

MEDICINAL PROPERTIES OF 6 NATURAL DYES

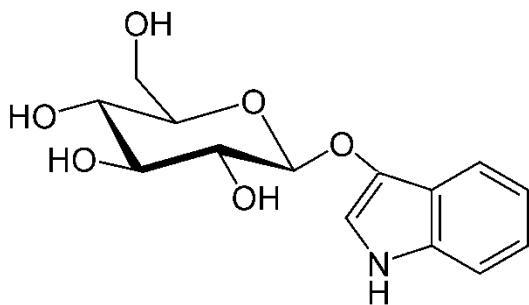
Indigo

- **Indigo:** Indigo dyed fabric impart many medicinal effects, it is known that dyed fabrics with natural colors impart some or all the activities mentioned below due to close proximity to the skin. The indigo dyed fabric is also sedative and calming. It is said to promote intuition.
- Indigo may be useful in controlling bleeding and abscesses. The Cherokees (a tribe, of the early settlement of America) used the plant as a source of blue dye for their clothes. Some Indian tribes used it for medicinal purposes.
- The Osage (another tribe) made eyewash from the plant. The Cherokees would make a tea from it. A hot tea was taken as a purgative and a cold tea to prevent vomiting. A pulverized root or hot tea was held over a sore tooth to relieve the pain. Indian children would use the dried pods with the loose seeds inside as rattles. **Thus the plant seems to have many beneficial effects.**

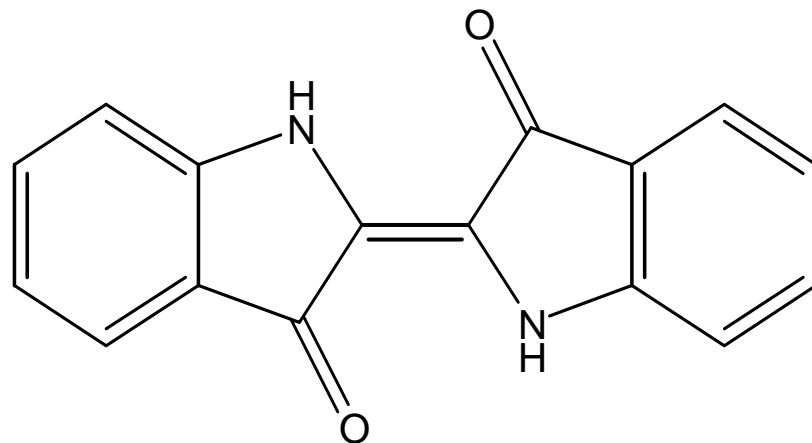
Chemical composition of Indigo Dye

Dye is obtained from the processing of the plant's leaves. These are soaked in water and [fermented](#) in order to convert the [glycoside indican](#) naturally present in the plant to the blue dye [indigotin](#).

[Glycoside Indican](#)



[Indigotin](#).



Different Medicinal properties observed

- Different Medicinal properties observed by folk medicine practitioners, Ayurvedic doctors and scientists:
- It is effective in eliminating toxic substance, dispelling heat and dampness, diminishing inflammation and swelling, relieving pain and itching..
- It also has antifungal, anticancer and antibacterial effects.
- A natural indigo plant dyed diaper is provided to obtain anti-microbial, sterilizing or deodorizing effect and treatment effect of atopic dermatitis by directly using fresh extract of the natural indigo plant. A decoction of the roots is used in the treatment of coughs.
- The root is dried, ground into a powder and applied externally in the treatment of pains in the chest.

Utility of Indigo

- Indigo has rather a mixed press for its medicinal virtues. One author says it is so astringent that it is not fit to be used internally - it is only used externally as a plaster applied to the region of the spleen and as an ointment for ulcers, inflammation and to staunch bleeding. However, it is widely used internally in Chinese herbal medicine where high doses are often employed in order to maintain high levels of active ingredients.
- The leaves are antibacterial, anticancer, antiviral, astringent and febrifuge.
- It controls a wide range of pathogenic organisms, including viruses.
- It is used internally in the treatment of a wide range of disorders, including meningitis, encephalitis, mumps, influenza, erysipelas, heat rash etc.
- This is also used medicinally, particularly in the treatment of high fevers and convulsions in children, coughing of blood and as a detoxifier in infections such as mumps.
- It is used in the treatment of fevers, pyogenic inflammation in influenza and meningitis, macula in acute infectious diseases, erysipelas, mumps and epidemic parotitis.

How good is indigo dye

- Both the leaves and the roots are used in the treatment of pneumonia.
- The root and the whole plant have anticancer properties whilst extracts of the plant have shown bactericidal properties.
- A decoction of the roots is used in the treatment of coughs.. The root is dried, ground into a powder and applied externally in the treatment of pains in the chest.
- Wild indigo, a decoction of the roots being used as an antiseptic wash for wounds and skin complaints.
- Modern research has shown that this acrid bitter herb stimulates the immune system and is particularly effective against bacterial infections.
- A tea made from the roots is cholagogue, emetic, febrifuge and purgative.
- The fresh root is also considered to be antiseptic, astringent and laxative.
- The infusion is used in the treatment of upper respiratory infections such as tonsillitis and pharyngitis, and is also valuable in treating infections of the chest, gastro-intestinal tract and skin.

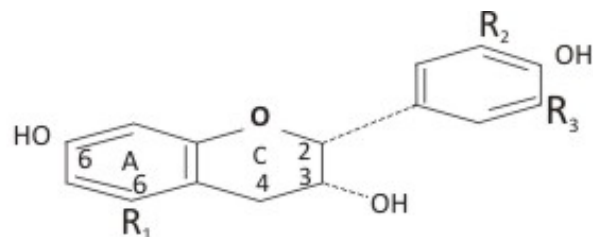
More benefits of Indigo

- The plant's antimicrobial and immune-stimulant properties combat lymphatic problems, when used with detoxifying herbs such as *Arctium lappa* it helps to reduce enlarged lymph nodes.
- Wild indigo is frequently prescribed, in the treatment of chronic viral infections or chronic fatigue syndrome.
- A decoction of the root soothes sore or infected nipples and infected skin conditions. When used as a mouth wash or gargle the decoction treats mouth ulcers, gum infections and sore throats.
- The fresh root, including the bark, is used to make a homeopathic medicine. This has a limited range of action, but is used especially in the treatment of certain types of flu.

Catechu

- **Catechu:** Catechu dyed fabric impart many medicinal effects, it is known that dyed fabrics with natural colors impart some or all the activities mentioned below due to close proximity to the skin. Thus the plant seems to have many beneficial effects.
- **Chemical Composition of Catechu.**—Successive treatment of catechu with ether and absolute alcohol abstracts the two principal constituents, namely, from 13 to 33 per cent of crude **catechin**, also called **catechuic acid**, and from 22 to 50 per cent of a peculiar tannic acid, called **catechu-tannic acid**. Besides these other compounds present are **pyrocatechin** ($C_6H_6O_2$), while **phloroglucin and protocatechuic acid** are produced by fusing it with caustic potash. By the action of sulphuric acid, *catechuretine* is produced. **Quercetin** was obtained from the aqueous solution of catechu. **Pyrocatechin** ($C_6H_6O_2$), or *catechol*, may be obtained from many tannins and extracts by means of destructive distillation.

(a)



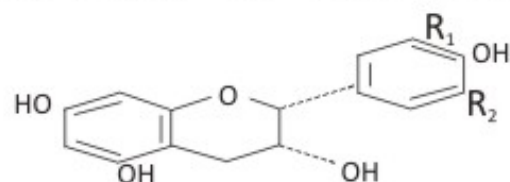
$R_1=R_2=OH, R_3=H$; Catchin

$R_1=R_2=R_3=OH$; Gallocatchin

$R_1=OH, R_2=R_3=H$; Afzefechin

$R_1=R_3=H, R_2=OH$; Fisetinidol

$R_1=H, R_2=R_3=OH$; Robinetinidol

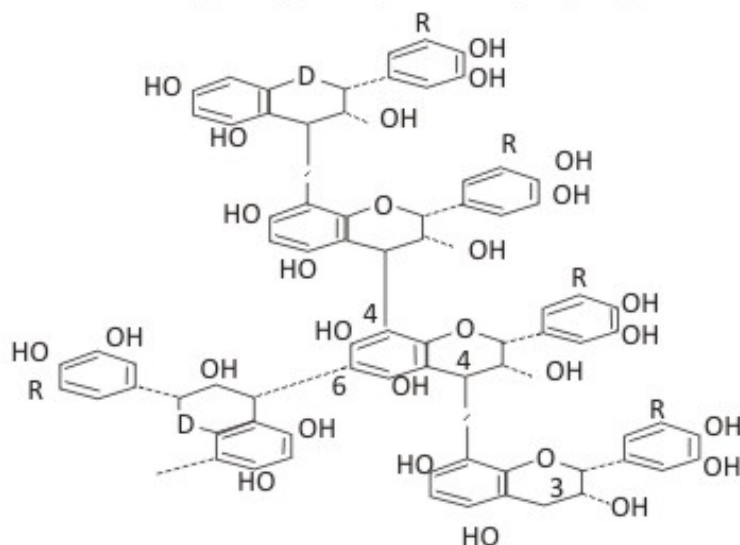


$R_1=OH, R_2=R_3=H$; Epicatechin

$R_1=R_2=H$; Epiafzelechin

$R_1=R_2=R_3=OH$; Epigallocatechin

(b)



Different Medicinal properties observed

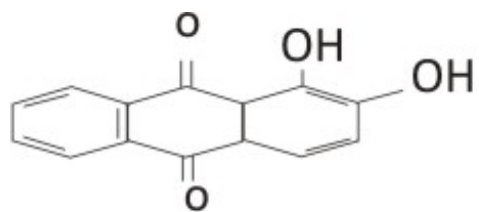
- Different Medicinal properties observed by folk medicine practitioners, Ayurvedic doctors and scientists:
- a) Catechu has antimicrobial activity.
- b) According to the principles of traditional Chinese medicine, catechu has bitter, astringent and neutral properties. Its main properties are to drain dampness, stop bleeding, clear the lungs, and transform phlegm.
- c) Catechu is used to treat sores, stop infections, and quench one's thirst. Some cultures use catechu as a type of mouthwash and to treat oral ulcers.
- d) Externally, catechu can treat conditions such as hemorrhoids and eczema.
- e) Catechins have significant antioxidant and antimicrobial effects. It is considered to be the best antioxidant. The antioxidant capacities are evaluated in terms of ascorbate equivalents by different methods. The extract restores antioxidant enzyme superoxide(SOD) from the radiation inducing damage.

More utility of catechu

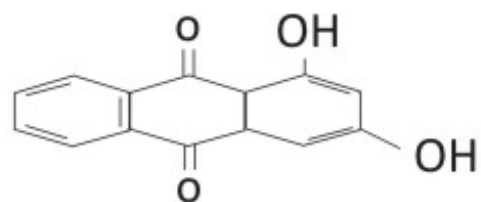
- f) Acacia has a considerable antimicrobial effect. A survey shows that they are being used as chewing sticks in various parts of the world, due to its antimicrobial effect and hence considered as valuable ingredient for dental care preparations.
- g) Due to presence of Toxifolin it has antiviral, anti-inflammatory, antioxidant activity.
- h) A medicinal extract of *Scutellaria baicalensis* and *Acacia catechu* acts as a dual inhibitor of cyclooxygenase and 5-lipoxygenase to reduce inflammation

Rubia cordifolia

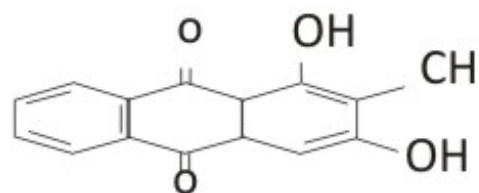
- **Rubia cordifolia:** Rubia dyed fabric impart many medicinal effects, it is known that dyed fabrics with natural colors impart some or all the activities mentioned below due to close proximity to the skin. Thus the plant seems to have many beneficial effects.
- **Chemical Composition.**—The color-producing principles of Rubia are chiefly **alizarin** ($C_{14}H_8O_4$) and **purpurin** ($C_{15}H_8O_5$), which exist in the root partly free, but mostly combined with sugar, in the form of more or less easily decomposable glucosids. The alizarin-glucosid is the **ruberythric acid** or **rubianic acid**, and is itself probably a decomposition product of **rubian**. In the formation of purpurin from the glucosid, an intermediary product is **pseudo-purpurin (purpurin-carbonic acid)**, which also exists in free condition. Upon exposure to the air, it loses carbonic acid, and becomes purpurin. Additional constituents of rubia are sugar (10 to 15 per cent), pectin, albuminous bodies, yellow **xanthine**, and **rubichloric acid**, which is a glucosid yielding an undesirable brownish-green coloring matter. As to other coloring principles of madder, *e. g.*, **munjistin** ($C_{15}H_8O_6$) and **purpuro-xanthine** ($C_{14}H_8O_4$).



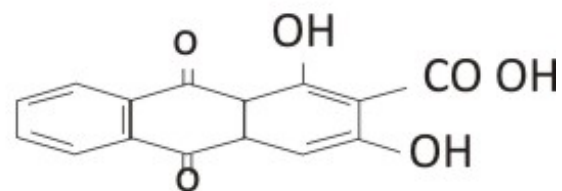
A



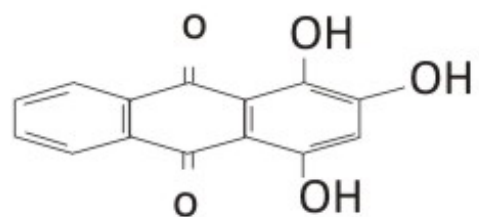
B



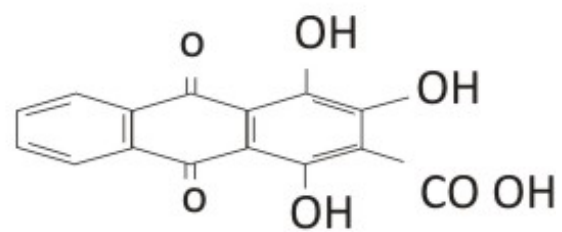
C



D



E



F

A-F are Different components in Rubia extract

Different Medicinal properties observed

- Different Medicinal properties observed by folk medicine practitioners, Ayurvedic doctors and scientists:
- Rubia has antimicrobial activity.
- It has medicinal qualities as it was used anciently to remedy health problems and can still be used today.
- Madder is mainly used for urinary tract problems. Those who use it will quickly realize how powerful it can be in turning urine red.
- The roots are alterative, anodyne, antiphlogistic, antitussive, astringent, diuretic, emmenagogue, expectorant, styptic, tonic and vulnerary.
- They have an antibacterial action, inhibiting the growth of *Staphylococcus aureus*, *S. epidermidis*, *Pneumococci* etc.

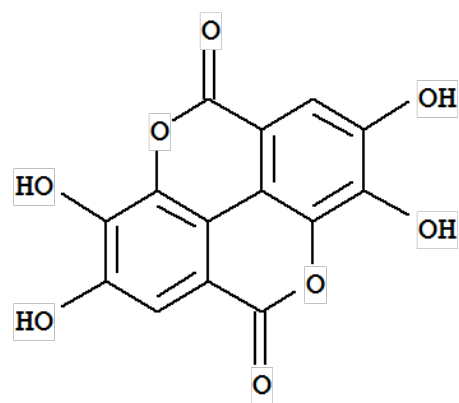
Utility of Rubia dye

- They are used to lower the blood pressure.
- The roots are used internally in the treatment of abnormal uterine bleeding, internal and external haemorrhage, bronchitis, rheumatism, stones in the kidney, bladder and gall, dysentery etc.
- The stems are used in Tibetan medicine, where they are considered to have a bitter taste and a cooling potency.
- Febrifuge, they are used in the treatment of blood disorders and spreading fever of kidneys and intestines.

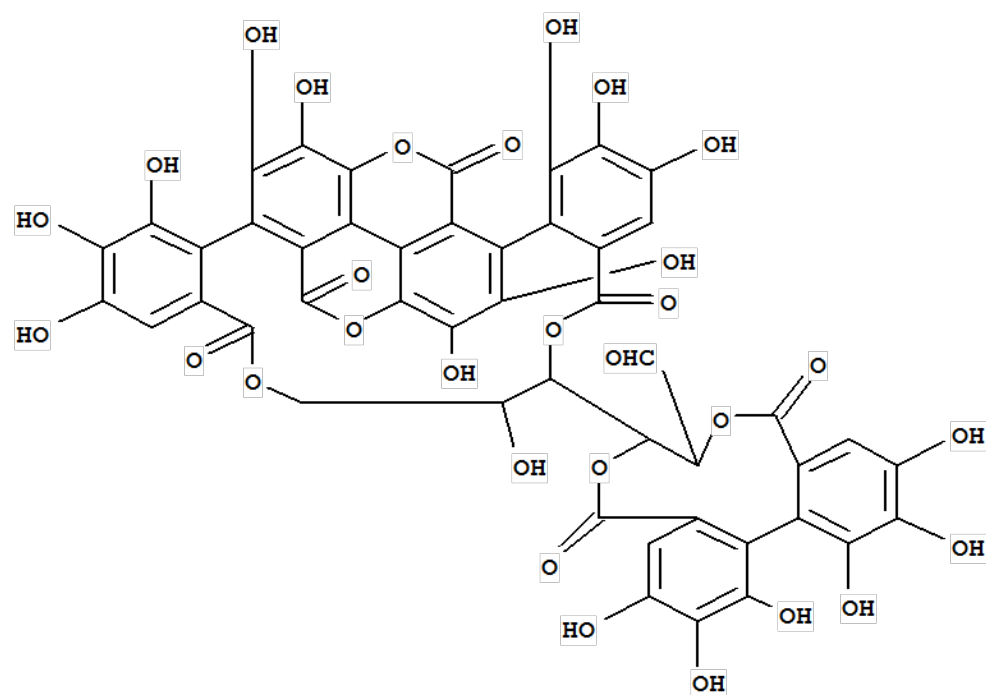
Punica granatum

- ***Punica granatum***: Punica dyed fabric impart many medicinal effects, it is known that dyed fabrics with natural colors impart some or all the activities mentioned below due to close proximity to the skin. Thus the plant seems to have many beneficial effects.

Chemical composition-The main substance responsible for most of its medicinal activity is **ellagitannin called punicalagin**



Ellagic acid



Punicalagin

Some documented medicinal properties of punica

- Some documented medicinal properties based on the chemical composition of Punica's epicarp are:
- In Brazil in punica is used as a popular medicine, the pharmacological activities attributed to the epicarp of pomegranate fruits *Punica granatum* Linn. (Punicaceae). This is a shrub or small tree native to Asia where its several parts have been used as an astringent, haemostatic, as a remedy for diabetes, as an anthelmintic specifically against tapeworms and for diarrhoea and dysentery.

Utility of Punica

- In Brazil the fruits are known as "romã" and are used for the treatment of throat infections, coughs and fever. There are several commercial phyto preparations in Brazil containing extracts from pomegranate. Although many reports on the antimicrobial activity of pomegranate exist in the literature, none of them relates such activity with its chemical composition. For the validation of such products it is necessary to define chemical markers, substances that when present in the preparations attest their quality.

Different Medicinal properties observed

- **Different Medicinal properties observed by folk medicine practitioners, Ayurvedic doctors and scientists:**
 - Punica has antimicrobial activity.
 - The pomegranate has a long history of herbal use dating back more than 3,000 years. All parts of the plant contain unusual alkaloids, known as 'pelletierines', which paralyse tapeworms so that they are easily expelled from the body by using a laxative.
 - The plant is also rich in tannin, which makes it an effective astringent. It is used externally in the treatment of vaginal discharges, mouth sores and throat infections.

Utility of Punica

- The whole plant, but in particular the bark, is antibacterial, antiviral and astringent. This remedy should be used with caution, overdoses can be toxic.
- The flowers are used in the treatment of dysentery, stomach ache and cough.
- Along with the leaves and seeds, they have been used to remove worms.
- The seeds are demulcent and stomachic.
- The fruit is a mild astringent and refrigerant in some fevers and especially in biliousness.

Some more medicinal properties of punica

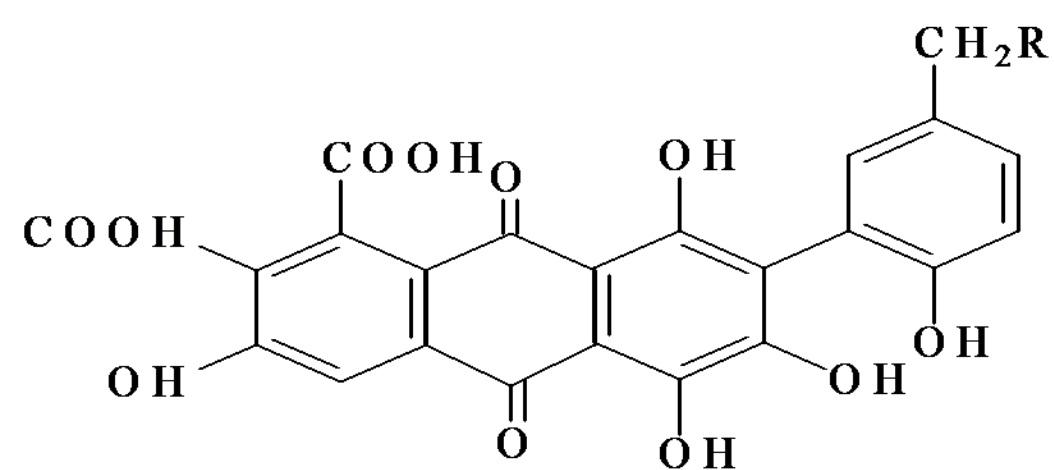
- It is also cardiac and stomachic.
- The dried rind of the fruit is used in the treatment of amoebic dysentery, diarrhoea etc.
- It is a specific remedy for tapeworm infestation.
- The dried pericarp is decocted with other herbs and used in the treatment of colic, dysentery, leucorrhoea etc.
- The fruit extract is also very useful for retardation of growth of prostate gland

Lac Dye

- **Lac:** When sticklac is crushed and washed with water, the water soluble lac dye mainly consisting of various derivatives of laccaic acid appear in the waste water after the processing. Concentrating the dye from the effluent yields about 1% of the lac dye. Laccaic acid⁸ has a basic structure of anthraquinoid. It is a mixture of minimum 5 closely related compounds of anthraquinone origin.

Chemical composition of Lac dye

- **Chemical composition**-The main substance responsible for most of its medicinal activity is shown below:
- The general formula of Laccaic acid is $C_{26}H_{19-26}N_{0-1}O_{12}$. The structure elucidated for Laccaic acid - A, C and E show the presence of one nitrogen atom. Laccaic acid - C is an amino acid derivative, while Laccaic acid -D is a carboxylic acid derivative. Laccaic acid - B is a alcoholic derivative. The 3-hydroxy group on the anthraquinoid skeleton is responsible for chelation with the metal ion of the mordant. Actually Laccaic acid which is responsible for dyeing is a hydroxy anthraquinone carboxylic acid. The elemental analysis shows carbon 51.4%, hydrogen 4.5%, Nitrogen 1.97% and ash less than 0.15.

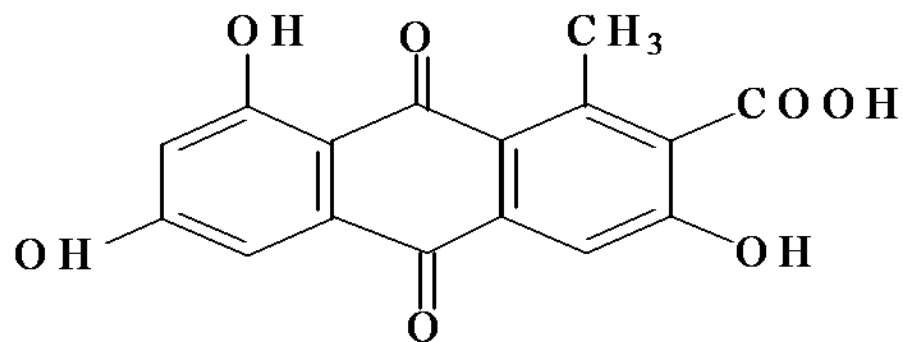


Laccaic acid- A ($R=CH_2NHCOCH_3$)

B ($R=CH_2OH$)

C ($R=CHNH_2$)

E ($R=CH_2NH_2$)



Laccaic Acid-D

Utility of Lac dye

- Lac dye is acidic in nature and is generally present as its sodium/ potassium salts, which are completely soluble in cold water, on the other hand pure dye is soluble in boiling water.
- a) Panini (550 B.C) mentioned the medicinal properties of lac in his book, the *Ashtadhyayi*.
- b) Lac dye has Antimicrobial properties of natural dyes against Gram-negative bacteria.
- c) Lac dye was non-mutagenic in Ames tests using five strains of *Salmonella typhimurium* with or without metabolic activation. No cytotoxicity or mutagenicity was observed in Chinese hamster lung (V79) cells exposed to lac dye in vitro.

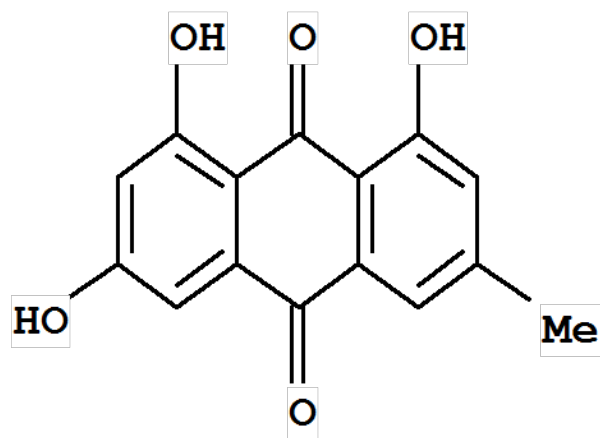
- d) A clastogenic effect was observed in the bone-marrow cells of mice that had been treated with lac dye injection or orally.
- e) Lac dye, a by-product of the shellac industry and has been considered for general use as a food coloring agent. Lac dye has major component laccaic acid it is found to have no mutagenic activity as assessed by two short-term assays: the Salmonella /microsome mutagenicity test, and the θ X fidelity assay.

Rheum

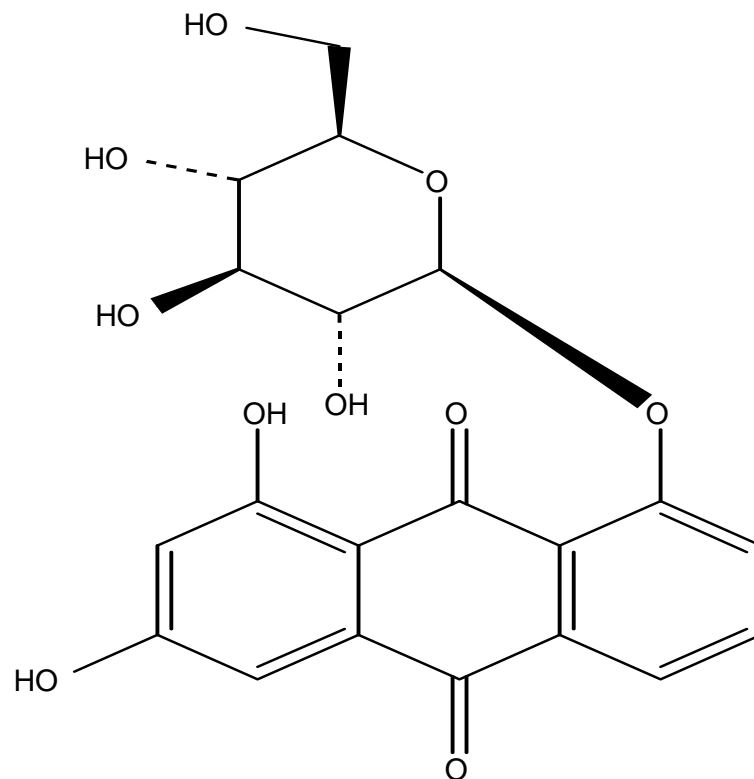
- **Rheum**: Rheum dyed fabric impart many medicinal effects, it is known that dyed fabrics with natural colors impart some or all the activities mentioned below due to close proximity to the skin. Thus the plant seems to have many beneficial effects.

Chemical composition-

- **Chemical composition-** The main phytochemicals present in the extract rhizomes and roots derived from *Rheum emodi* Wall.
- They are **chrysophanol, Physcion, Emodin β - Catechin, Emodin-8-O- β -D-glucopyranoside and chrysophanol-8-O- β -D-glucopyranoside**. The bioassay-guided chemical examination of the rhizomes of *R. emodi* resulted in the isolation of two new oxanthrone esters, **Revandchinone-1, Revandchinone-2**, a new **anthraquinone ether Revandchinone-3** and a new oxanthrone ether, **Revandchinone-4**.



Emodin



Chrysophanol-8-β-D-glucoside

Different Medicinal properties observed

- **Different Medicinal properties observed by folk medicine practitioners, Ayurvedic doctors and scientists:**
 - Rheum has a long and proven history of herbal usage, its main effect being a positive and balancing effect upon the whole digestive system. It is one of the most widely used herbs in Chinese medicine.
 - The root are astringent, tonic and purgative .the tuber is pungent, bitter, alexiteric, emmenagogue , diuretic ;reported to be useful in biliousness, chronic bronchitis asthma, sore eyes and bruises.
 - The roots are used to chronic constipation. The tuber is used in biliousness, sore eyes and fever. It is also used as blood purifier.

Utility of Rheum dye

- The root is anticholesterolemic, antiseptic, antispasmodic, antitumor, aperient, astringent, cholagogue, demulcent, diuretic, laxative, purgative, stomachic and tonic.
- Small doses act as an astringent tonic to the digestive system, whilst larger doses act as a mild laxative.
- The root is taken internally in the treatment of chronic constipation, diarrhoea, liver and gall bladder complaints, haemorrhoids, menstrual problems and skin eruptions due to an accumulation of toxins.
- Externally, the root is used in the treatment of burns.
- A homeopathic remedy is prepared from the dried root. This is used especially in the treatment of diarrhoea in teething children.