Natural Colours for Healthier Products

Dr Hormaz Patva
Technical Director
Sensient India Private Limited

Contents

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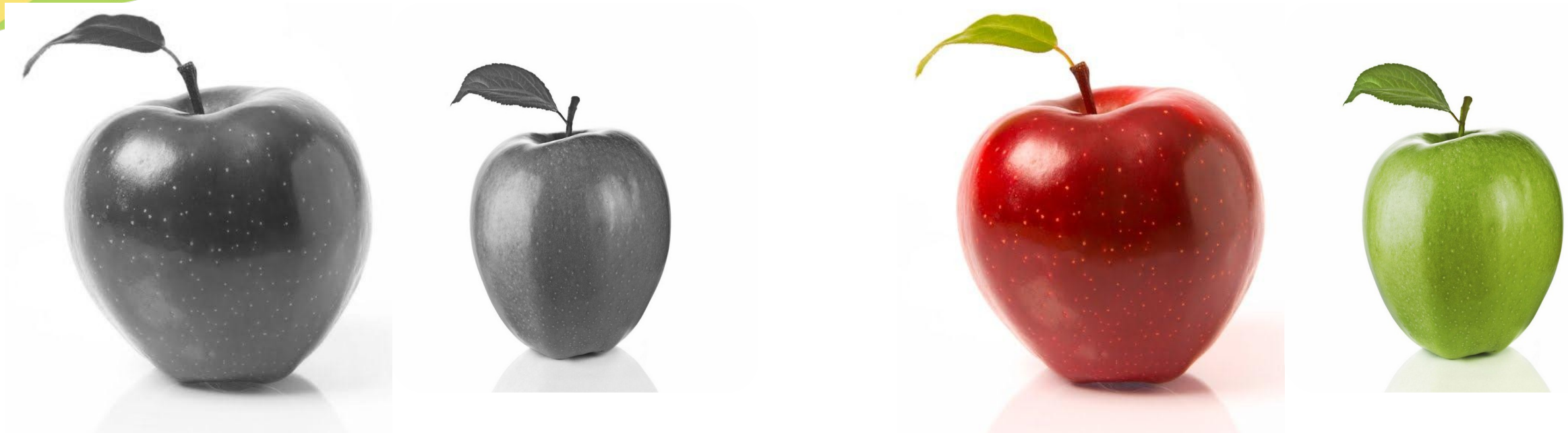
- Why Colouring
- Colour palette
- Key manufacturing steps
- Key challenges for Natural Colour
- Southamton study on Synthetic colour
- Health Benefits of Natural Colours
- Application area focus for Natural colour considering Health aspects

Did you know that a lasting colour impression is made within 90 seconds, and accounts for 60% of the acceptance or rejection of an object? A product's first impression is everything, and impressions are grounded in visual appeal.

Why Colouring?

- Aesthetic Value

Why Colouring?



- Aesthetic Value
- Product Identification

Why Colouring?

- Aesthetic Value
- Product Identification
- Judgment of Quality

Why Colouring?

- Aesthetic Value
- Product Identification
- Judgment of Quality
- Flavour Identification

Colour Pallete

Curcumin	E 100
Turmeric Root	
Riboflavin	E 101
Lutein	E 161b
β-Carotene	E 160a
Carrot	
Annatto	E 160b
Paprika-Extract	E 160c
Paprika	
Carmine	E 120
Beetroot “Strawberry Red“	
Beetroot	
Anthocyanins	E 163

Grape	
Hibiscus	
Aronia	
Elderberry	
Stinging Nettle	
Spinach	
Chlorophyll	E 140
Chlorophyllin	E 140
Copper-Chlorophyll	E 141
Copper-Chlorophyllin	E 141
Burnt Sugar	
Caramel	E 150
Carbo Medicinalis	E 153
Titanium Dioxide	E 171

Process flow- Colour creation

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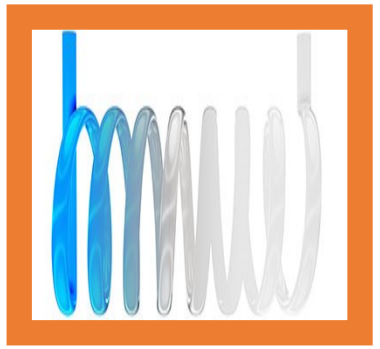
Agronomy Technology

Seed Technology

Farming



Process Engineering Technology

Primary Extraction

Concentration

Purification Selective Extraction

Final Product Form

Standardization Filtration

Application Technology

Custom Applications/Formulations

Shelf

4 Key Challenges for Natural Colours

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- pH Stability/Dependence
- Light Stability
- Heat Stability
- Cost-In-Use

pH Stability

Challenge: Shade shift can occur when using anthocyanins at higher pH levels. An intended red match can easily shift to purple at levels above a pH of 4.0.

Light Stability

Challenge: Yellow shades from Turmeric are bright and vivid; however, this color is light sensitive and will fade over time. It's a great yellow option for products without clear packaging though. However, the best solution is having multiple yellow botanical sources to select from.

Heat and High Water Activity Stability

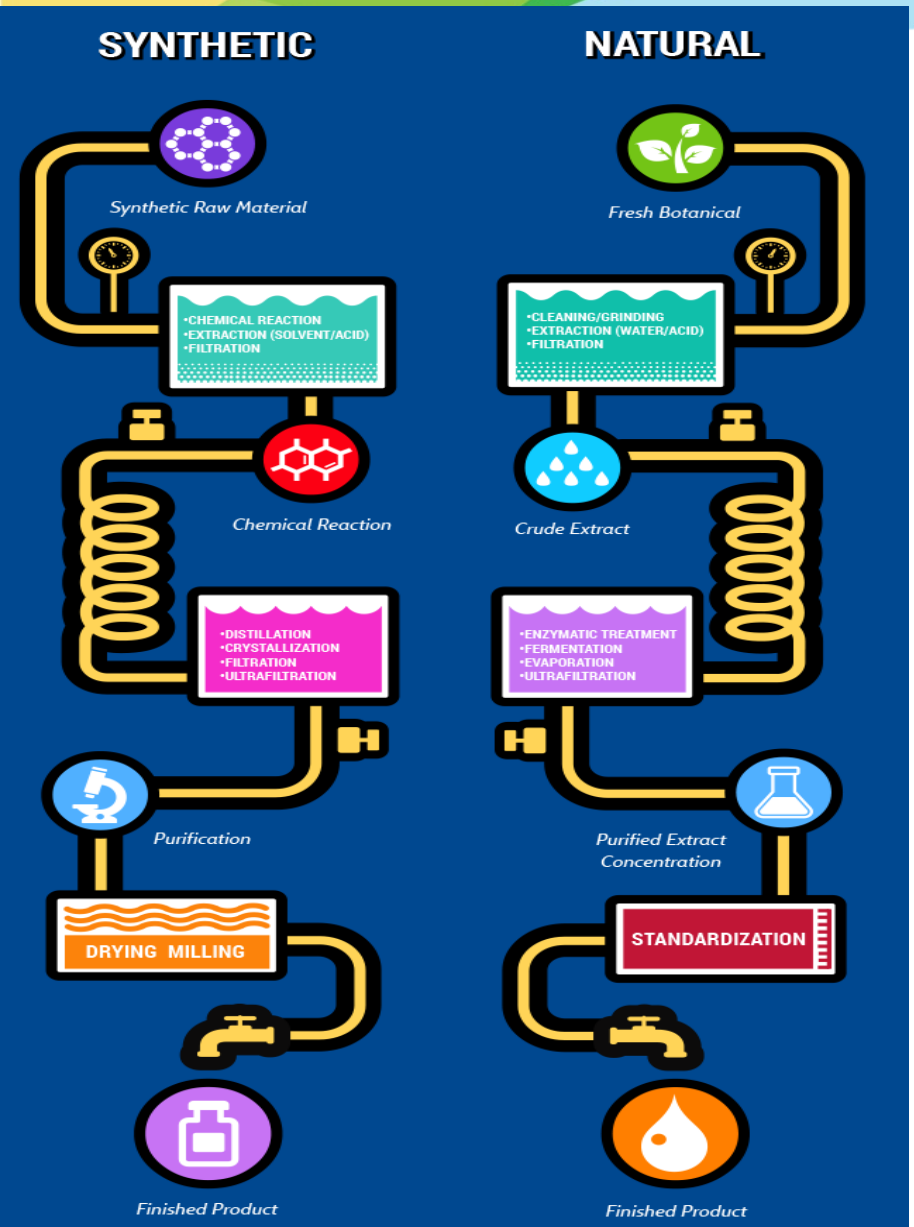
Challenge: Some natural colors like beet juice and spirulina do not stand up to heat very well or high water activity and stabilizing their shades as they undergo processing of high temperatures and water content is challenging.

Anthocyanin Solution

Standard Beet Solution

Heat Stable Beetroot Solution

Key Cost Driver for Naturals, Cost in Use



- The natural state for synthetic is powder, while for natural it is liquid
- Drying natural colors is possible in almost all cases but generally does add to cost-in-use
- Usage rate, not differences in cost of raw color, is generally what leads to higher cost-in-use (CIU) for natural colors
- Because of the lower pigment load in raw material used to make natural color (2% vs. 90%)
- Additional steps in the manufacturing process *can* contribute to CIU difference, but meaningful reduction over time will come from better botanicals and other raw material

Focus on Natural

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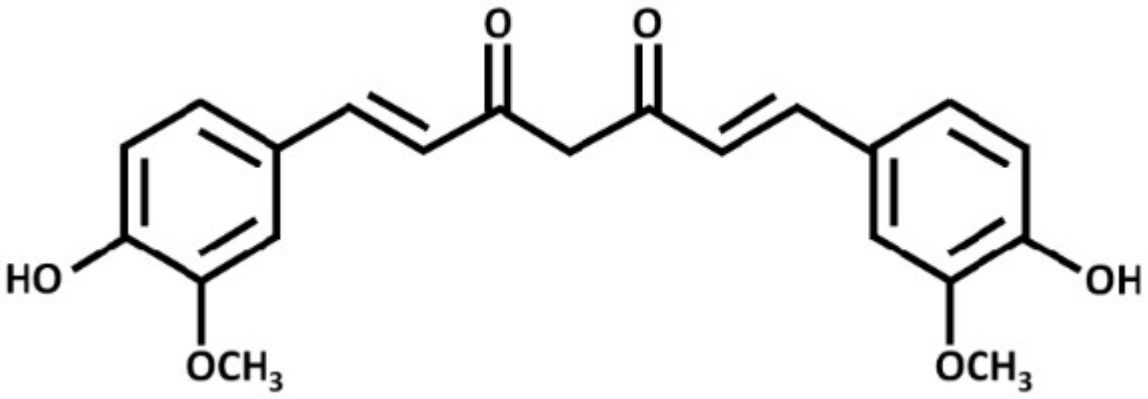
Artificial colouring has a bad reputation. A study conducted and published by researchers from Southampton University on the effect of a combination of certain artificial food colours on childhood behavior. These azo-dyes have become known as the 'Southampton 6' colours (Sunset yellow, Quinoline yellow, Carmoisine, Allura red, Tartrazine, Ponceau 4R).

Also driven by the introduction of the Southampton Six colours legislation in July 2010, Europe has moved strongly towards natural colours. (The regulation states if the colours E102 tartrazine, E104 quinoline yellow, E110 sunset yellow, E122 carmoisine, E124 ponceau 4R and E129 Allura red are used, products must carry the warning; '*consumption may have an adverse effect on activity and attention in children'.*

Health Benefit of Colours

Turmeric/ Curcumin

Curcumin is the principle pigment of turmeric, a spice obtained from the rhizomes of *Curcuma longa*. As the spice turmeric, curcumin has been a component of the diet for many years. Obtained by extraction from the plant to produce an oleoresin, which is then purified. Curcumin provides a bright, strong yellow shade in solution. It is an oil soluble pigment that is available in convenient, water-dispersible forms that are used in a wide range of foods.



Health Benefits:

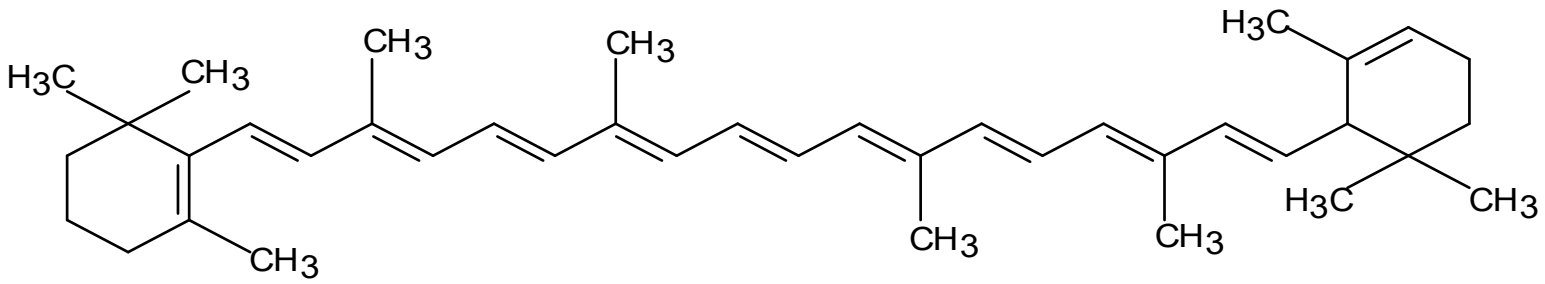
Curcumin has the potential to treat a wide variety of inflammatory diseases including cancer, diabetes, cardiovascular diseases, arthritis, Alzheimer's disease, psoriasis, etc

*These statements have not been evaluated by any Administration. These products are not intended to diagnose, treat, cure or prevent any disease.

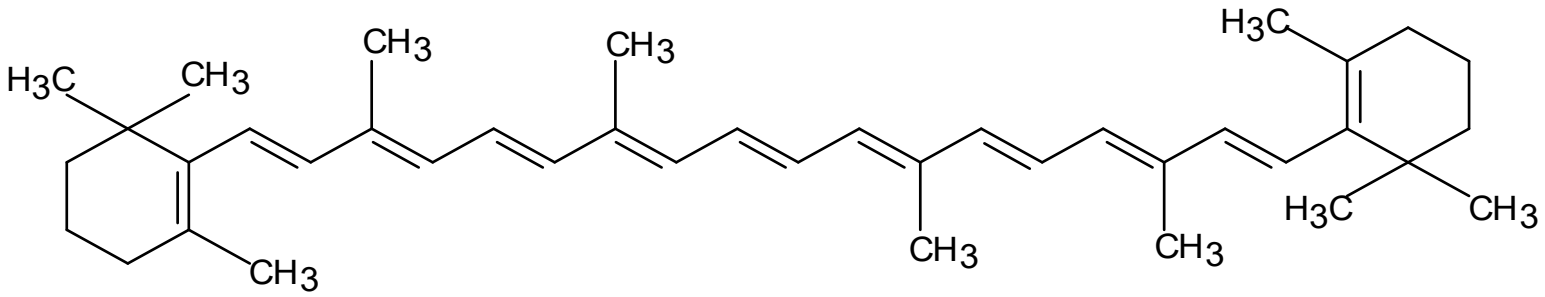
Beta Carotene

Carotene is extracted from various edible sources. It is one of several hundred carotenoids that are found occurring naturally and is distributed very widely. Nutritionally, it is valuable as vitamin A and has always played a significant role in the diet.

β-Carotene is divided into two groups, mixed carotenes from both vegetable (160a ii) and algal (160a iv) origin, and β-Carotene made by chemical synthesis (160a I) or by fermentation from *Blakeslea trispora* (160a iii).



α-Carotene



β-Carotene

Natural Carotenes- Health Benefits

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- *Antitumorgenic Activity:*
  - α-Carotene inhibits malignant transformations more than β -Carotene
  - α-Carotene reduces lung cancer risk
  - Carrot Juice inhibits DNA damage
- *Antioxidant Activity:*
  - Carotenes are effective singlet oxygen quenchers & radical chain breakers at low oxygen pressure
  - Superior antioxidative effect of α-Carotene compared to β-Carotene in liposomes

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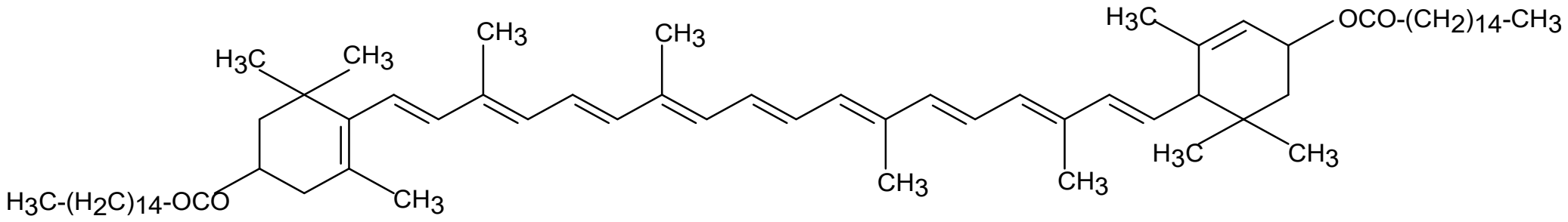
Lutein



Helenien (Luteindipalmitate)

Lutein is one of over 600 known naturally occurring carotenoids. Lutein is the yellow xanthophyll (*Tagetes erecta*) that is found in all green leaves and is responsible for the attractive yellow orange colour of marigold flowers. Although lutein is oil soluble it is also available in specially formulated water dispersible powder and liquid forms and thus finds application in a wide range of food and drinks.

Lutein- Health Benefits

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Preventing AMD:

- Lower risk of age-related macular degeneration
- Prevention of retina epithel deterioration

Antioxidant Activity:

- Inhibition of LDL Oxidation
- Protective against arteriosclerosis
- Synergistic with other natural carotenoids

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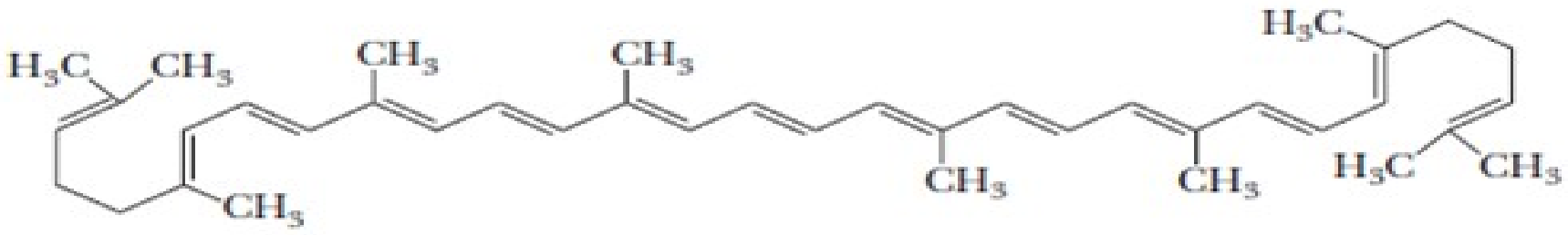
Lycopene



Lycopene

Source: Tomatoes (*Solanum lycopersicum)*, Biofermentation

Bioavailability : enhanced by processing with oils e.g (Paste, sauce)

Health Benefits: most powerful carotenoid quencher of singlet oxygen, frequent lycopene intake is associated with a reduced risk of cardivascular diseases, cancer e.g.

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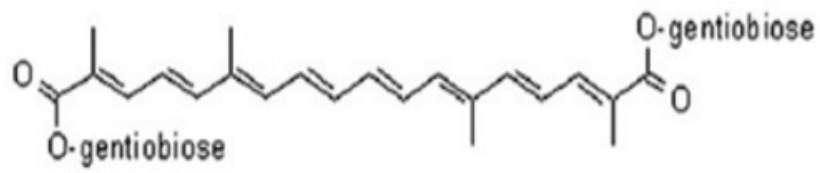
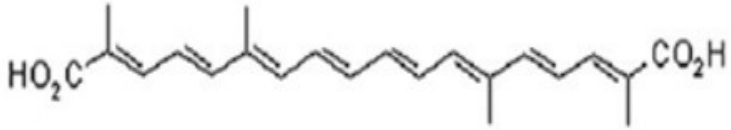
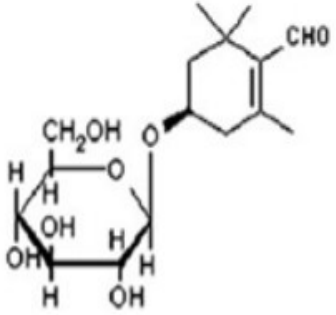
Saffron



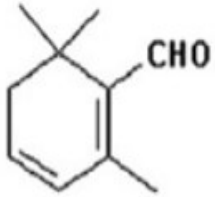
Crocin



Crocetin



Picrocrocin



Safranal

- Although majorly used in cooking, due to colour & aroma it imparts to foods, it also represents an ancient medicinal plant & its exhibit therapeutic properties
- It represents one of the main sources of crocins (carotenoid derivatives), safranal, & picrocrocin

Health Benefits

- Antioxidant effect
- Anti inflammatory properties

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Elderberry Concentrate

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Cyanidin-3-O-glucoside

(-)-Epigallocatechin

Active components

Main Antioxidant components:

- Cyanidin
- Epigallocatechin

Antioxidant Activity:

- Strong Radical Scavening Activity
- Protective effect against lipid membrane oxidation
- Inhibition of LDL-Oxidation

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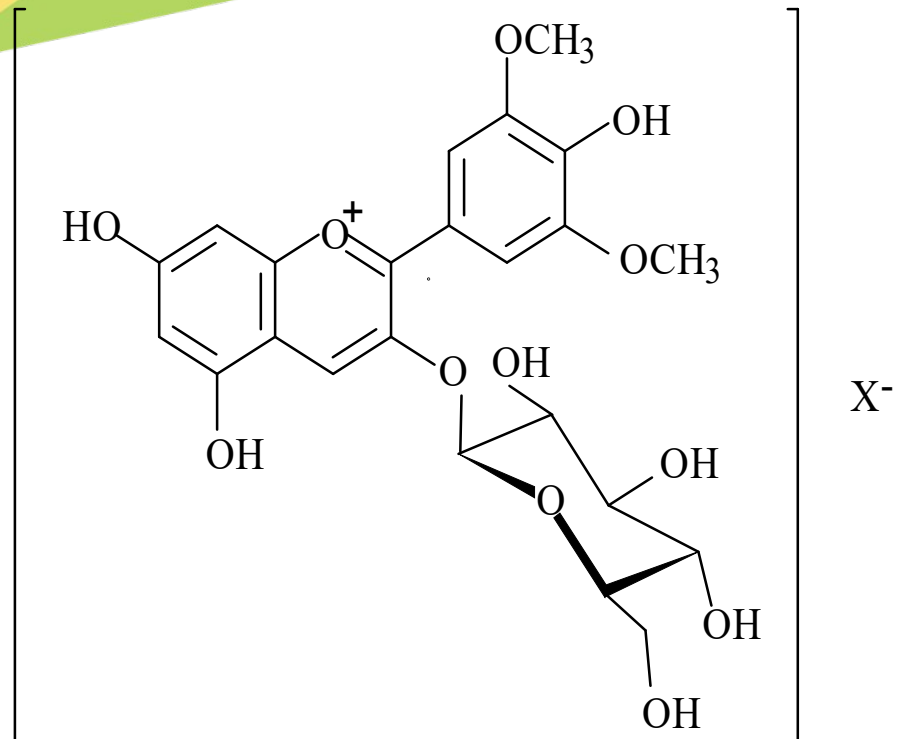
Grape Extract



Malvidin-3-O-glucoside

Gallic acid

Active Components

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Malvidin, Catechins, Gallic Acid:

- Main antioxidant components
- Superior activity of Malvidin
- High polyphenol content

Intake of Grape Polyphenols & Anthocyanins:

- Reduced risk of thrombosis and artheriosclerosis
- Inhibition of LDL oxidation

Optimized blood flow in arterial system:

- Preventing platelet aggregation

Natural Colours – Applications Healtheir food applications

Plant Based products

- Plant based alternatives/VEGAN: Whether motivated by dietary lifestyle, environmental sustainability, health aspirations or animal welfare, half of meat alternative buyers ate MORE meat alternatives in the past and nearly 40% ate LESS animal meat.
- Consumer demand not only continues to fuel growth in this category, but also the ability to patent meat substitute products makes the category highly attractive to investors.
- However, the sensory component of developing visually appealing and great tasting meat analogues with acceptable mouthfeel presents a potential barrier to enter this market—these are highly technical and challenging products for food scientists.
- **Natural Colour plays a vital role in aesthetic delivery of product**.

Plant based meat products

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Colour solutions

- Lycopene
- Anthocyanins
- Carotene
- Iron Oxide
- Beetroot
- Caramel
- Caramel substitutes
- Nat opacifying agents

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SIGHT: PLANT-BASED MEAT ANALOGUES THAT LOOK RADISHING

The visual aesthetics of plant-based meat analogues vary on a few things...

Type of animal meat being mimicked

Shade of the starting base material

Visual preference

To maintain a simple, plant-based ingredient statement, food color from botanical sources is the obvious option, and luckily, there are solutions available to address the three variables mentioned above.

Effect of Natural colour solutions in vegan meat

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VISUAL PREFERENCE
RAW PINK/RED COOKS TO BROWN
BUT CENTER REMAINS PINK

SOLUTION(S):
Blend of pH and heat-stable red and brown botanical juices

VISUAL PREFERENCE
RAW PINK/RED AND COOKS TO BROWN

SOLUTION(S):
Blend of pH-stable red and brown botanical juices

VISUAL PREFERENCE
RAW PINK COOKS TO WHITE

SOLUTION(S):
Blend of pH-stable red and white/opacity botanical juices

VISUAL PREFERENCE
RAW AND COOKED PINK/RED

SOLUTION(S):
pH and heat-stable red botanical juice

VISUAL PREFERENCE
RAW WHITE COOKED WHITE WITH GOLDEN BROWN OUTER

SOLUTION(S):
Botanical whitening/opacity solution with golden brown botanical juice

Plant Based Dairy Products

Plant based Flavoured milk

Milk source:
Coconut
Almond
Roasted almond
Oats
Soy
Colour of the base is critical to achieve bright stable shades

Colour options can be Carotenoids, Chlorophylls, Natural Browns

Plant based Yoghurt

Almond milk, soy milk, sugar, culture, stabilizer

Colour options can be Carotenoids, anthocianins, Chlorophylls

Plant based Icecream

base

Almond milk, soy milk, sugar, glucose syrup, stabilizer

Colour options can be curcumin, Carotenoids, anthocianins, beetroot, Chlorophylls, Caramel

Cheese & Egg Analogues

Colour options: Carotenoids giving different yellow to orange shades

Colour options
Carotenoids

Pesto and Lavender cheese

Colour options Chlorophyllin, Heat stable beetroot, Anthocianins

Ingredients

- Coconut fat
- Starch
- Salt
- Potassium sorbate
- Water

Natural Colours- Other products

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Healthy Indian Sweets

Health Beverage

Extruded products

Nutraceutical gummies

Sensient Technologies

Get in touch to find out more about our range of flavours and colour solutions, and discover what we can create together.

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sensient.com

Sensient India Private Limited
R&D Center : A30, TTC Industrial Area, Khairane MIDC, Navi Mumbai - 400705 +9122 62925300
Manufacturing Facility: R3, TTC Industrial Area Rabale MIDC, Nav
Mumbai – 400701 +91 22 68560801
Email: salesindia@sensient.com

Thank You