# LAXATIVES

Laxatives are used for curing acute and chronic constipation, treating haemmoroids, although constipation affects the pregnant women and eldery individual. Laxatives are well known, highly advertised and commonly used OTC drugs. They exert therapeutic effect on the GIT. These drugs are classified as stimulant, saline and osmotic cathartics, bulk forming agents, stool softners and lubricants.

## Aloe

### Biological Source

Aloe is the dried juice collected by incision, from the bases of the leaves of various species of Aloe. ***Aloe perryi*** , ***Aloe vera*** Linn or ***Aloe barbadensis*** and ***Aloe ferox*** , belonging to family **Liliaceae**.

### Geographical Source

Aloes are indigenous to East and South Africa, but have been introduced into the West Indies and into tropical countries, and will even flourish in the countries bordering on the Mediterranean.

### Cultivation and Collection

It is an evergreen perennial growing to 0.8 m by 1 m at a slow rate. The plant prefers light (sandy) and medium (loamy) soils, requires well-drained soil and can grow in nutritionally poor soil. The plant prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It requires dry or moist soil and can tolerate drought. They are xerophytic plant. It can be propagated by seeds. Seeds are sown in the spring in a warm green house. The seed usually germinates in 1–6 months at 16°C. The seedlings are transferred to the pots containing well-drained soil. They are allowed to grow in sunny part for at least their first two winters. The offsets will be available, usually in spring.

## Characteristics

### *Curacao aloe*

It is usually opaque and varies in colour from bright yellow-ish or rich reddish brown to black. Sometimes it is vitreous and small fragments are then of a deep garnet-red colour and transparent. It is then known as ‘Capey Barbados’ and is less valuable, but may become opaque and more valuable by keeping. Curacoa Aloes possesses the nauseous and bitter taste that is characteristic of all Aloes and a disagreeable, penetrating odour

### *Socotrine aloes*

It may be distinguished principally from Curacoa Aloes by its different odour. Much of the dry drug is characterized by the presence of small cavities in the fractured surface; it is yellow-brown to dark-brown in colour and opaque. Fracture is irregular and porous and taste is bitter.

### *Zanziber aloes*

Zanzibar Aloes often very closely resembles Curacoa in appearance and is usually imported in liver-brown masses which break with a dull, waxy fracture, differing from that of Socotrine Aloes in being nearly smooth and even. It has a pleasant odour and bitter taste.

### *Cape aloes*

It forms dark coloured masses which break with a clean glassy fracture and exhibit in their splinters a yellowish, reddish-brown or greenish tinge. Its translucent and glossy appearance are very characteristic and red-currant like odour sufficiently distinguish it from all other varieties of Aloes.

## Chemical Constituents

The most important constituents of Aloes are the three isomers of Aloins, Barbaloin, β-barboloin and Isobarbaloin, which constitute the so-called ‘crystalline’ Aloin, present in the drug at from 10 to 30%. Other constituents are amor-phous Aloin, resin, emodin and Aloe-emodin. Barbaloin is present in all the varieties; it is slightly yellow coloured, bitter, water

soluble, crystalline glycoside. Isobarbaloin is a crystalline substance, present in Curacao aloe and in trace amount in Cape aloe and absent in Socotrine and Zanzibar aloe. The chief constituents of Socotrine and Zanzibar aloe are Barbaloin and β-Barbaloin.

## Chemical Tests

Boil 1 gm of drug with 100 ml water, allow it to cool; add 1 gm kieselguhr, stir it well and filter through filter paper.

1. *Borax Test:* Take 10 ml of aloe solution and to it add 0.5 gm of borax and heat; a green coloured fluorescence is produced indicating the presence of aloe-emodin anthranol.
2. *Modified Anthraquinone Test:* To 0.1 gm of drug, 5 ml of 5% solution of ferric chloride is added followed by the addition of 5 ml dilute hydrochloric acid. The mixture is heated on water bath for 5–6 min and cooled. An organic solvent (benzene or chloroform) is added and shaken. Separate the organic solvent layer and add an equal volume of dilute ammonia. The ammoniacal layer produces pinkish red colour.

3. *Bromine Test:* To 5 ml of aloe solution, add equal volume of bromine solution; bulky yellow precipitate is formed due to the presence of tetrabromaloin.

## Uses

The drug Aloes is one of the safest and stimulating purga-tives, in higher doses may act as abortifacient. Its action is exerted mainly on the large intestine; also it is useful as a vermifuge. The plant is emmenagogue, emollient, stimu-lant, stomachic, tonic and vulnerary. Extracts of the plant have antibacterial activity. The clear gel of the leaf makes an excellent treatment for wounds, burns and other skin disorders, placing a protective coat over the affected area, speeding up the rate of healing and reducing the risk of infection. To obtain this gel, the leaves can be cut in half along their length and the inner pulp rubbed over the affected area of skin. This has an immediate soothing effect on all sorts of burns and other skin problems.

# Rhubarb

## Synonym

Rheum; Radix rhei; Rhubarb rhizome.

## Biological Source

**Rhubarb** is the rhizome and roots of ***Rheum officinale*** , ***R. palmatum*** , ***Rheum emodi*** , ***R. webbianum*** belonging to the family ***Polygonaceae***.

## Geographical Source

It is obtained largely from cultivated as well as wild species of *Rhubarb* grown in regions extending from Tibet to South East China. It is also found in Germany and several European countries. In India it is grown extensively in Kashmir, Kullu, Sikkim, Uttar Pradesh, Panjab.

## Cultivation and Collection

The rhizomes are collected either in spring or in autumn from 6 to 10 year old plants., grown at an altitude of more tha 3, 000 meters. These are duly cleaned, decordicated and dried. The relatively larger rhizomes are cut into small pieces either longitudinally or transversely. The cut fragments are threaded and dried in the shade. They are also dried artifically in an atmosphere of hot wooden boxes and exported for commercial consumption.

## Characteristics

It is usually found to be compact, rigid, cylindrical conical or barrel shaped with 8-10 cm length and 3-4 cm thickness. They appear to be mostly longitudinally wrinkled, ridged or furrowed; whereas a few of them do exhibit transverse annulations or wrinkles. Interestingly, the flat pieces are prepared from large rhizomes that are normally cut longitudinally and, therefore, they appear to be largely as plano-convex with tapering at both ends. These two varieties of pieces possess a sharp characteristic odour and a bitter astringent taste.

## Chemical Constituents

**Rhubarb** essentially contains mainly the anthraquinone glycosides and the astringent components. The former range between 2 to 4.5% and are broadly classified into *four* categories as stated below:

(*a*) **Anthraquinones with —COOH moiety—***e.g.*, Rhein; Glucorhein;

(*b*) **Anthraquinones without —COOH moiety**—*e.g.*, Emodin; Aloe-Emodin; Chrysophanol; Physcion;

**Rhubarb** in addition to the above constituents, consists of **rheinolic acid, pectin, starch, fat** and **calcium oxalate**. The calcium oxalate content ranges between 3-40% in various species of rhubarb which reflects directly on the corresponding **ash values** (*i.e.*, total inorganic contents).

## Chemical Tests

1. The Rhubarb powder on being treated with ammonia gives rise to a pink colouration.
2. Rhubarb gives a blood-red colouration with 5% potassium hydroxide.
3. It gives a positive indication with modified Borntrager's test (see under Aloes).

## Uses

1. It is used mainly in the form of an ointment in the treatment and cure of chronic eczema, psoriasis and trichophytosis—as a potent *keratolytic agent.*
2. It is employed as a bitter stomachic in the treatment of diarrhoea.
3. It is also used as a purgative.

# Castor Oil

## Synonyms

Castor bean oil, castor oil seed, oleum ricini, ricinus oil, oil of palma christi, cold-drawn castor oil.

## Biological Source

Castor oil is the fixed oil obtained by cold expression of the seeds of ***Ricinus communis*** ., belonging to family **Euphorbiaceae.**

## Geographical Source

It is mainly found in India, Brazil, America, China, Thai-land; in India it is cultivated in Gujarat, Andhra Pradesh, and Karnataka.

## Preparation

Castor oil is obtained from castor seeds. The oil is obtained by two ways; either after the removal of the seed coat or with the seed coat. Seed coats are removed by crushing the seeds under the grooved rollers and then they are subjected to a current of air to blow the testas. The kernels are fed in oil expellers and at room temperature they are expressed with 1 to 2 tons pressure per square inch till about 30% oil is obtained. The oil is filtered, steamed 80–100°C to facilitate the coagulation and precipitation of poisonous principle ricin, proteins and enzyme lipase present in it. Oil is then filtered and this oil with 1% acidity is used for medical purpose.

The oil cake which remains contains of ricin, lipase and about 20% oil. The cake is grounded, steamed to 40° to 80°C, and a pressure of 3 tons pressure per sq. inch is applied. This yields the second quality of oil with 5% acidity and is used for industrial purpose.

## Characteristics

Medicinal or the first grade or Pale pressed castor oil is colourless or slightly yellow coloured. It is a viscid liquid which has slight odour with slightly acrid taste. Castor oil is soluble in absolute alcohol in all proportions; Specific gravity is 0.958 to 0.969, refractive index at 40°C is 1.4695 to 1.4730, acid value not more than 2, saponification value 177 to 187, and acetyl value is about 150.

## Chemical Constituents

Castor oil consists of glyceride of ricinoleic acid, isoricinoleic, stearic, and dihydroxy stearic acids. Ricinoleic acid is responsible for laxative property. Castor oil also contains vitamin F. 90% of the fatty acid content is ricinoleic acid. The ricinoleic acid is an 18-carbon acid having a double bond in the 9–10 position and a hydroxyl group on the 12th carbon. This combination of hydroxyl group and unsaturation occurs only in castor oil.

## Chemical Tests

About 5 ml of light petroleum (50° to 60°) when mixed with 10 ml of castor oil at 15.5° shows a clear solution, but if the amount of light petroleum is increased to 15 ml, the mixture becomes turbid. This test is not shown by other oils.

## Uses

Castor oil is mild purgative, fungistatic, used as an ointment base, as plasticizer, wetting agents, as a lubricating agent. Ricinoleic acid is used in contraceptive creams and jellies; it is also used as an emollient in the preparation of lipsticks, in tooth formulation, as an ingredient in hair oil. The dehydrated oil is used in the manufacture of linoleum and alkyl resin. The main use of castor oil is the industrial production of coatings, also employed to make pharmaceuticals and cosmetics in the textile and leather industries and for manufacturing plastics and fibres.

# Ispagula

## Synonyms

Ispaghula, Ispagol, Ishabgula, Spongel seeds.

## Botanical Source

Ispaghula consists of dried seeds of ***Plantago ovata*** belonging to family **Plantaginaece**.

## Geographical Source

Ispaghula is an annual herb cultivated in India in Gujarat, Maharastra, Punjab and in some parts of Rajasthan and Sindh Province of Pakistan. It is cultivated extensively around Sidhpur in north Gujarat.

## Cultivation and Collection

Isabgol seeds are sown in the month of November by broadcasting method. Well-drained loamy soil with a pH of 7.5–8.5, cool and dry climate is suitable for its growth. Ammonium sulphate is also added as a fertilizer. Good water supply to the plants is to be provided at 8–10 days interval, seven to eight times. Though ispaghula is not affected by pests or disease, the percentage yield is decreased to great extend due to heavy rainfall or storms. The fruits are collected in the month of March/April after the fruits are completely mature and ripe. The fruits are then dried and the seeds separated.

## Chemical Constituents

Ispaghula seeds contain about 10% mucilage which is present in the epidermis of testa. Mucilage consists of two complex polysaccharides, of which one is soluble in cold water and the other soluble in hot water. Chemically it is pentosan and aldobionic acid. Pentosan on hydrolysis yields xylose and arabinose and aldobionic acid yields galactouronic acid and rhamnose. Protein and fixed oil are present in endosperm and embryo.

## Chemical Tests

1. Ispaghula seeds when treated with ruthenium red give red colour due to the presence of mucilage.
2. Add water to few seeds on a slide, mucilage comes out and forms zone surrounding the seeds.
3. *Swelling factor:* Swelling factor is the parameter to determine the purity of seeds. Swelling can be determined quantitatively by swelling factor. 1 g of the drug is put in a measuring cylinder of 25 ml capacity and 20 ml water is added. It is shaken periodically for first 23 h and kept for one more hour. The volume occupied by the drug is called swelling factor. Swelling factor of ispaghula seeds is 10–13.

## Uses

Ispaghula seeds are used as an excellent demulcent and bulk laxative in chronic constipation. The laxative activity of ispaghula mucilage is purely mechanical. It is also useful in dysentery, chronic diarrhoea, in cases of duodenal ulcers and piles. It works effectively as a soothing agent. Ispaghula husk is also used for similar purpose.

# Senna

## Synonyms

Alexandrian senna, Tinnevelly senna, Folia senna.

## Biological Source

Senna leaf consists of the dried leaflets of ***Cassia acutifolia*** known as Alexandrian senna and of ***C. angustifolia*** which is commercially known as Tin-nevelly senna. It belong to family **Leguminosae**.

## Cultivation and Collection

Senna plant is a small shrub of 1–1.5 m height with paripinnate compound leaves. Tinnevelly senna is mostly cultivated in well-ploughed, levelled, rich clayed semiirrigated land sometimes after paddy crop in South India. Propagation is done by seeds which are rubbed with coarse sand and sown thinly by broadcasting or in rows 30 cm apart, first during February–March and second after rain in July. Seeds germinate on the third day. The crop becomes ready for harvesting after about 2 months but first plucking of leaflets is done after 3 months of sowing when the leaves appears mature, thick and bluish in colour. Second plucking is fol-lowed after a month and subsequent pluckings after 4–6 weeks. The plant can survive for two to three years, but it is grown as an annual.

## Characteristics

Senna leaflets are 3–5 cm long, 2 cm wide and about 0.5 mm thick. It shows acute apex, entire margin and asymmetric base. Outline is lanceolate to ovate lanceolate. Pubescent lamina is found on both the surfaces. Leaves show greyish green colour for Alexandrian senna and yellowish green for Tinnevelly senna. Leaves of Tinnevelly senna are somewhat larger, less broken and firmer in texture than that of Alexandrian senna. Odour of leaves is slight but characteristic and the taste is bitter, mucilagenous. Both the types of leaflets show impression or transverse markings due to the pressing of midrib. Distingushing characters of Alexandrian and Indian senna are given in below.

## Distinguishing characters of Alexandrian and Indian senna

| Character | Indian Senna | Alexandrian senna |
|---|---|---|
| Appearance | Generally entire and less broken in good condition | Broken and brittle in nature |
| Size | 2.5–5.0 cm long and 7–9 mm wide | 2.4 cm long and 6–12 mm wide. |
| Shape | Lanceolate | Ovate lanceolate |
| Apex | Less acute with a sharp spine | Acute with a sharp spine |
| Margin | Entire, flat | Entire curled |
| Base | Less asymmetrical | Conspicuously asymmetrical |
| Veins | Pinnate, distinct towards the under surface and anastomosing towards margin | Pinnate, distinct towards the under surface and anastomosing towards margin |
| Surface | Transverse and oblique impressions, less pubescent (hairy) | Without transverse and oblique impressions and more pubescent |
| Texture | Flexible and less brittle | Thin more brittle |
| Odour | Faint | Faint |
| Colour | Light green | Light greyish green |
| Test | Bitter mucilaginous | Bitter mucilaginous |
| Vein Islet Number | 19–22.5 | 25–29.5 |
| Stomatal index | 14–20 | 10–15 |
| Palisade ratio | 4–12 | 4.5–18 |

## Chemical Constituents

Senna contains sennosides A and B (2.5%) based on the aglycones sennidin A and B, sennosides C and D which are glycosides of heterodianthrones of aloe-emodin and rhein are present. Others include palmidin A, rhein anthrone and aloe-emodin glycosides. Senna also contains free chryso phanol, emodin and their glycosides and free aloe-emodin, rhein, their monoanthrones, dianthrones and their glycosides. Mucilage is present in the epidermis of the leaf and gives red colour with ruthenium red.

## Chemical Test

*Borntrager test for anthraquinones:* The leaves are boiled with dilute sulphuric acid and filtered. To the filtrate organic solvent like benzene, ether or chloroform is added and shaken. The organic layer is separated,and to it add ammonia solution. The ammoniacal layer produces pink to red colour indicating the presence of anthraquinone glycoside.

## Uses

Senna leaves are used as laxative. It causes irritation of large intestine and have some griping effect. Thus they are prescribed along with carminatives. Senna is stimulant cathartic and exerts its action by increasing the tone of the smooth muscles in large intestine.

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