jams, jellies showing that the preference of colours is based on the type of food consumed. The intakes of colours like tartazine, erythrosine and sunset yellow were high among children due to ingestion of foods containing high concentration of colours. The study emphasized the need to evaluate the risk of the population to colours on long-term basis.

A simple spectrophotometric method has been developed for the determination of water-soluble synthetic food colours in soft drinks (**Ol-wah Lau et al., 2007)**

Ion-pair formation with octadecyltrimethyl ammonium bromide at pH 5.6 and extraction of the ion-pair into n-butanol. The proposed method has been applied to determine amaranth, carmoisine, Green S, Orange G, Patent blue V, Ponceu 4u, sunset yellow and tartazine singly in soft drinks. The optimum experimental conditions for the method were reported. The percent-age extraction for all the colours except Green S under the optimum conditions ranged from 98-100. The precision of the proposed method was in the range 1-2.4% at the level of 8.0 micro gram ml^{-1} for the food colours.

Palash is mainly used to get rid of worms from the stomach due to its anthelmintic activity. It can be used to manage diarrhoea as it has antimicrobial and astringent properties. It also helps to manage liver disorders due to its antioxidant properties. Taking Palash leaf powder might help in managing blood sugar levels by improving

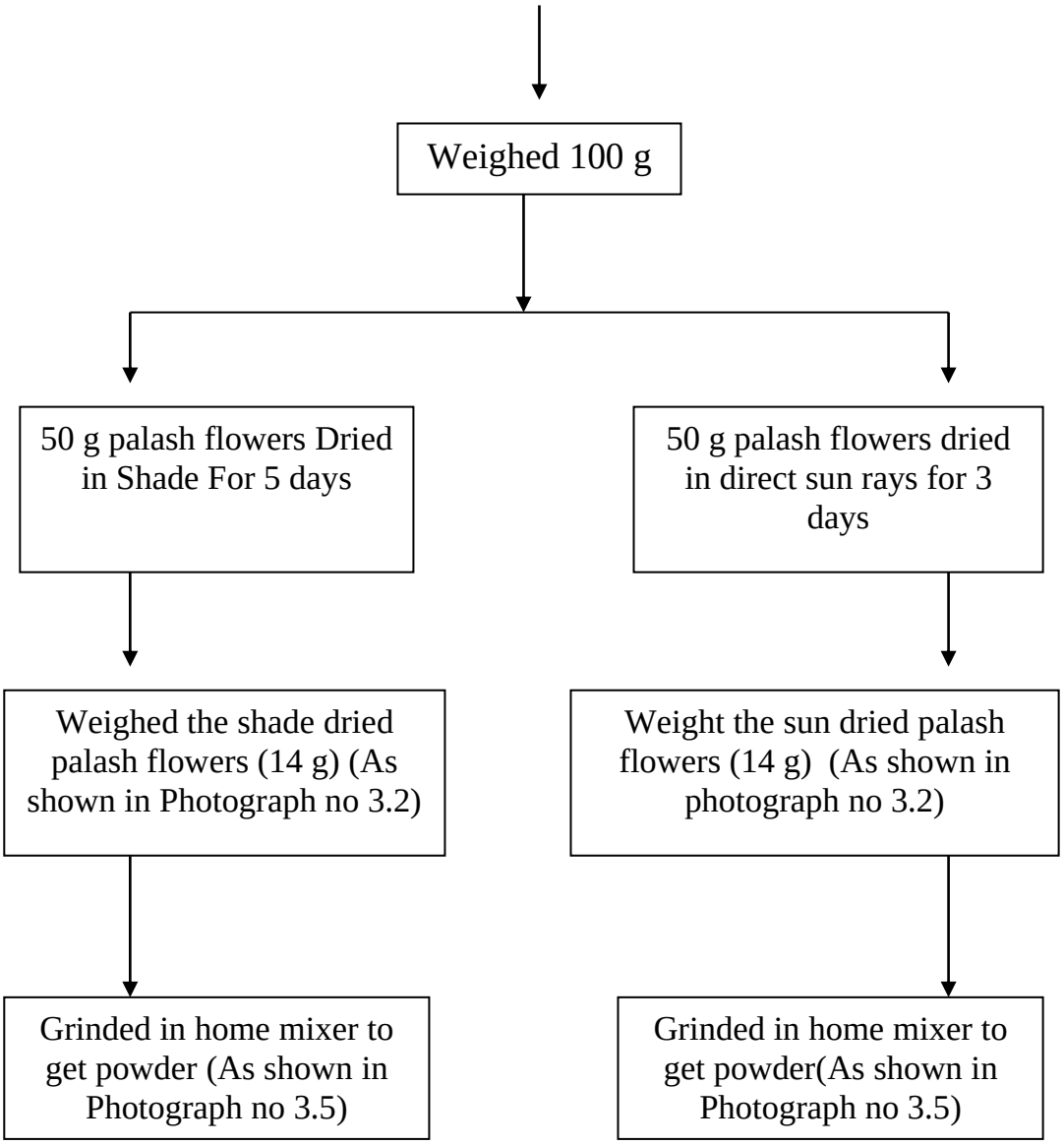
glucose metabolism in the body.
Applying Palash leaf paste on the skin helps in managing skin infections and also promotes wound healing due to its antiseptic and anti-inflammatory properties.
Palash decoction can also be used to wash pubic areas in case of vaginal infections and urinary problems due to its antifungal and antimicrobial properties
Palash or tesu, with their striking hue, are most associated with Holi. The flowers, soaked in water, produce a colour that has traditionally been used to celebrate this festival. For centuries, they've also been appreciated for their medicinal uses (as have other parts of the tree, like the bark and the seeds). But like a number of other flowers, such as banana, moringa, rose and marigold, they've also been put to culinary use in India, most frequently to prepare cooling drinks.
Like many under-appreciated indigenous ingredients, palash has recently caught the attention of chefs, mixologists and other food professionals. Khanna, who grew up familiar with the uses of palash in her native Varanasi, makes a Tesu aur Khas ka Sherbet, which she had once served at a Banaras ka Khana food festival at The Oberoi Gurgaon. "Later Anamika Singh of Anandini teas introduced a tea blend with palash petals," she says.
The constraints caused by fast dwindling motuku trees (Butea monosperma) notwithstanding, Adivasis in Adilabad and neighbouring districts cannot restrain themselves from making natural colours from its flowers. Though the activity is carried out on a much reduced scale, the craving of the Adivasis for natural colours to be used during Holi hasn't died down.
A couple of days ahead of the festival, youngsters venture into the forest and open spaces where the blooming 'flame of the forest' are found. The flowers are used in making an eco-friendly colour used for smearing on near and dear ones.
"For centuries, we have played Holi with the orange colour extracted from the *mur pungar* (Gondi word for motuku flowers)," said Pendur Bhagwant Rao, headman or patel of Samaka village in Indervelli mandal. "We want to continue the tradition as long as we can," he added as he alluded towards the steadily decreasing number of palash trees.

Methodology includes the following concepts as they relate to a particular discipline or field of inquiry:
1. A collection of theories, concepts or ideas;
2. Comparative study of different approaches; and
3. Critique of the individual methods

Methodology refers to more than a simple set of methods; rather it refers to the rationale and the philosophical assumptions that underlie a particular study.
The present study was divided into two phases
Phase I
1 Collection of palash flowers.
2 Drying of palash flowers.
3 Extraction of colour from dried palash flowers.
Phase II
1 Selection of suitable recipes and standardization.
2 Sensory evaluations of recipes prepared with dried palash flower extract/synthetic colour.
Phase I
Collection of sample
Sample is nothing but a fraction of a big lot. In other words it is part and parcel of a whole thing. When we select a sample we get convinced by its selection; only then we select the sample. Selected units represent all the possible characteristics of the big lot from which the sample is taken sample is also called as miniature replica of big size or area or any dimension.
Fresh Palash flowers are available only in the begining of summer season. Palash flowers were collected from same area around periphery of Nagpur city. According to Oke (2006), Palash flowers are used for preparation of

natural orange red colour. This also has medicinal value. Traditional procedure of extraction of Palash flower colour was followed as given in the following

The Drying Procedure of Palash Flowers Used Has Been Shown In Fig 3.1
Fresh palash petals
(As shown in photograph no.3.1)



Colour extraction from the sample

Dried palash flowers were selected to colour extraction as shown in fig 3.2

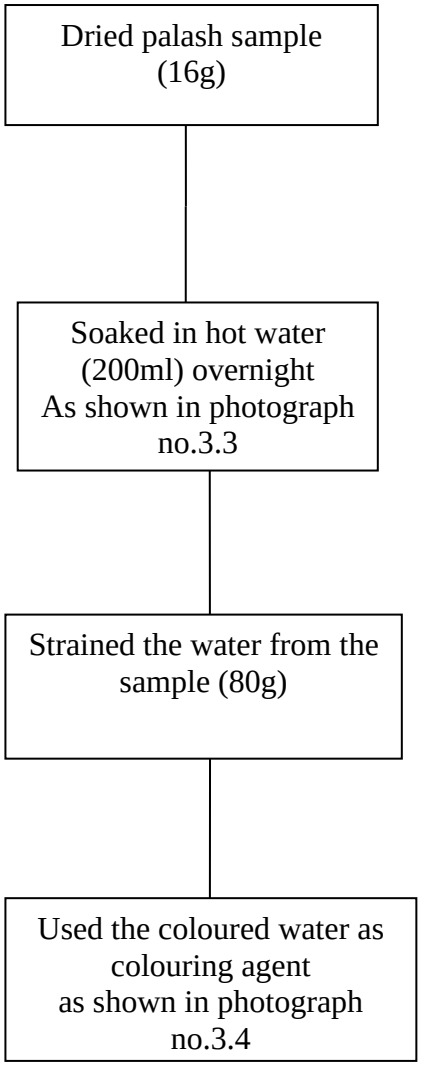


Fig 3.2

Phase II

Selection of Recipes

Three sweet recipes were selected in which synthetic colour is normally used -

1 Coconut burfi (photograph no. 3.7)
2 Jalebi (photograph no.3.8)
3 Sweet rice (photograph no.3.9)

Sensory Evaluation of Recipes

When the quantity of a food product is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. Every time food is eaten a judgement is made.

Sensory quality is a combination of different senses of perception coming into play in choosing and eating a food. Appearance, flavour and mouthfeel decide the acceptance of the food. The effective characteristic is not the property of the food, but the subjects reaction to the sensory qualities of foods. This reaction is highly conditioned

by a variety of psychological and social factors and in the final analysis, plays a vital role in the acceptance and preference of foods.

Sensory evaluation of the three recipes i.e. coconut burfi, jalebi, sweet rice with the parameters of colour, taste, texture, and acceptability was done by six judges comprising of staff members from the Department of Home Science Sample score cards are given in Appendix I, II, III.

Before selecting the recipes for sensory evaluation a series of trials were conducted to standardize the recipes to asses the colour addition.

Three consecutive trials were done for evaluation of each recipe. Each recipe prepared with the addition of natural colour from palash was compared with a control sample prepared with addition of synthetic colour.

Composition of Coconut Burfi

Sr. No.	**Ingredients**	**Quantity**
1	Dried coconut (grated)	100g
2	Milk	150ml
3	Sugar	130g
	Colour extraction	
	From palash flower	
4	Synthetic colour	10ml
5		10ml

Number of serving – 8 pieces
Size of serving - 2 pieces

Method of Preparation

1 Dried coconut was soaked in the milk for 1 hour.
2 Soaked grated coconut was grinded coarsely.
3 In kadhai coconut mixture was taken and suger was added and cooked till soft ball stage.
4 It was then divided into two parts. It was again divided into two parts; in one part 5ml synthetic colour was added and other part kept as it was.
5 It was spread on the greased plate.
6 Coloured mixtures was then spread on white mixture and rolled with rolling pin.
7 Barfi was allowed to set.
8 Barfi was cut into square pieces.
9 Score cards were provided to each judge. Sensory evaluation was carried out for three consecutive days.
10 Scores obtained were statistically analysed.

Composition of Jalebi

Sr. No.	Ingredients	Quantity
1	Refined wheat flour	300g
2	Arrowroot flouir	30g
3	Bengal gram flour	30g
4	Curd	90ml
5	Water	350ml
	For Syrup	
6	Water	400ml
7	Sugar	300g
	Colour extraction	
8	From palash flower	10ml

9	Synthetic colour	10ml

Number of serving – 30 pieces
Size of serving - 2 pieces

Method for Preparation

1 Refined wheat flour, arrowroot flour and bengal gram flour mixed thoroughly.
2 Curd was churned in another bowl was mixed with flour mixture.
3 Pour batter was prepared using lukewarm water.
4 Mixture was allowed to ferment overnight covering with lid in a warm place.
5 Hydrogenated oil was taken in heavy bottom flat pan and heated till smoking temperature.
6 Batter was taken in jilebi maker and round jilebies were prepared before taken in jilebi maker colour was added.
7 Jilebies were deep fried till light golden brown.
8 Sugar syrup was prepared with above proportions and cooked till single thread consistency.
9 After frying jilebies they were immediately dipped in sugar syrup for 20 sec and removed in a plate for serving.
10 Hot jilebies were served for testing and evaluation was done by each judge individually.

Composition of Sweet Rice

Sr. No.	Ingredients	Quantity
1	Rice	300g
2	Sugar	290g
3	Ghee	30g
4	Water	600ml
	Colour extraction	
5	From palash flower	10ml
6	Synthetic colour	10ml

Number of serving – 6
Size of serving -- 1 medium bowl

Method of preparation

1 Rice was washed, soaked for half hour and water was drained.
2 Ghee was taken in the kadhai, drained rice added in it and fried till it became dry.
3 Boiling water was added to it and rice was cooked.
4 Grated coconut and cashewnut were added cooked for 5 minute.
5 Rice was divided into two part. In one part of rice 10ml natural palash colour was added.
6 Rice were served for testing and evaluation was done by each judge individually.

Coding Of Recipes

For convenience in conducting the experience recipes were coded and presented is like judges for sensory evaluation. The recipe codes are given in table 3.4 coding of recipes.

Table No 3.4

Coding Of Recipes

Sr. No.	Product	Recipes
1	**Coconut Burfi**	
	control	CC
	Experiment	CE
2	**Jalebi**	
	Control	JC
	Experimental	JE
3	**Sweet Rice**	
	Control	SC
	Experimental	SE

All the recipes were standardzed and evaluated by judges on three consecutive days. Mean scores for each sensory attribute for 3 evaluations of each judge was calculated (Appendix V). The data was tabulated and evaluated statistically by applying‘t’ test (AppendixIV)

Colour Extraction from Palash Flower:

For this study colour of the palash flower (Butea manosperma) was extracted from dried palash flowers (16g) soaked in hot water(200ml) overnight. After soaking of palash flower liquid colour extract of palash flowers was extracted as given in methodology (photograph no 3.1). This extract was used in the preparation of all three recipes. Each time fresh extract was prepared and used. Concentration of colour was matched with the synthetic colour.

The mean scores for each sensory attribute of the three recipes and the statistical interpretation between mean score of control and experimental recipes have been tabulated and discussed in the following paragraph.

Result of Sensory Evaluation:

Colour evaluation of Control and Experimental Product. A comparison has been drawn between colour control and experimental products. Data is given in table 4.1 and 4.1a

Colour is a vital constituent of food. It is probably one of the first characteristics perceived by the senses. The art of colouring is centuries old and a number of pigments have been employed as food colours.The first impression of a food is usually visual and a major part of our willingness to accept a food depends upon its colour. The colour of food may vary considerably from place to place, and from season to season, depending upon numerous factors. With the increasing awareness of toxicity of synthetic colours, demand for pigments from natural sources has increased.(Babu and Shenolikar 1995).Therefore for this study colour of palash flower(Butea manosperma) as natural colour was selected, because of its beautiful orange red colour and is easily available.

Table No. 4.1
Mean Scores For Colour Of Control And Experimental Product

Table No. 4.1 a
Statistical Interpretation For Colour Of Control
And Experimental Products

Sr.No.	Judges	CC	CE	JC	JE	SC	SE
1	J1	8	10	8	10	8	10
2	J2	8.6	10	8	10	8	10
3	J3	8.6	10	9.3	9.3	9.3	9.3
4	J4	6.6	10	10	8.6	10	8.6
5	J5	7.3	9.3	9.3	9.3	9.3	9.3
6	J6	7.3	10	10	10	10	10

Result of 't' test for Coconut burfi	Result of 't' test for Jalebi	Result of 't' test for Sweet rice
Calculated value of 't'=2.4 df(10) at 5%=2.228 1%=3.169	Calculated value of't'=0.4 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.6 df(10) at 5%=2.228 1%=3.169

Coconut burfi was prepared with grated coconut, milk and sugar. Cooked burfi divided into two parts i.e. control and experimental as a given in procedure. In control part synthetic colour was added and in experimental part natural colour was added.

It is observed that all the judges scored high for coloured burfi prepared with natural(Burea monosperma) colour than the synthetic colour. Statistical analysis revealed that there was no significance difference in colour of experimented burfi as compared to the control sample. Results thus prove that addition of natural palash colour did not effect the appearance of the burfi with respect to colours.

Colour of the jalebi should be yellowish orange red with gloss or shine of sugar syrup.It is said that man eats first with eyes. Sensory evaluation was conducted for judging the jalebi Both Jalebies were tested simultaneously. Mean scores of colour were obtained out and 't' test was applied to see whether there was any difference between the acceptance of colour in control as well as experimental group. It was found that colours of both groups were equally accepted and there was no difference in its acceptance.

Sweet rice was prepared by using synthetic colour (control) and by using natural colour (Butea monosperma). Three consecutive trials were taken. When the colour was tested by the panel of judges. It was observed that all the juldges scored high to the sweet rice prepared by addition of natural colour. 't' test was applied to see whether there was any difference between the acceptance of colour in control as well as experimental samples. It was found that colour of both groups were equally accepted and there was no difference in its acceptance.

Use of natural palash extract in all the three recipes revealed that with respects to colour the acceptability was equivalent to that prepared with the addition of synthetic colour.

Flavour Evaluation of Control And Experimental Products.
Table No. 4.2
Mean Scores For Flavour Of Control And Experimental Product

Table 4.2a
Statistical Interpretation For Flavour Of Control
And Experimental Products

Sr.No.	Judges	CC	CE	JC	JE	SC	SE
1	J1	10	10	10	10	10	10
2	J2	10	10	9.3	9.3	10	10
3	J3	10	9.3	9.3	10	9.3	9.3
4	J4	8.6	9.3	10	10	10	8.6
5	J5	10	9.3	10	10	7.3	9.3
6	J6	9.3	10	10	10	10	10

Result of 't' test for Coconut burfi	**Result of 't' test for Jalebi**	**Result of 't' test for Sweet rice**
Calculated value of 't'=0 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.047 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.4 df(10) at 5%=2.228 1%=3.169

Acceptance of food is important, but it is the flavour that ultimately determines the quality and acceptability of foods. No matter how safe nutritious inexpensive and and colourful of food may be, if the flavour is undesirable, it is not accepted. Even hungry and nutritionally deprived people reject food that does not have flavour of their choice. Therefore for this study, characteristic of flavour was considered

Results of statistical analysis showed that addition of natural palash colour did not affect the flavour of all the three recipes.

Taste Evaluation Of Control And Experimental Products

The sense of taste refers to the ability of taste organs to perceive and recognize the four basic taste-sweet, sour, salty, and bitter. These taste qualities are independent of one another and are analysis to the skin senses(tough, warmth, cold and pain). The taste sensation is therefore responsible for chemical stimulation. The components of food responsible for taste are nonvolatile compounds. They must be in solution or dissolve in saliva to produce the taste response. Taste is sensed by the buds which lie mostly in grooves around little projections on the upper surface of the tongue. The taste buds consist of sensitive cells, in bundles, from which slender hair-like structures emerge through the pore of the taste bud and make contact with the stimulate substance. The message is then sent back through one of the nerve of taste to the brain.

ble No .4.3
Mean Scores For Taste Of Control And Experimental Product

Sr. No.	Judges	CC	CE	JC	JE	SC	SE
1	J1	10	10	10	10	10	10
2	J2	10	10	10	8.6	10	10
3	J3	10	10	8.6	10	9.3	9.3
4	J4	10	10	8.6	10	10	9.3
5	J5	10	10	10	10	7.3	9.3
6	J5	10	10	10	10	10	10

Table No. 4.3a

Result of 't' test for Coconut burfi	Result of 't' test for Jalebi	Result of 't' test for Sweet rice
Calculated value of 't'=0 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.53 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=1.13 df(10) at 5%=2.228 1%=3.169

Statistical Interpretation For Taste Of Control
And Experimental Products

From the table no.4.3 it is seen that all judges given more score to the natural colour used recipe. Statistical analysis was done taste of synthetic colour used recipe and natural colour used recipe. It was found that there was no real difference between two group of three recipes. So palash flower as a natural colour it did not affected the taste of these

Texture Evaluation of Control And Experimental Products

In addition to appearance, taste and smell, the textural aspects of food contribute to flavoure, viscosity and elasticity and secondary characteristics, such as brittleness, chewiness and gumminess all contribute to food acceptability and taste.

Table No. 4.4
Mean Scores for Texture of Control and Experimental Product

Sr. No.	Judges	CC	CE	JC	JE	SC	SE
1	J1	8	9.3	10	10	10	10
2	J2	9.3	9.3	10	\10	10	10
3	J3	8.6	10	10	10	10	10
4	J4	9.3	9.3	9.3	10	9.3	9.3
5	J5	10	10	10	10	8.6	9.3
6	J6	10	10	10	10	10	10

Table No. 4.4a
Statistical Interpretation For Texture Of Control And Experimental Product

Result of 't' test for Coconut burfi	**Result of 't' test for Jalebi**	**Result of 't' test for Sweet rice**
Calculated value of 't'=0.83 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=1.66 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.40 df(10) at 5%=2.228 1%=3.169

Table no. 4.4 shows the mean scores for the texture of the recipes. To see the acceptability of the texture between the synthetic colour used recipe and natural colour used recipe 't' test was applied for the three recipe individually, it was seen that there was no significant difference between control and experimental sample and texture was of acceptable equally in all three recipes.
Acceptability Evaluation of Control and Experimental Products

Table N0. 4.5
Mean Scores for Acceptability of Control and Experimental Product

Sr. No.	Judges	CC	CE	JC	JE	SC	SE
1	J1	8	9.3	9.3	10	10	10
2	J2	10	10	10	10	10	10
3	J3	9.3	10	9.3	10	10	10
4	J4	10	10	10	10	9.3	9.3
5	J5	9.3	9.3	10	10	9.3	9.3
6	J6	9.3	10	10	10	10	10

Table 4.5a
Statistical Interpretation for Acceptability Of Control And Experimental Product

Result of 't' test for Coconut burfi	Result of 't' test for Jalebi	Result of 't' test for Sweet rice
Calculated value of 't'=1.367 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0.24 df(10) at 5%=2.228 1%=3.169	Calculated value of 't'=0 df(10) at 5%=2.228 1%=3.169

Acceptability of food depends upon colour, taste, texture, and flavour. If these parameters are fulfill the food is acceptable. For synthetic colour used recipe and natural colour used recipe 't' test was applied for Coconut burfi, Jalebi, Sweet rice..
From the table it was seen that though there was difference in the mean score when 't' test was applied and hypothesis was formed that there was no real difference between the mean scores obtained by synthetic as well as palash extract prepared recipes are no significant difference hence all three recipes were acceptance by all judges from the above.
Result of the study thus prove that use of natural palash extract is food product did not adversely effect the sensory properties and was comparable to those prepared with synthetic colours.

This study was conducted for comparative study on natural (Butea monosperma) and synthetic colour in food preparation. For this study palash flowers were used as natural colour for comparing with synthetic colour. Palash flowers were collected and dried under two conditions viz. sun drying and shade drying. The dried samples were powdered for use in food preparation. The colour of shade dried flower powder was brighter hence it was used for the study, products were prepared with the incorporation of natural and synthetic colours and evaluated for sensory attributes.
For this study three recipes were selected i.e. coconut burfi, jalebi, sweet rice For all three recipes sensory evaluation was conducted by six judges for the parameters of colour, flavour, taste, texture and acceptability. To see whether there was any difference between acceptance of natural colour and synthetic colour statistical't' test was applied. From the mean score obtained for all parameters of coconut burfi calculated 't' value was calculated i.e. 't'=2.47 for colour, 't'=0 for flavour, 't'=0 for taste, 't'=0.83 for texture, 't'=1.367 for acceptability and for all calculated 't' value df(10) at 5%=2.228, at 1%=3.169. So from these all statistical value it was safely said that null hypothesis was accepted at both the level i.e. at 5% and 1% but only for colour of coconut burfi hypothesis was accepted at 1% level. Therefore it was found that there was no any significant difference between natural (palash flower) and synthetic colour used coconut burfi and hypothesis was accepted here.
From the mean score obtained for the jalebi with all parameters calculated't' value was found i.e. 't'=o.43 for colour, 't'=0.047 for flavour, 't'=0.53 for taste, 't'=1.66 for texture, 't'=0.24 for acceptability and for all calculated 't' value df(10) at 5%=2.228, at 1%=3.169. So from these all statistical value it was safely said that null hypothesis was accepted at both the level i.e. at 5% level and at 1% level. There it was found that there was no any significant difference between natural (palash flower) and synthetic colour used jalebi and hypothesis was accepted here.

For the sweet rice mean score obtained with all parameters calculated 't' value was found i.e. 't'=0.063 for colour, 't'=0.4 for flavour, 't'=1.13 for taste, 't'=0.40 for texture, ,'t'=0 for acceptability and for calculated 't' value df(10) at 5%=2.228, at 1%=3.169. So from these all statistical value it was safely said that null hypothesis was accepted at both the level i.e. at 5% level and at 1% level. There it was found that there was no any significant difference between natural (palash flower) and synthetic colour used sweet rice and hypothesis was accepted here.

Palash flowers are available seasonally, for storage, it was dried in sun and shadow to know which method of drying gives good effect of colour. Palash flowers were dried in sun for three days and in shadow for five days. Powder was made from sun dried and shadow dried palash flowers. It was found that palash flowers dried in shadow gave a dark orange colour which was more appealing than sun dried palash flowers.

Palash trees are grown widely in India. It grows on a wide variety of soils including shallow, black cotton soil, clay loams and even saline or waterlogged soils. These palash trees are mostly grown in the forest region so that palash flowers are wasted in large quantity without any use. But we can use the palash flower as a natural source of colour which is used in the food. Because with the increasing awareness of toxicity of synthetic colours, demand for pigments from natural sources has increased (Babu and Shenolikar 1995; Khanna and Singh 1975) Natural colours are now being considered as an alternative, many countries have restricted the use of synthetic colours in food products (IFT1988). Natural food colours also protect food from oxidation by enzymes. Therefore they not only enhance the appearance of the food food but also protect them (reddy et. al. 2005)

Following are the scope of the study:-

Small scale industry of palash flowers can be established for extraction of natural colour.

Mahila bachat gat can run this project, Because raw materials are very cheap and easily available.

Colour of palash flowers can used in food without affecting the health of the people and large amount of palash flowers are not wasted.

House wife can also make the colour from palash flower because colour extraction of flower is very easy.

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