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## **A Review on Natural Colourants Used in Cosmetics**

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#### ABSTRACT

Colour plays a vital role in marketing any product such as cosmetics, food additives, pharmaceutical products etc. It gives the attractiveness for a product. Colour also helps to get the attention of the customers. Early days synthetic dyes were used as colorants in these products. The carcinogenic effect and the toxic effect of the synthetic dyes made the impact and thirst on the use of natural dyes. Natural dyes are obtained from the pigments produced by the microorganisms and the phytochemicals produced by the plants. Animal pigments are rarely used as colorants. The synthetic colorant in cosmetic industry is now replaced by the natural pigments. The colours obtained from the natural sources possess various properties like anti-cancer and so on. Some of the phytochemicals such as anthocyanins are used as colorant and also as antioxidant. Hence the natural colorants are used as a nutritional one and also it maintains in improving the health.

Key words: Cosmetics, Colourants, Pigments, Phytochemicals, Antioxidant

#### 1. INTRODUCTION

The word "cosmetics" comes from the Greek "kosm tikos," which means "having the power, organize, or ability in beautifying." Colors are crucial in cosmetics because they draw customers in and grab their attention. Colors are crucial in the marketing of any product, including clothing, food, and cosmetics. Nowadays, cosmetics play a significant role in women's lives. Women utilize a variety of cosmetics in their daily lives, including lipstick, nail polish, hair colour, perfume, skin care products, and others. Some of these items, however, contain colourants. Applying tattoos to the flesh has recently been popular among youths, who also employ a variety of dyes and colours.<sup>1</sup>

Most of the colours seen in cosmetics are synthetic dyes or colours. Xanthone, quinoline, Indigo, and azo dyes are a few of the most popular synthetic colours used in cosmetics. Eventually, it was discovered that the synthetic colours had hazardous and cancerous effects. Azo dyes were discovered to be the most hazardous of these many synthetic dyes, and in 1996, Germany outlawed these particular azo dyes. Synthetic colours are discovered to not be environmentally friendly. Synthetic dyes are related with a number of issues. People then began using cosmetics using natural pigments.<sup>1</sup>

Most people prefer to use natural dyes because they are concerned about their health and the environment. Natural dyes are simple to create and biodegradable. Nowadays, there is a greater need for natural colourants in cosmetic products. The pigments used in natural colours are those created by microbes, plants, and animals. These natural pigments are non-carcinogenic, nontoxic, and environmentally beneficial.

While most synthetic colours are soluble in oil or other solvents, the majority of these natural pigments are soluble in water. These natural pigments have numerous uses in the food, textile, pharmaceutical, and cosmetic industries since they are environmentally safe. As a result, the current analysis examines synthetic dyes, the issues they cause, as well as natural pigments that can be used in place of synthetic dyes in cosmetics.<sup>1</sup>

#### 2. NATURAL COLOURANTS

Many prefer to use natural colourants in cosmetics instead of synthetic dyes because of a number of issues with such dyes. These days, more natural colourants are being used in cosmetics. Natural colourants come from biological sources and are generally safe for the environment and do not pose any issues. Plants, bacteria, and other biological sources can be used to create natural pigments. The majority of natural colourants are derived from sustainable sources. Plant elements like stems, bark, leaves, fruits, flowers, and seeds, among others, are used to make natural colourants. Natural sources of colour include henna, teak, annatto, paprika, carrots, red cabbage, turmeric, and others. The benefits of natural colourants include their environmental friendliness, lack of toxicity, lack of side effects, non-carcinogenicity, reduced pollution, and increased health benefits such as vitamin A content and anti-cancer properties.<sup>1</sup>

#### 2.1 Sources of Natural Pigments Microbial Pigments

The primary source of naturally occurring colours is microbes. Colored pigments can be produced by some microorganisms and used in the cosmetics and other industries. These microorganism-produced pigments withstand heat and light. Microorganisms that can grow easily in the right setting to produce natural-colored pigments are frequently found in the environment. A range of coloured pigments with varied qualities, such as anticancer property, are produced by microorganisms like fungi, bacteria, and algae. <sup>1</sup>

## 2.2 Animal Pigments

Pigments are also created by animals. Animals develop their own pigments as a form of warning coloration against predators. Animals occasionally create their hues to entice mates. Melanin is the ideal pigment for animals. The pigment melanin gives animals' hair, skin, and fur their colours. The red colour of the prickly pear plant is produced by the blood of the insect Cochineal beetle, which is found there. Seldom is this pigment used in eye shadow, however it is frequently used in lipsticks. In Cherry Coke, it serves as a colour additive. Certain marine sources, including some fish and jellyfish species, have coloured pigments. <sup>1</sup>

## 2.3 Plant Pigments

Plants produce lot of secondary metabolites which are known as phytochemicals. These phytochemicals are not essential for the growth and development of the plant. The phytochemicals have medicinal property which tends them to be used in pharmaceutical industry. Phytochemicals also possess different attractive colors and flavors which tends them to be used in the cosmetics and food industry. The pigments are produced in different parts of the plants including stem, bark, leaves and flowers. Plants approximately produce 2,00,000 compounds among which few compounds are said to be colored compounds. Major classes of plant pigments include Anthocyanins, Carotenoids, Betalains, Flavones, Chlorophylls, Lycopene etc.<sup>1</sup>

#### 2.3.1 Acai

Dark purple is the colour of the aça berry. Anthocyanins, which are mostly found in aça fruit and include cyanidin-3-rutinoside and cyanidin-3-glucoside, are their principal chemical constituents. A number of flavone and flavanol glycosides, flavanol derivatives, and phenolic acids are also present in these fruits. Moreover, the fruit produces an oil that is dark green in colour and is extracted from the fruits (pulp) of the Brazilian açai palm.<sup>6</sup>

#### 2.3.2 Alkanet

A plant in the borage family called alkanet produces a dark crimson dye from its roots. Despite the plant's blue blossoms, its dark red roots have a whitish center and a blackish exterior. Inside, the roots are blue-red. Alkannin, the primary component present in alkanet root, is soluble in alcohol, ether, and oils but insoluble in water. Remember that pyrrolizidine alkaloids, which are water-soluble substances harmful for internal usage in higher quantities, are present in alkanet root. If you want to give your lip formulations a pleasant pinkish colour, choose for oil macerates rather than alkanet powder or water-soluble extracts like glycerites, which might not be appropriate (or safe) for this kind of product.<sup>6</sup>

## 2.3.3 Annatto

The carotenoid source annatto, which contains norbixin and bixin and can be utilised as a water-soluble extract, an oil-soluble extract, or an oil suspension, is one of the most popular. The annatto colourant gives off a red or orange tint and is frequently stable, but the pH affects the colour. Long used as a culinary colouring, annatto has also been utilised in textiles, pharmaceuticals, and cosmetics. It is commonly found in dairy products.<sup>2</sup>

#### 2.3.4 Avocado

Unrefined avocado oil has a rich, dark green colour and can even partially harden when it cools, as you may have experienced if you've ever used it. Carotenoids and chlorophylls including lutein, alpha-carotene, beta-carotene, neoxanthin, violaxanthin, zeaxanthin, antheraxanthin, chlorophylls a and b, and pheophytins a and b are found in the skin, flesh, and oil.

Lutein, one of the 600 known naturally occurring carotenoids, is one of the primary pigments present in avocado oil. Only plants can synthesize lutein, which is abundant in green foods like spinach, kale, and avocado and other xanthophylls.<sup>6</sup>

#### 2.3.5 Beetroot

A popular natural colorant for water-based cosmetics is beetroot. Its primary component, betanin, breaks down when exposed to light, heat, and oxygen. To make a vibrant pink or crimson glycerite that you can use in your emulsions or water-based gels and tonics, mix beetroot powder with glycerin. Have in mind that because beetroot is water-soluble, it cannot be used in oil macerations.<sup>6</sup>

#### 2.3.6 Blue Tansy

Due to its ancestry in the Asteraceae family, blue tansy is a relative of chamomile. The chemical known as Chamazulene is produced by German chamomile, as you can see in the list below. This substance, which is created during the steam distillation process, is also present in Blue Tansy (17–38% Chamazulene in the essential oil). Use Blue Tansy essential oil to provide a blue tint to your recipe. Tansy Oil shouldn't be mistaken with this (Tanacetum vulgare).

## 2.3.7 Buriti

The palm buriti is also cultivated in the Amazon region. The fruits resemble chestnuts in certain ways. The fruit pulp is orange-yellow and is used to make juice and cooking oils. Can you picture frying chips in this oil? It is edible and used in cooking and frying. The fruit's oval seed is edible.

Compared to acai oil, buriti oil is comparable in that it contains over 70% oleic acid. Buriti is special due to its high beta-carotene concentration, which is even more intriguing. A carrot contains 6.6 mg of beta-carotene per 100g of carrot pulp, whereas a buriti fruit contains 30 mg of beta-carotene per 100g of fruit pulp, making it the richest natural source of the antioxidant. Much more beta-carotene is present in the oil, which has 330 mg per 100 grammes of buriti oil.<sup>6</sup>

## 2.3.8 Butterfly Pea

Beautiful blue-colored butterfly pea flower petals are widely used as colouring in natural cosmetics. They were also utilised as an illustration in one of our organic gel scrubs! Anthocyanins, p-coumaric acid, and ferulic acid are all present in the flowers of the butterfly pea. In addition to anthocyanins, the petals of C. ternatea contain a significant amount of flavonoid substances such p-coumaric acid and ferulic acid. Blue butterfly pea petals contain anthocyanins that come from a type of anthocyanidin called delphinidin.<sup>6</sup>

#### 2.3.9 Calendula

Typically, petal colours in the yellow to red spectrum are caused by carotenoids. Combinations of these carotenoid pigments are primarily responsible for the diverse range of petal colour in different types of calendula. Extracts of the petals of calendula cultivars with orange and yellow flowers have been found to contain 19 carotenoids. The primary carotenoid found in calendula petals has been identified as flavaxanthin, and it is obvious that this pigment is what gives calendula petals their distinctive orange hue. Lycopene and lutein are two more carotenoids that have been found in calendula. Although not being permitted for use in the EU or the USA, flavaxanthin is utilised as a food additive under the E number E161a.<sup>6</sup>

#### 2.3.10 Caramel

Various food and beverage products use distinct red to dark-brown liquids or powders as colour additives under the name "caramel colours," which is a family of colours. Additionally, other product categories that are not discussed in this review contain caramel colours as components including animal feeds, cosmetics, and medications. By caramelising carbohydrates at a regulated temperature and under controlled processing conditions, caramel colours are created.<sup>3</sup>

## 2.3.11 Carrot Root

The majority of the pigment in carrot roots (Daucus carota) is made up of carotenoids, which are undoubtedly among the most common and important pigments in all living things. Carotenoids are the colours found in many plants, especially the roots of carrots. Carotenoids make up the majority of the naturally occurring oil-soluble colours, aside from chlorophylls. Betacarotene is responsible for the predominant colour of carrot roots. Macerated carrot root in oil, which has a wonderful orange hue, is usually seen in organic skincare products.<sup>6</sup>

#### 2.3.12 Chamomile (German)

This chamomile cultivar, often known as Hungary or Blue Chamomile, produces an essential oil that is deep blue because of its high chamazulene content (2-5%). A significant amount of alcohols, including bisabolol, are also present in the essential oil. Only the essential oils of German and Roman chamomile contain chamazulene, which is produced during distillation from another substance called matricin. Particularly the German chamomile essential oil is affected by this component, turning vivid blue. Given that the industry likes for this oil to have a light straw colour, Roman chamomile essential oils are frequently distilled in a way that prevents the development of chamazulene. Both chamomiles' anti-inflammatory qualities are attributed to chamazulene.

#### 2.3.13 Elderberry

Given that both elderberry and acai berries have a rich purple colour, it should not be surprising that they both contain some of the same chemical pigments and natural colourants. Anthocyanin termed cyanidin 3-glucoside, which is very water soluble, is what causes its primary pigment.<sup>6</sup>

#### 2.3.14 Henna

Since ancient times, henna has been used to colour silk, wool, leather, human skin, hair, and fingernails. Lawsone is a substance found in henna. Lawsone (2-hydroxy-1,4naphthoquinone), commonly referred to as hennotannic acid, is a reddish-orange pigment found in the water hyacinth (Eichhornia crassipes). flower and the leaves of the henna plant (Lawsonia inermis).

## 2.3.15 Hibiscus

Anthocyanins, the red pigments found in the red flowers of the Hibiscus species, are frequently utilised as colouring agents. The primary chemical pigment thought to be present in hibiscus petals of the species Hibiscus rosa-sinensis is cyanidin-3-sophoroside. Moreover, extracts of a Hibiscus species known as Roselle (Hibiscus sabdariffa), assumed to be indigenous to West Africa, are made. The two anthocyanins cyanidin-3-sambubioside and delphinidin3sambubioside that are most prevalent in Hibiscus sabdariffa.<sup>6</sup>

#### 2.3.16 Indigo

The plant's fermented leaves are used to extract the blue pigment used in indigo. Indigotin, a blue to mauve colour, is created as a result (an indigoid structure). The plant is also referred to as Pigmentum indicum on occasion. The fermenting plant material discharges a paste, which is transformed into cakes and crushed into a fine powder. As the powder is exposed to air, it turns blue.

Indican, a glucoside found in many Indigofera species, is the source of the indigo dye, which is then transformed by an enzyme into blue indigotin. This dye, which is fairly colorfast, is mixed with stabilizers and other substances to create a variety of colourants. About of indigo used in commerce today is created synthetically.<sup>6</sup>

## 2.3.17 Iris

Iris extract is a botanical product that is extracted from the roots of Iris germanica and contains significant amounts of isoflavones and rhizomes. Mangiferin, which is believed to be one of the main co-pigments in iris flowers, produces a variety of purple, mauve, and blue hues when it interacts with anthocyanin (a delphinidin glycoside).

In the past, Iris germanica was used to make Iris Green, a green pigment created from several plants' perianth leaves. Just extracting the flower juice and combining it with an aluminum hydroxide (alum) base produced the pigment. Purple iris perianth leaves were used to provide the green hue. Initially purple, the dye will turn blue when alum is added, and green when calcium is added.<sup>6</sup>

## 2.3.18 Ixora Coccinea

Ixora coccinea is a species of flowering plant in the family Rubiaceae. Ixora coccinea flowers give a crimson colour when dried and powdered. In order to create various cosmetic products, such as lipstick, rouge, and eye shadow, the obtained colour was used as a natural colourant.<sup>4</sup>

## 2.3.19 Madder

The Mediterranean native madder was historically commonly cultivated as a dye plant. The plant has been employed as a source of a long-lasting red dye because its generic name, Rubia, signifies red. The roots of the plants, which are 2-3 years old and are still red after drying, are used medicinally. Alizarin and purpurin, two red chemical compounds generated from the roots and tubers, are among the ingredients. Anthraquinone glycosides are another.<sup>6</sup>

### 2.3.20 Marigold

The annual herb marigold, which contains lutein and whose dried flower petals are used for dyeing, is another source of carotenes. Marigold is a source of a highly tinctorial dye that is both heat and light stable and can be combined with calcium silicate, gelatin, or vegetable oil. In addition, marigold is more

affordable than other yellow and orange colours like saffron and turmeric. For dye stability, marigold flowers must be stored properly.<sup>2</sup>

#### 2.3.21 Pomegranate

Although the inedible fruit peels are the main source of colourants in pomegranate, watersoluble pigments called anthocyanins are chiefly responsible for the appealing red/purple colour of the juice. Punicalagin, punicalin, gallagic, and ellagic acids are some of its main components. Alkaloids like isopelletierine are also present in it. Due to the presence of a significant amount of tannins, punica granatum dye and many other common natural dyes are considered to be powerful antibacterial agents.<sup>6</sup>

## 2.3.22 Red Cabbage

The pink-purple colour of red cabbage, Brassica oleracea L. var. capitata, is well known. Anthocyanins, a type of natural pigment utilised as a natural colourant, make up the majority of the dye's water-soluble composition. Red cabbage contains eight anthocyanins, including the anthocyanins cyanidin-3-glucoside and delphinidin-3-glucoside.<sup>6</sup>

#### 2.3.23 Red Clover

High quantities of isoflavones are found in red clover, including formononetin (7-hydroxy4'methoxyflavone), a naturally occurring colourant that is a dull, golden yellow. There is little knowledge on the ideal time to harvest red clover fields to maximise the content of the isoflavones, despite the fact that formononetin is oestrogenic in vitro and in vivo, which has led to several scientific research looking at the effects of formononetin on sheep.<sup>6</sup>

## 2.3.24 Red Sandalwood

Santalin, a complex chemical, is the red pigment derived from Pterocarpus santalinum, sometimes known as red sandalwood. Its fundamental structure comes in a variety of variations, all of which produce fairly strong red colours. Comparatively speaking, this red's stability is really good. It has been in use for many ages in custom. Red sandalwood contains compounds that produce either a red colour (Santalin A or Santalin B) or a yellow colour (Santalin Y).

#### 2.3.25 Rosehip

The reddish colouring, which is linked to the carotenoid content, gives cold-pressed rosehip oil its distinctive colour. In contrast, the oil obtained through solvent extraction has a yellowish hue. This may be because the organic solvent can extract pigments and a number of other compounds from the seeds, or it may be because the high temperature of the oil extraction process causes the red pigment to degrade. Three carotenes (lycopene, betacarotene, and carotene) and six xanthophylls (neoxanthin, transviolaxanthin, cis-violaxan-thin, 5,6epoxylutein, lutein, and cryptoxanthin) are found in rosehips. These fruits are among those with the greatest range of carotenoid colours due to the huge number of chemicals they contain. The highest levels of total carotenoids, which are primarily made up of lycopene and betacarotene, were found in rose hips.<sup>6</sup>

#### 2.3.26 Roselle

Roselle is the common name for a mixture of anthocyanin dyes derived from the plant, Hibiscus sabdariffa. Roselle appears to be a good and promising source of water soluble natural red colourants. It has been claimed to be used as a flavouring for sauces, jellies, marmalades, and soft drinks as well as to use as a colourant for dishes. Flavonoids called anthocyanins are water-soluble natural colours. Due to the presence of anthocyanins, aqueous extracts of Roselle or Hibiscus sabdariffa L. calyces exhibit a distinctively bright red coloration that could be used as a colouring ingredient in pharmaceutical products.<sup>5</sup>

## 2.3.27 Safflower

Carthamin, a pigment with a yellow-orange hue, is found in safflower. A closer look reveals that it contains two natural colourants, one of which is yellow and the other red. The blooms produce a yellow colour, while the seeds produce oil. Carthamidin generates a yellow colour dye that is water soluble, while carthamin makes a red dye that is water insoluble.<sup>6</sup>

## 2.3.28 Saffron

The Crocus sativus has crocines, crocetins, picrocrocine, and safranal in its dried stigmas and tips of styles. They should be shielded from light because they are delicate colours. The yellow pigment riboflavin, as well as vitamins, are abundant in the stigmas of C. sativus. Moreover, the primary source of the yellow-red pigment, crocin, is found in saffron. The carotenoid pigment - crocin is principally in charge of giving saffron its golden yellow-orange hue. The taste of saffron is due to the bitter glycoside picrocrocin. High colouring strength, good stability, and slow fading are all characteristics of saffron. Moreover, saffron has been used as a colouring agent in cosmetics, such as lipstick. The saffron's scent is a result of safranal. To avoid confusion with the lethal fall crocus, Colchicum autumnale.

## 2.3.29 Spinach

Beta-carotene, chlorophyll a, and b are the three main pigments found in spinach leaves. Other pigments including xanthophylls are present in smaller concentrations. Only the green chlorophylls are visible in green leafy plants like spinach because they cover up the vibrant red, orange, and yellow colours of the carotenoids. The amount of chlorophyll in spinach decreases when it is blanched. As a lipophile, chlorophyll.<sup>6</sup>

## 2.3.30 Spirulina

Spirulina is a type of cyanobacteria biomass (blue-green algae). There are two species of Arthrospira that generate the pigments phycocyanin and phycoerthyrin: Arthrospira platensis and Arthrospira maxima. Phycoerthyrin is a red pigment, whereas phycocyanin is a blue pigment that absorbs orange and red light. Spirulina is one of the pigments of microalgal origin that are in high demand right now on the market.<sup>6</sup>

#### 2.3.31 St. John's Wort

St. John's Wort contains the brilliant red pigment hypericin. Despite the herb's beautiful yellow blossoms, the macerated oil is a deep crimson colour. The oil turns a dark red after steeping these flowers in it for a while, and it can be utilized in anhydrous or emulsified formulations. One of the most well-known chemical components of St. John's Wort, along with hyperforin, is hypericin, which is thought to have antibacterial, antiviral, and antidepressant characteristics. One half of the molecule in hypericin is hydrophilic (loves water), and the other half is hydrophobic, giving it a special molecular structure (water repelling).

## 2.3.32 Tomato

Lycopene, and -carotene, lutein, zeaxanthin, and b-cryptoxanthin are the tomato's main nutrients. Red carrots, watermelons, gac, and papayas are just a few examples of the red fruits and vegetables that contain lycopene, a vivid red carotene and carotenoid pigment and phytochemical. The pigment found in tomato-based sauces, lycopene, is insoluble in water. Only organic solvents and oils may dissolve it. About 80–90% of the carotenoid content of red, ripe tomatoes is made up of it. The carrot's yellow pigment, beta-carotene, is an isomer of lycopene.<sup>6</sup>

#### 2.3.33 Turmeric

Oftentimes, turmeric is referred to as Indian saffron. It is made up of Curcuma longa plant rhizomes, both fresh and dried. The rhizome has been used for thousands of years as a spice, medicinal, and colouring ingredient. A substance called curcumin, which ranges in colour from yellow to deep orange, is found in

turmeric. About 5% of the volatile oil, resin, and yellow colouring agents in turmeric are called curcuminoids. Curcumin, the natural colourant that gives turmeric its characteristic yellow hue, makes up around 50–60% of the spice's chemical composition.<sup>6</sup>

#### 2.3.34 Walnut

Juglone (5-hydroxy-1,4-naphthoquinone), plumbagin (yellow quinone pigment), and tannin are all present in black walnut drupes. Orange-brown dye is produced by black walnuts. As the outer skin darkens from bright green to black over time, the liquid (dye) extracted from the inside husk gets progressively darker. Lawsone, the substance in henna leaves that causes colouring, is an isomer of juglone.<sup>6</sup>

#### 2.3.35 Yarrow

Certain essential oils from yarrow, which are similar to Blue Tansy and German Chamomile, may include chamazulene, which gives the oil a deep blue hue. Certain dark blue yarrow essential oils contain around 15% chamazulene, making them an excellent natural colouring agent for your skincare product. A substance called matricine that is not found in the actual plant, azulene or chamazulene, is transformed into them during the steam distillation of the herb. Azulene and chamazulene can only be created by applying heat and using the steam distillation method.<sup>6</sup>

## 3. CONCLUSION

The majority of industries, including the food industry, the pharmaceutical industry, and the cosmetics industry, frequently employed synthetic dyes as colourants. These synthetic colours have a number of restrictions and issues. They aren't earth-friendly. Because they are nondegradable and have a carcinogenic quality, synthetic colours are poisonous. The majority of artificial dyes are regarded as xenobiotics. The health of humans is impacted in a number of ways by synthetic dyes like azo dyes. People prefer to utilize natural pigments as colourants for these reasons. Natural colours come from a variety of sources, including microbial life, plants, and animals. The pharmaceutical sector as colouring and due to their medicinal property, in the food industry as colouring and flavoring agents, in the cosmetics industry as antioxidants and colouring agents.

Natural pigments with qualities like anti-cancer, anti-inflammatory, anti-obesity, anti-diabetic, and antioxidants include betalains, carotenoids, and anthocyanins. Yellow-colored carotenoids are high in vitamin A and have free radical scavenging properties that aid in the fight against cancer. The FDA has allowed some naturally occurring pigments from annatto seeds, beta carotene, etc. for use in cosmetics and assigned them a colour index. Anthocyanins can be employed in cosmetics due to their

colour and antioxidant properties because they are used as pH indicators and colorants in the food, textile, and other industries. Chlorophyll and lycopene both have vibrant colours that can be utilized in cosmetics.

Another excellent and affordable source of natural colours is microbial pigments. Prodigiosin and other microbial pigments are what give vivid red colour. This prodigiosin is utilized in the production of soaps and cosmetics. Inks for highlighter pens and papers are created using other microbiological pigments, such as violacein. Because beetle pigment has a vivid red colour, animal

pigments like that are utilized to make cosmetics like lipstick and eye shadow. Therefore, the majority of natural colours are found in cosmetics. Natural pigments also have some drawbacks, such as short-term stability and a lack of much brighter colour than synthetic dyes. Although the natural dyes have some disadvantages, they have numerous health benefits and they are considered to be safe and non-toxic when compared to synthetic dyes. It is better to use natural pigments and natural substances in cosmetics to avoid major health problems. Thus, further research can be focused on the benefits and use of natural colorants in cosmetics and other sectors.

Table 1: Types and source of microbial pigments

MICROBIAL PIGMENTS		
PIGMENT	SOURCE	COLOUR
Zeaxanthin	Staphylococcus aureus, Flavobacterium sp.	Yellow and golden yellow hues
Prodigiosin	Serratia marcescens	Red colour
Astaxanthins	Phaffia rhodozyma	Red colour
Lycopene	Blakesela trispora	Red, yellow, and orange hues
Pyrocyanin	Pseudomonas aeruginosa	Green colour
Carotene	Dunaliella salina	Cream
Monascorubramin, Rubropunctatin	Monascus purpureus	Yellow, orange, and red hues.
Torularhodin	Rhodotorua	Orange-red
Canthaxanthin	Monascus roseus	Orange-pink



Figure 1: 1.Acai, 2.Alkanet, 3.Annatto, 4.Avocado, 5.Beetroot, 6.Blue Tansy, 7.Buruti, 8.Butterfly Pea, 9.Calendula, 10.Caramel, 11.Carrot Root, 12.Chamomile,13.Elderberry, 14.Henna, 15.Hibiscus, 16.Indigo



Figure 2: 17.Iris, 18.Ixora Coccnea, 19.Madder, 20.Marigold, 21.Pomogranet, 22.Red Cabbage, 23.Red Clover, 24.Red Sandle Wood, 25.Rosehip, 26.Roselle, 27.Safflower, 28.Saffron, 29.Spinach, 30.Spirulina, 31.St. Johns Wort, 32.Tomato, 33.Turmeric, 34.Walnut, 35.Yarrow.

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