Colouring Foods Naturally

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Even before a consumer tastes a food product, the propensity to buy is enhanced by the colour of the product. An attractive colour is associated with quality and freshness. Consumers select food products based on an attractive colour.

Why go Natural?

One of the most significant studies deterring consumers from artificial colourings was the Southampton study published in September 2007, "The Lancet", which found that a concoction of artificial colours led to hyperactivity in children.

As a result of such studies major companies have been searching for natural alternatives to their synthetic colours particularly those involved in producing products aimed at children.
The value of International colouring market was estimated at around US$1.15bn in 2007 according to Leatherhead Food International (LFI). The most important single colour is caramel with sales worth over US$112m and other natural colours were worth US$353m

Natural colours now make up 31% of the colouring market, compared to synthetic with 40% and this percentage ratio will completely change after the hype created as a result of Southampton report. Many international companies are finding solutions for replacing synthetic colours with Natural stable and cost effective counterparts.

Colouring of the food product is required:

- To restore original appearance of food where natural colours have been destroyed by heat processing & subsequent storage
- To ensure uniformity of colour due to natural variations in colour intensity
- To intensify colours naturally occurring in foods to meet consumer expectations
- To give an attractive appearance to foods otherwise that looks unappetizing
- To help preserve identity or character by which foods are recognized & thus aid in product identification
- To serve as visual indication of food quality

These colours are added to foods either in synthetic or Natural form.

Synthetic dyes: Synthetic dyes do not occur in nature and have to be manufactured artificially. These are petroleum products that can be made with a high degree of purity, intense colour concentrate and consistent quality. These colours exhibit good tolerance towards heat, light and chemical influences.

Colouring Foodstuff/ Natural colours:

If foods need to be coloured there are options available like using colours derived from colouring foodstuffs or by adding Natural colours that are allowed to be used in foods as per the legislation for the product in question and in appropriate quantities. It depends on the properties of the food, their stability towards heat, light, pH, packaging and storage conditions, interactions with the ingredients used for manufacturing. All these are very critical parameters to be considered when a Natural colour/ colouring foodstuff is added to the food and at all events preliminary experiments and stability tests should be carried out to stabilize the natural colour.

Some of the Natural Colours/ Colouring Foodstuff mostly used for food applications are enlisted:

Turmeric: It is a bright yellow colourant made from the roots of Curcuma Longa. The pigment responsible for the colour are known as curcuminoids, curcumin and related compounds. Turmeric solubility depends on the medium in which the pigment is dispersed. It can be available in water soluble or oil soluble/dispersible forms. It can be used to all food products to achieve a bright fluorescent yellow shade under good manufacturing practices. It dose exhibits excellent heat stability but shows poor light stability and cannot be used in food products that are directly exposed to sunlight, Turmeric also has been associated with claims as antioxidant, anticancer and antimutagenic properties through scientific studies.

Annatto: Annatto is another yellow colourant obtained from the seeds of Bixa Orellana. Pigments responsible for the yellow/orange colourant are the carotenoids bixin and norbixin. These are available in water, oil soluble and dispersible forms. Annatto dose not exhibit a very good stability towards heat and light and these have to be considered when used in food product.

Beta Carotene: Beta Carotene is a precursor to Vitamin A in addition to imparting an orange yellow colour to food products. Beta carotenes are available as Naturals extracted from palm and vegetable sources or are derived from algae, fungus or synthesized. Beta Carotene is oil soluble but can be processed into water dispersible and emulsified forms. They exhibit fairy good heat and light stability and can be used over a wide range of pH. conditions when used under GMP conditions. Beta Carotenoids have been associated with antioxidant properties and is also critical to optimal immune system support.

Paprika is extracted from the pod of Capsicum annum or paprika. It contains three main naturally occurring pigments, capsanthin, capsorubin and beta carotene. These combinations deliver a bright orange to red orange colour to food products. These oleoresins are oil soluble but can be emulsified to produce a water soluble/dispersible form. Paprika exhibit fairy good heat and light stability and can be used over a wide range of pH conditions when used under GMP conditions.

Lutein: Lutein is extracted from tagetes flowers (marigold). It exhibits fairy good heat, light and pH stability in foods delivering yellowish shade. Recent studies have demonstrated that the intake of carotenoid rich vegetables is inversely related to the risk of certain diseases like advanced age related macular degeneration. Lutein and Zeaxanthin are accumulated in the retina and may help to retard destructive processes in the retinal pigment epithelium.

Riboflavin is yellow or yellow-orange in color and in addition to being used as a food colouring it is also used to fortify some foods. It is used in baby foods, breakfast cereals, fruit drinks, vitamin-enriched milk products, some energy drinks. It exhibits good heat stability however degrades rapidly when exposed to light.

Beetroot juice is prepared by pressing beets & subsequent concentration process. Main ingredients, apart from sugar, minerals & protein, are pigments betanin & vulgaxanthin that exhibits colour to food products. It shows good pH stability however cannot be used in food products where higher processing temperatures are used as the pigment degrades rapidly

Red Cabbage, Grape extract, Black carrot and elderberry concentrates as a source of red colourant. They exhibit bright red to purple red colour hues at pH level of 3.8. A higher pH causes the anthocyanin based pigment to turn to unstable purplish blue colour. Anthocyanin exhibits fairly good light and heat stability, however they cannot be used in products containing Vitamin C as the pigment degrades rapidly. Anthocyanins act as antioxidants and may help prevent coronary heart disease and strokes. Studies show they may have anti-inflammatory properties and have antiviral and anti microbial activity as well.

Caramel: Complex mixtures of compounds, some of which are in the form of colloidal aggregates, manufactured by heating carbohydrates either alone or in the presence of food-grade acids, alkalis or salts; classified according to the reactants used in their manufacture as follows:

Class I: Prepared by heating carbohydrates with or without acids or alkalis; no ammonium or sulfite compounds are used.

Class II: Prepared by heating carbohydrates with or without acids or alkalis in the presence of sulfite compounds; no ammonium compounds are used.

Class III: Prepared by heating carbohydrates with or without acids or alkalis in the presence of ammonium compounds; no sulfite compounds are used.

Class IV: Prepared by heating carbohydrates with or without acids or alkalis in the presence of both sulfite and ammonium compounds.

Caramel colours are water-soluble and produce colour ranging from golden brown to nearly black.

Trends in colours around the globe: Natural colours will remain at the forefront with use of more concentrated colouring solutions directly extracted from fruits and vegetables and their different blends delivering a vast range of colour shades matching with their synthetic counterparts, with added nutritional benefits. These are specifically formulated to suit particular applications.

Apart from these are some of the interesting concepts that are possible with use of colours.

- Colours to increase the visual excitement through addition of sparkling effects (these are colours coated on edible gum based films. This is an easy way to create a new look to “old favourites” with simple line extensions.

- Food grade inks to print on food products like potato chips, bakery products that are applied to the food by direct contact methods.

- Colour Changing effect that can be achieved by using a lake and dye colourant in a dry mix with colour changing effect being triggered by water addition to the dry mix, addition of dry powder to a wet product, or during consumption to colour the mouth.

- luster effects due to reflection, interference and refraction creating shimmering effect to products such as Cereals, Confections and Frostings, Hard and soft candies (including lozenges), Nutritional supplement tablets and gelatin capsules and Chewing gum.

These concepts are possible with use of colours, however Country specific legislation needs to be taken into account prior to its usage.

Future Scope for Colours

As the negative press about side effects with artificial colours continues worldwide, natural colours are taking the centrestage. Also shift towards healthy lifestyle drives consumer markets, the demand for natural colours and colouring foodstuffs is going to gain importance significantly.

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