

1.3 PHARMACOGNOSY Theory (75 hours)

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.
2. Various systems of classification of drugs of natural origin.
3. Adulteration and drug evaluation; significance of Pharmacopoeial standards.
4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.
 - (a) Laxatives: Aloes, Rhubarb. Castor oil, Ispaghula, Senna.
 - (b) Cardiotonics-Digitalis, Arjuna.
 - (c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.
 - (d) Astringents-Catechu.
 - (e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica. Datura.
 - (f) Antihypertensives - Rauwolfia.
 - (g) Antitussives - Vasaka, Tolu balsam, Tulsi.
 - (h) Antirheumatics - Guggul, Colchicum.
 - (i) Antitumour - Vinca.
 - (j) Antileprotics - Chaulmoogra Oil.
 - (k) Antidiabetics - Pterocarpus, Gymnema Sylvestro. (**GUDMAR**)
 - (l) Diuretics - Gokhru, Punarnava.
 - (m) Antidysentrics - Ipecacuanha.
 - (n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.
 - (o) Antimalarials - Cinchona.
 - (p) Oxytocics - Ergot.
 - (q) Vitamines - Shark liver Oil and Amla.
 - (r) Enzymes - Papaya, Diastase, Yeast.
 - (s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.
 - (t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.
 - (u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.
6. Collection and preparation of crude drug for the market as exemplified by Ergot, Opium, Rauwolfia, Digitalis, Senna.
7. Study of source, preparation and identification of fibres used in sutures and surgical dressings: Cotton, Silk, Wool and Regenerated fibre.
8. Gross anatomical studies of Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nuxvomica & Ipecacuanha.

CHAPTER 5.; Occurrence, Distribution, Organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following category of drugs.

BRIEF INTRODUCTION OF CHAPTER 5.

(**Occurrence**: Source- An instance of something occurring), (**Distribution**-Family) (**Organoleptic evaluation**- Morphology) (**Chemical Constituents** chemical components) including (**Tests** identification chemical tests) wherever applicable and (**Therapeutic efficacy of** - Therapeutical And Pharmaceutical Uses) of Following category of drugs.

A. LAXATIVES
1. Aloes,
2. Rhubarb.
3. Castor oil,
4. Ispaghula,
5. Senna.
B. CARDIOTONICS
6. Digitalis,
7. Arjuna.
C. CARMINATIVES & G.I. REGULATORS
UMBELLIFEROUS
8. Coriander,
9. Fennel,
10. Ajowan,
11. Cardamom
12. Ginger,
13. Black pepper,
14. Asafoetida.
15. Nutmeg.
16. Cinnamon,
17. Clove.
D. ASTRINGENTS
18. Catechu.
E. DRUGS ACTING ON NERVOUS SYSTEM
19. Hyoscyamus,
20. Belladonna.
21. Aconite,
22. Ashwagandh
23. Ephedra,
24. Opium,
25. Cannabis,
26. Nux vomica.
27. Datura
F. ANTIHYPERTENSIVE
28. Rauwolfia.
G. ANTITUSSIVES
29. Vasaka,
30. Tolu balsam,
31. Tulsi.
H. ANTIRHEUMATICS
32. Guggul,
33. Colchicum.
I. ANTITUMOUR
34. Vinca.
J. ANTILEPROTICS
35. Chaulmoogra Oil.
K. ANTIDIABETICS
36. Pterocarpus,
37. Gymnema Sylvestre.

L. DIURETICS
38. Gokhru,
39. Punarnava.
M. ANTIDYSENTRICS
40. Ipecacuanha.
N. ANTISEPTICS AND DISINFECTANTS
41. Benzoin,
42. Myrrh,
43. Neem,
44. Curcuma.
O. ANTIMALARIALS
45. Cinchona.
P. OXYTOCICS
46. Ergot.
Q. VITAMINES
47. Shark liver Oil and
48. Amla.
R. ENZYMES
49. Papaya,
50. Diastase,
51. Yeast.
S. PERFUMES AND FLAVOURING AGENTS
52. Peppermint Oil,
53. 52. Lemon Oil,
54. Orange Oil,
55. Lemon grass Oil,
56. Sandalwood.
T. PHARMACEUTICAL AIDS
57. Honey,
58. Arachis Oil,
59. Starch,
60. Kaolin,
61. Pectin,
62. Olive oil,
63. Lanolin,
64. Beeswax,
65. Acacia,
66. Tragacanth,
67. Sodium alginate,
68. Agar,
69. Guar gum,
70. Gelatin.
U. MISCELLANEOUS
71. Liquorice,
72. Garlic,
73. Picrorhiza,
74. Dioscorea,
75. Linseed,
76. Shatavari,
77. Shankhapushpi,
78. Pyrethrum,
79. Tobacco.

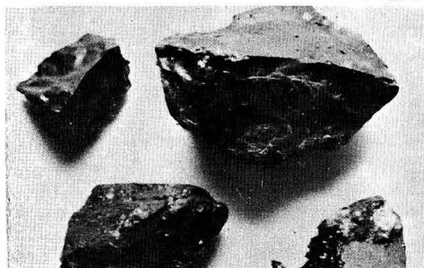
1. ALOES

SYNONYMS AND REGIONAL NAMES: San. Ghirtakumar ; Hin. Musabbar, Kumari, ; Kan. Lolorasa

BOTANICAL SOURCE: Aloes is dried juice of leaves of *Aloe barbadensis* and *Aloe ferox*

FAMILY: Liliaceae.

MORPHOLOGY: FORM: irregular mass; **COLOUR:** Dark chocolate brown to black; **SURFACE:** Dull, opaque appearance; **FRACTURE:** Brittle; **ODOUR:** Characteristic; **TASTE:** Bitter and unpleasant. All the 4 commercial forms are compared here below for their morphological characters.



MORPHOLOGY:

	Curacao	Cape	Socotrine	Zanzibar
1. COLOUR	Yellowish brown to chocolate brown	Dark brown to greenish brown	Yellowish brown to dark brown	Light blue
2. FORM	Hepatic or livery	Glassy	Same as Curacao.....	
3. TEXTURE	Opaque	Glassy	Same as Curacao..	
4. FRACTURE	Waxy	Brittle	Porous	Waxy
5. ODOUR	Iodoform odour	Rhubarb odour	Characteristic	
6. TASTE	All bitter and unpleasant.....			

CHEMICAL CONSTITUENTS:

- GLYCOSIDES** – Anthracene glycosides (11-40%)
- Barbaloin or Aloin, a C Glycoside (not easily hydrolysable with dil. acids and the linkage between the sugar and the aglycone is through C-C)
 - Isobarbaloin (+++ Curacao, + and - in the other two)
 - Aloinosides A and B (only in Cape aloes, O- Glycosides)
 - Glycosides of barbaloin.

These are stereoisomers and are Barbaloin-11-O-A-L Rhamnosides or simply O-Rhamnosides of barbaloin

RESINS (resinotannol + Cinnamic acid or Coumaric acid).

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Laxative.
 2. As a bitter substance.
 3. Used externally for *Ulcus cruris* (a type of ulcer), eczema and burns.
 4. Aloes have found uses in cosmetics: as a moisture base cleanser, skin toner, night cream, hand and body lotion, hair conditioner, all purpose cream, shampoo, eye lotion as a post operative treatment and also in dental surgery.
- Note:** Contraindicated in case of pregnancy and during menstruation.

CHEMICAL TESTS

Preparation of test solution: 1g of aloes is boiled in 100 ml of water. On cooling, 1g of Kieselguhr is added, stirred and filtered. Filtrate is used for tests –

1. **Borax test for Anthranol:** (Schonteten's Reaction) 0.5g of borax is heated with 10 ml of test soln. Green coloured fluorescence is seen which is due to aloe-emodin anthranol.
2. **Bromine test:** Heavy yellow ppt. of tetrabromaloin is formed when equal volumes of bromine soln. and test soln. are mixed.
3. **Nitrous acid test for Isobarbaloin:** To 5 ml of test soln. equal volume of sodium nitrite soln. and a few drops of dil. acetic acid are added whereby pink or purplish colour is produced (negative in Zanzibar and Socotrine aloes because of the absence of isobarbaloin).
4. **Nitric acid test:** Based on the presence of Isobarbaloin. Add 2 ml of HNO₃ to a 5 ml soln. of Aloes and observe the colour. A brown colour changing immediately to green – Cape aloes, a deep brownish red – Curacao aloes, a pale brownish yellow – Socotrine aloes and finally a yellowish brown colour – Zanzibar aloes.
5. **Klunge's Isobarbaloin test (Cupraloin test):** Dilute the test soln. by adding equal volume of water in the proportion of 1:1 and to this add a drop of saturated copper sulphate solution + 1g NaCl + 10 ml 90% alcohol. Observe the colour. Wine red colour persists for a long time – Curacao aloes; feeble wine red colour changing soon to yellow – Cape aloes. No colour is obtained in the other two varieties as they do not contain isobarbaloin.
6. **Modified Borntrager's test or modified anthraquinone test:** To 0.1g of the drug Aloes, 5 ml of 5% soln. of ferric chloride and 5 ml dil. HCl are added and boiled on a water bath for 5 minutes. After cooling, the mixture is extracted with an organic solvent like benzene in a separating funnel. The benzene layer is now shaken with an equal volume of dil. ammonia whereby a pinkish red colour is formed in ammoniacal layer.

(a) Laxatives: Aloes, Rhubarb. Castor oil, Ispaghula, Senna.

2. RHUBARB

SYNONYMS AND REGIONAL NAMES: Radix rhei, Rheum, Revandchini
San. Banglachini, Gandhini Pita; Hin. Revandchine; Kan. Revakinni;

BOTANICAL SOURCE: Rhubarb consists rhizome of *Rheum emodi* and *Rheum webbianum*

FAMILY: Polygonaceae

MORPHOLOGY:

Rhubarb is collected from 6 yrs old plants just before flowering season and marketed with cortex intact or partially decorticated.

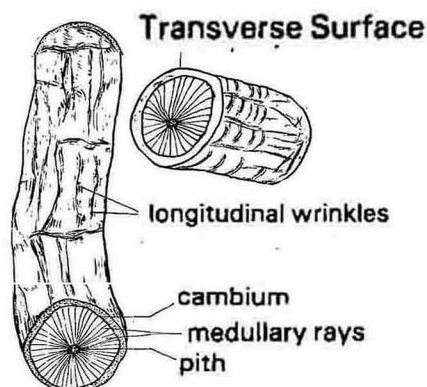
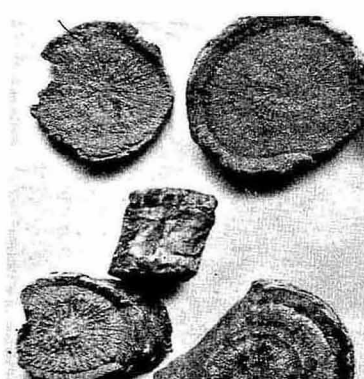
SHAPE: Compact solid, cylindrical, barrel shaped conical or plano-convex pieces; **SIZE:** Variable, 2 – 20 cm(l), 1.5 – 8 cm(d);

COLOUR: Orange brown; **ODOUR:** Characteristic;

SURFACE: Irregularly longitudinally wrinkled, brownish cortex;

FRACTURE: Granular and uneven;

FRACTURED SURFACE: Starch present; transverse surface shows prominent cambium line. **TASTE:** Bitter and slightly astringent



RHUBARB RHIZOMES

CHEMICAL CONSTITUENT:

GLYCOSIDES – Anthracene derivatives – (2 – 3%),

8 – O – mono and diglycosides of chrysophanol, aloe-emodin, rhein, emodin and physcion; Heterodianthrones like palmidin A, B, C and rheidin A, B, C etc.

TANNINS – Glucogallin – Tetrarin, Catechin and Epicatechin.

RESINS, FATTY OIL etc.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Laxative 2. In small doses as antidiarrhoeic.

CHEMICAL TEST:

Constituents answer Borntrager's test. For details see Senna.

(a) Laxatives: Aloes, Rhubarb. Castor oil, Ispaghula, Senna.

3. CASTOR OIL

SYNONYMS AND REGIONAL NAMES: San. Erendi, Hin. Erand, Kan. Haralenne,

BOTANICAL SOURCE:

Castor Oil is fixed oil obtained by cold expression from seeds of
Ricinus communis

FAMILY: Euphorbiaceae

MORPHOLOGY:

COLOUR: Colourless or pale yellow; **NATURE:** Viscid liquid;

ODOUR: Faint, **TASTE:** Acrid and nauseating;

SOLUBILITY: Soluble in alcohol in all proportions.

CHEMICAL CONSTITUENTS: LIPIDS – Fixed Oils (45 to 55%)

- a mixture of triglycerides
- Triricinolein (75%) which on hydrolysis yields Ricinoleic acid responsible for cathartic effect.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. **Cathartic ; (Increases the movement of the bowels , Strongly laxative)**
2. **In soap industry.**
3. **As a lubricant.**

CHEMICAL TEST:

1. **When mixed with equal volume of dehydrated alcohol, the soln. remains clear.**
2. **When treated with half of its volume petroleum ether (50–60°) it mixes completely but with twice its volume it becomes turbid and partly soluble.**
(turbid : clouded as with sediment)

(a) **Laxatives:** Aloes, Rhuburb. Castor oil, Ispaghula, Senna.

4. ISAPGOL

SYNONYMS AND REGIONAL NAMES: Ispaghula, Isapgul, Indian Psyllium, flea seed. Spogel Seeds.
San. Shigdhajiraka, Hin. Isabghol, Kan. Isabagolu

BOTANICAL SOURCE: Isapgol consists of dried ripe seeds and husk of *Plantago ovata*

FAMILY: Plantaginaceae

MORPHOLOGY:

SIZE: 1 to 3.5mm Long, 1 to 1.75 mm wide,

SHAPE: Ovate and boat shape with a Dorsal or convex surface on top and Ventral or concave surface at the bottom.

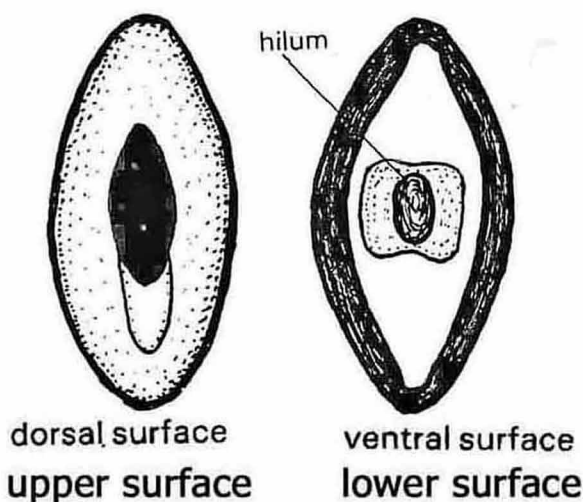
DORSAL SURFACE: Opaque grey with small reddish brown spot at centre; Ventral surface: Deep furrow is seen, Hilum is at centre;

COLOUR: Pinkish-grey to brown. **ODOUR:** None

TASTE: mucilaginous.



ISPAGHULA SEEDS



CHEMICAL CONSTITUENTS: CARBOHYDRATES-Aucubin
Mucilage (Pentosan + Aldobionic acid)

Pentosan (Hydrolysis) $\rightarrow$ Xylose + Arabinose

Aldobionic acid (Hydrolysis) $\rightarrow$ Galacturonic acid + Rhamnose

THERAPEUTICAL AND PHARMACEUTICAL USES:

Bulk Laxative, Purgative, Demulcent, Diarrhoea and Dysentery.

Constipation: Difficulty in evacuation of the bowels.

Demulcent: Softening effect on to the skin.

Dysentery: Severe Diarrhoea.

(a) Laxatives: Aloes, Rhuburb. Castor oil, Ispaghula, Senna.

5. SENNA

SYNONYMS AND REGIONAL NAMES: Sonamukhi, Senai ki patti, Indian Senna, Tinnevelly Senna.
San. Swarnamukhi, Hin. Sonamukhi, Kan. Nelavarike.

BOTANICAL SOURCE:

Senna consists of dried leaflets and pods of *Cassia angustifolia* (Tinnevelly Senna) and *Cassia acutifolia* (Alexandrian Senna)

FAMILY: Leguminosae

MORPHOLOGY OF LEAFLET:

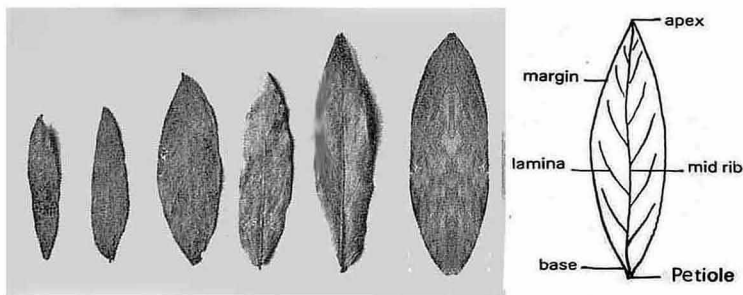
TYPE: Paripinnate leaf,

SHAPE: Lanceolate, **SIZE:** 2.5 to 6cm Long and 7-8mm Wide,

MARGIN: Entire, **APEX:** Mucronate, **BASE:** Asymmetrical,

UPPER SURFACE: Pale green Trichomes on both surface

LOWER SURFACE: Transverse lines, **ODOUR:** None, **TASTE:** Bitter.

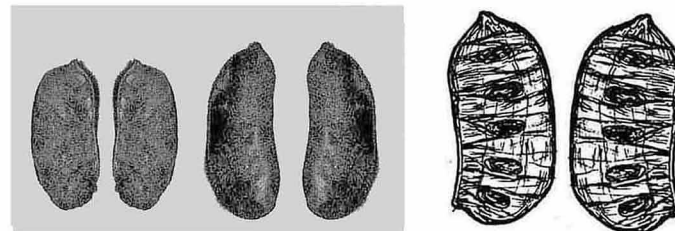


MORPHOLOGY OF PODS:

CONDITION: Dry, **TYPE:** Legume,

SHAPE: Broadly oblong, flat, thin, **COLOUR:** Brownish green;

SIZE: 5cm long and 2 cm wide. **ODOUR:** Slight, **TASTE:** Bitter.



CHEMICAL CONSTITUENTS:

GLYCOSIDES: – Anthracene glycosides } Leaves 3% (Pods 1.5 to 2.5%)
– Dianthrone glycosides }
– Sennoside A (0.3 to 0.45%) } Homodianthrone glycosides
– Sennoside B (0.3 to 0.5%) }
– Sennoside C and } Heterodianthrone glycosides
Sennoside D }
– Rhein, Aloe emodin – aglycones

FLAVONOID – Kaempferol glycoside

CHEMICAL TEST:

ANTHRAQUINONE TEST OR BORNTRAGER'S TEST:

Boil about 100 mg of powdered drug in 5 ml 10% H_2SO_4 for one or two minutes.

As a result O-glycosides present undergo hydrolysis. Filter immediately. The cooled filtrate is now extracted in a separating funnel with organic solvent like ether, chloroform or benzene. The organic solvent layer is separated by a pipette and to this 5 ml of 10% ammonia is added. Shake gently and then allow to separate. The formation of a rose-pink coloration in the upper ammoniacal layer indicates the presence of anthraquinones.

THERAPEUTICAL AND PHARMACEUTICAL USES

Laxative, used specially in case of habitual constipation.

(a) Laxatives: Aloes, Rhubarb. Castor oil, Ispaghula, Senna.

6. DIGITALIS

SYNONYMS AND REGIONAL NAMES: Fox glove, Digitalis leaf

BOTANICAL SOURCE: Digitalis is the leaf of *Digitalis purpurea* dried at a temperature below 60° immediately after collection.

FAMILY: Scrophulariaceae

MORPHOLOGY:

LEAVES TYPE: Simple; **SIZE:** 10 to 30 cm in length, 4 to 11 cm in width;

SHAPE: Ovate lanceolate to broadly ovate; **VENATION:** Pinnate,

PETIOLE: Winged; **Margin crenate to serrate, also dentate, at times;**

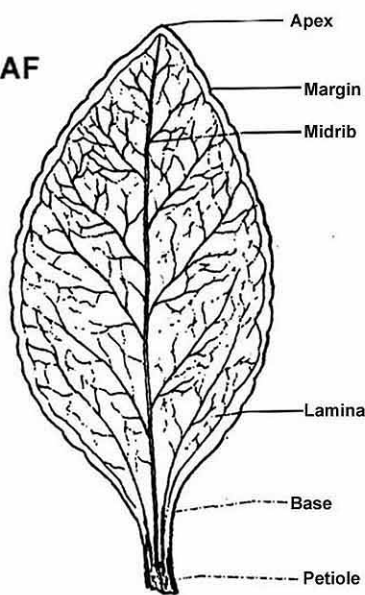
APEX: Obtuse or rounded; **BASE:** Tapers into a winged petiole; prominent on the lower surface; close network of veinlets;

UPPER SURFACE: Dark green and minutely hairy;

LOWER SURFACE: Pale green to greyish green and pubescent;

TASTE: Very bitter. **ODOUR:** Distinct;

DIGITALIS LEAF



CHEMICAL CONSTITUENTS: GLYCOSIDES – Cardiac glycosides – Cardenolides.

(Primary glycoside)	(Secondary glycoside)	(Aglycone)
1. Purpurea glycoside A----(EH) ---->	Digitoxin-----	(AH)----> Digitoxigenin
2. Purpurea glycoside B----(EH) ---->	Gitoxin-----	(AH)----> Gitoxigenin
3. Glucogitaloxin-----	(EH) ----> Gitaloxin-----	(AH)----> Gitaloxigenin

EH — Enzymic hydrolysis, AH — Acidic hydrolysis.

In the above glycosides the sugars are same. That is the primary glycoside on enzymic hydrolysis yields corresponding secondary glycoside and one molecule of dextrose as the sugar part. Further, when the secondary glycosides undergo acidic hydrolysis, the corresponding aglycones are obtained alongwith 3 molecules of a rare or special sugar called as Digitoxose.

Saponin glycosides – gintonin, digitonin etc.; Flavonoids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Cardiotonic (having a tonic effect on the heart)
2. Employed in most forms of cardiac failure.
3. Diuretic (stimulates the flow of urine) in cardiac edema.

CHEMICAL TESTS: Cardiac glycosides (Cardenolides).

Test based on special sugar-Digitoxose, a desoxy sugar. or even cymarose from *Strophanthus kombe* or the glycoside

1. **KELLER KILIANI TEST:** Digitoxose the glycoside is dissolved in glacial acetic acid with one or two drops of FeCl_3 in it and this is now added to a soln. of conc. H_2SO_4 also containing one or two drops of FeCl_3 . At the junction of the two layers formed on mixing, reddish brown colour is seen and the upper acetic acid layer turns bluish green.

The next two tests are based on the presence of 5-membered unsaturated lactone ring – Cardenolides (eg. *Digitalis purpurea*, *Digitalis lanata* and *S. kombe*).

2. **BALJET TEST:** Glycoside/Aglycone + Sodium picrate—yellow to orange colour.
3. **LEGAL TEST:** Glycoside/Aglycone in pyridine is made alkaline by adding sodium nitroprusside soln. — pink to red colour.

(b) Cardiotonics-Digitalis, Arjuna.

7. ARJUNA

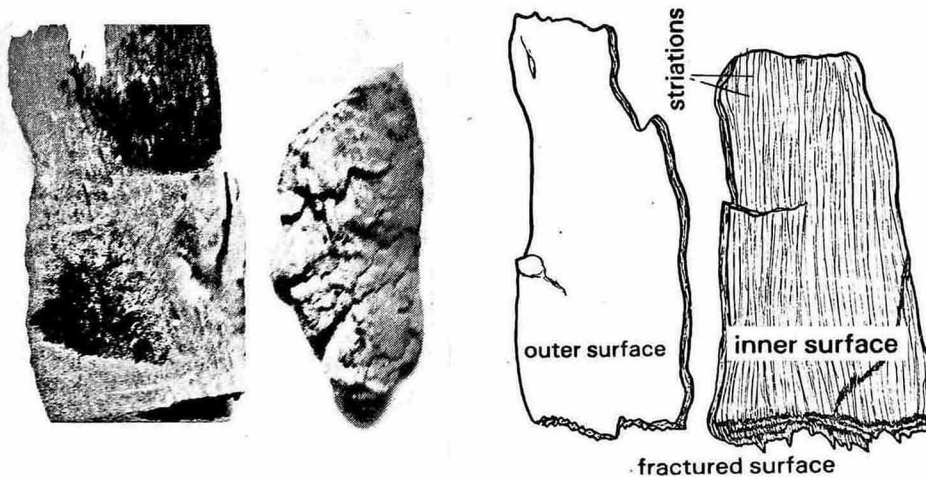
SYNONYMS AND REGIONAL NAMES: Arjun tree,
San: Arjuna, Hin. Anjan Arjan, Kan.Holematti

BOTANICAL SOURCE: Arjuna consists of dried bark of *Terminalia arjuna*

FAMILY:- Combretaceae

MORPHOLOGY:

SHAPE: Flat or slightly curved, **SIZE:** 1cm thick, 1.5cm long, and 10cm wide. **COLOUR:** Grey colour outside and reddish striated inside. **SURFACE :** Smooth; **FRACTURE:** Fibrous; **ODOUR:** None **TASTE:** Astringent.



ARJUNA BARK

CHEMICAL CONSTITUENTS: GLYCOSIDES:

1. TANNINS (12%) – mainly pyrocatechol tannins.
2. Large quantities of CALCIUM SALTS and small traces of ALUMINIUM and MAGNESIUM SALTS.
3. ARJUNGLUCOSIDES, phytosterols, organic acids and organic esters, sugars, colouring matter etc.
4. Responsible for the diuretic property of Arjuna is a saponin like substance.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Mild diuretic (increases the flow of urine).
2. Astringent (arrests discharges or secretions).
3. Cooling, tonic and febrifuge (a drug which reduces fever).
4. Reported to give beneficial effects in ischaemic heart disease.

(b) Cardiotonics-Digitalis, Arjuna.

8. CORIANDER

SYNONYMS AND REGIONAL NAMES: Coriander fruits;
San. Dhanyakam; Hin. Dhaniya; Kan. Kottambari beeja;

BOTANICAL SOURCE:

Coriander consist dried ripe fruits of *Coriandrum sativum*

FAMILY: Umbelliferae

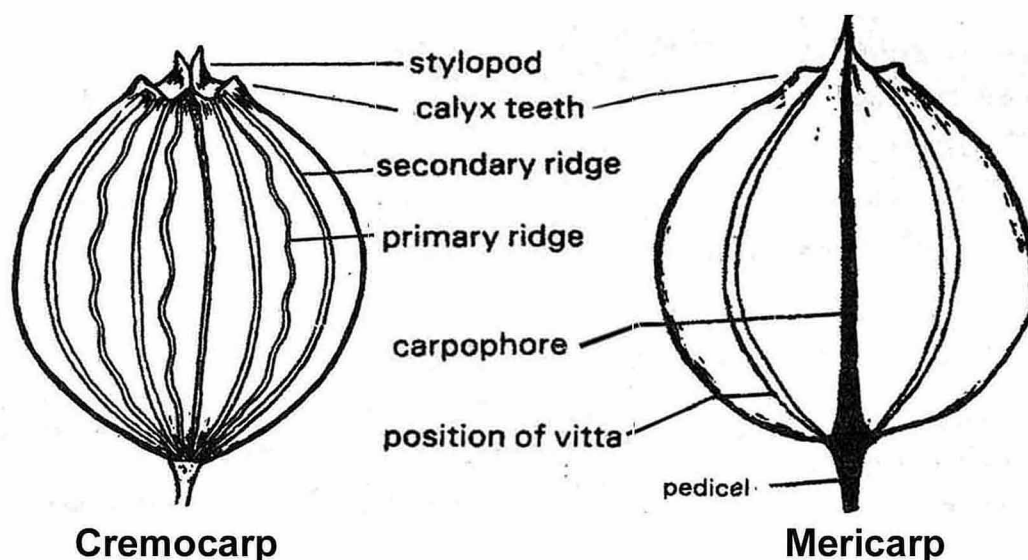
MORPHOLOGY:

TYPE: Cremocarp; **SHAPE:** Oval shape.

Cremocarp is made of two mericarps. a mericarp has 2 surfaces, and 5 primary and 4 secondary ridges. Primary ridges are straight

COLOUR: Yellowish brown. **SIZE :** 2 to 4mm Diameter

ODOUR : Aromatic, **TASTE:** Spicy and charasteristic.



CHEMICAL CONSTITUENTS: VOLATILE OIL (0.2-1%)

Linalool (coriandrol),

Terpenes (20%), Borneol, Citronellol.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Carminative (relieves excessive collection of gas in the stomach),
Aromatic, Stimulant and Flavouring agent.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel,
Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

9. FENNEL

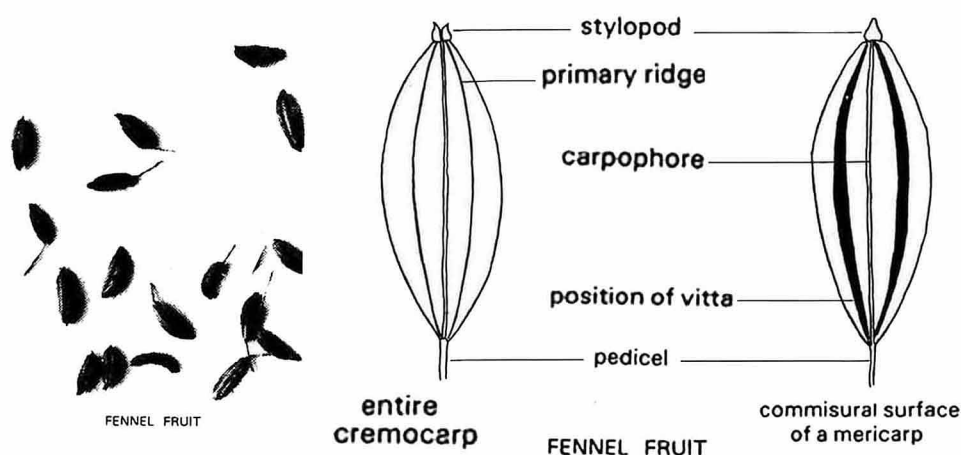
SYNONYMS AND REGIONAL NAMES: Fennel fruit
San. Madhurika, Hin. Badi Saunph, Kan. Bade Soppu.

BOTANICAL SOURCE:

Fennel consists of dried ripe fruits of *Foeniculum vulgare*.

FAMILY: Umbelliferae.

MORPHOLOGY: TYPE: Cremocarp is two seeded mericarps;
SHAPE: Straight oblong, tapering towards base and apex, pedicel is at base;
SIZE: 5 to 10mm long, 2 to 4mm wide,
SURFACE: Each Mericarp has two surfaces, Dorsal and Ventral. Dorsal surface has 5 primary ridges, Ventral surface is flat with carpophores,
COLOUR: Green to yellowish brown,
ODOUR: Sweet aromatic. **TASTE:** Strongly aromatic.



CHEMICAL CONSTITUENTS: VOLATILE OIL(4-6%)-

Anethole (50-60%), a Phenolic ether

d-Fenchone (20%), a Ketone

Methyl chavicol. terpineol

FATTY OIL (12-18% and **PROTEIN** (14-22%) are also present, though not active.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Spasmolytic,
2. Carminative, Aromatic, Stimulant,
3. Stomachic (Gastric stimulation)
4. Appetizer
5. Galactagogue (Increases the flow of milk)
6. Comforts the belly ache in infants.
7. Eye wash (Aqua Foeniculi).

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

10. AJOWAN

SYNONYMS AND REGIONAL NAMES:

Trychyspermum copticum, *Carum copticum*, Bishop's weed.

BOTANICAL SOURCE: Ajowan consists of dried ripe fruits of the plant *Trychyspermum ammi* Sprague

It contains not less than 1.0 per cent (w/w) of thymol on dried basis.

FAMILY: Umbelliferae

MORPHOLOGY: COLOUR: Yellowish-brown, **ODOUR:-** Agreeable

TASTE: Aromatic, warm like thymol Size - 1.7 - 3 mm long, 1.5 - 2.4 mm broad and 0.5 - 1.5 mm thick.

SHAPE: It occurs in the form of cremocarps or separated mericarps with bifid stylopod, and five light coloured ridges. Apical half to 2/3 parts of cremocarps have purplish tinge.



Ajowan ripe fruits

CHEMICAL CONSTITUENTS: VOLATILE OILS

Ajowan fruits contain volatile oil, fat 17%

carbohydrates. Traces of tannin, glycoside and steroidal substances

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Antispasmodic, Stimulant and Carminative
2. Sore throat and Bronchitis.
3. Used in preparation of Lotions, and Ointments
4. Ajowan Oil and dethymolised ajowan oil is used as Antiseptic, antifungal, insecticide and anthelmintic
is preferred as Deodorant in mouthwash, tooth paste and gargles and as flavouring agent for disinfectant soaps.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

11. CARDAMOM

SYNONYMS AND REGIONAL NAMES: Cardamom fruits, Cardamom seeds
San. Ela; Hin. Choti-ilaychi ; Kan. Yalakki;

BOTANICAL SOURCE:

Cardamom consists of ripe fruit of *Elettaria cardamomum*

FAMILY: Zingiberaceae

Shows 3 locules with axile placentation. There are 2 rows of seeds in each locule.

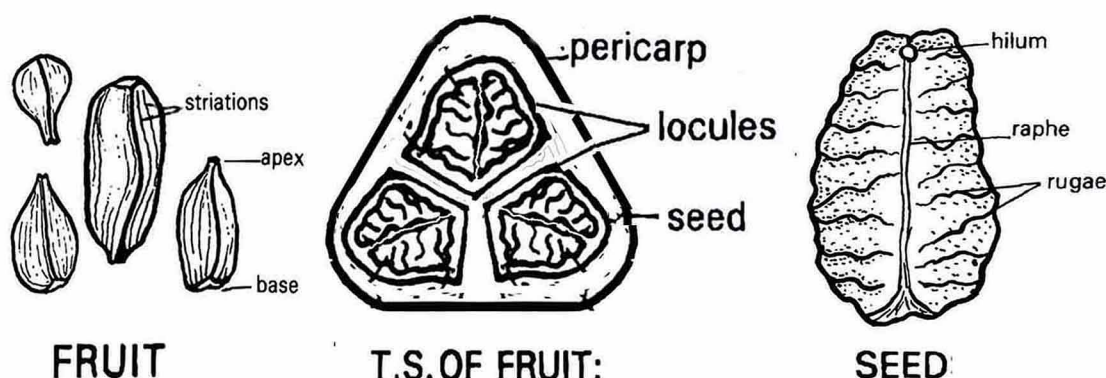
MORPHOLOGY:-

Each seed is surrounded by thin whitish layer called aril.

Colour: Natural colour of Cardamom without processing is green or pale buff. If treated with sulphur dioxide it changes to white

Odour: Aromatic, agreeable and pleasant **Taste:** Strongly aromatic

Size: Cardamom Fruits are 2 cm in length. **Shape:** They are ovoid or oblong, plump, 3-sided, sharply beaked at the top, with smooth or longitudinally striated surfaces.



CHEMICAL CONSTITUENTS: VOLATILE OIL- (3.5-7% in fruits and 8-9% in seeds)
1,8-Cineole (50%), L-Terpineol, Terpinyl acetate, Limonene, Borneol
STARCH (22%-40%) and FATTY OIL

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Carminative (Relieves the excessive collection of gas in the stomach)
2. Flavouring agent,

AROMATIC: 1. Having a strong pleasant odour, 2. (Chemistry) relating to contain one or more benzene rings.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

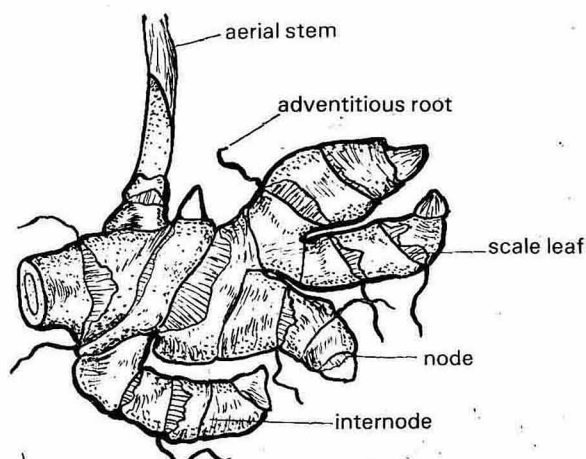
12. GINGER

SYNONYMS AND REGIONAL NAMES: Zingiber, Zingiberis and Jamaican ginger.
San. Adrakam Hin. Adrak Kan. Shunti

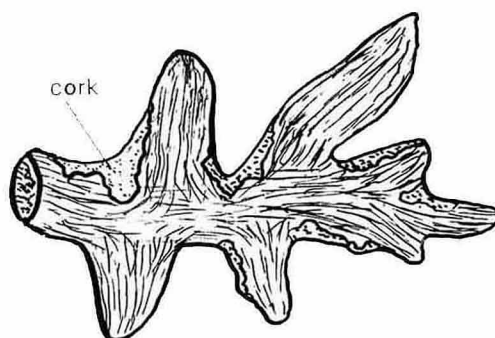
BOTANICAL SOURCE: Ginger is rhizome of *Zingiber officinale*

FAMILY: Zingiberaceae

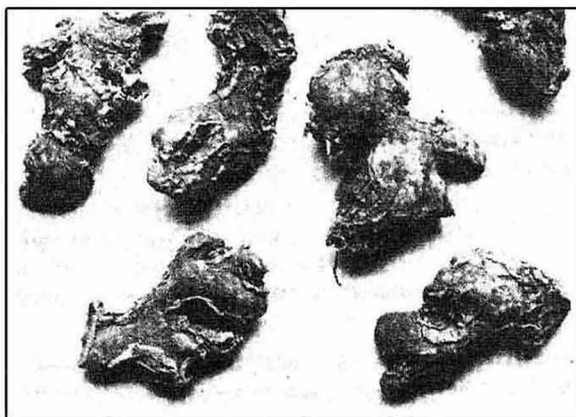
MORPHOLOGY:- Colour- buffm. Odour- agreeable and aromatic
Taste- Pungent. Size- 7 to 15 cm(l), 3 to 6 cm(w) and 1 to 1.5 cm(t):
Form - irregularly branched (sympodial), laterally compressed, branches known as fingers arise obliquely from the rhizome,



Fresh Rhizome



Dried Rhizome



CHEMICAL CONSTITUENTS:

VOLATILE OIL (0.6 to 3%) – Sesquiterpene – Zingiberene

– Sesquiterpene Alcohol – Zingiberol – Borneol – Linalool, Geraniol etc – Aldehyde- Citral.

PUNGENT PRINCIPLES (5 to 8%) – Gingerol – Shogaol – Zingerone.

Resinous Matter – starch – mucilage.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Carminative, Stimulant and Flavouring agent

Stimulant : A drug that temporarily quickens some vital process

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel,
Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

13. BLACK PEPPER

SYNONYMS AND REGIONAL NAMES: Pepper, *Piper nigrum*, Maricha.

BOTANICAL SOURCE: Pepper is dried unripe fruit of perennial climbing vine *Piper nigrum*

FAMILY: Piperaceae

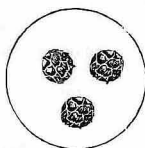
MORPHOLOGY: SEED

COLOUR: Blackish-brown or greyish-black. ; **ODOUR:** Aromatic and pungent

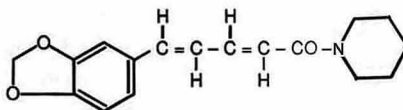
SIZE: Berries 3.5 - 6 mm diameter; globular and coarsely reticulately wrinkled with remains of stigma at apex. pericarp is thin with single white kernel and is hollow at centre, entirely consisting perisperm and a small endosperm and embryo.



Piper nigrum



Vine Fruiting



Piperine

CHEMICAL CONSTITUENTS:

Pepper contains an alkaloid piperine (5 - 9 per cent), volatile oil (1 - 2.5 per cent), pungent resin (6.0 per cent), piperidine and starch (about 30 per cent). The volatile oil which is yellowish in colour contains mainly *l*-phellandrene and caryophyllene.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Fruits used as aromatic, stimulant, stomachic carminative. It causes feeling of warmth and used as condiment. It stimulates taste-buds, with increase gastric juice. oil is used as spice due to pungent taste. It is reported to enhance bio-availability of certain drugs.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

14. ASAFOETIDA

SYNONYMS AND REGIONAL NAMES: Devil's dung, S.Hinguka; H.Heeng; K.Hingu;

BOTANICAL SOURCE: Asafoetida is the oleo-gum-resin obtained by incising living rhizomes and roots of *Ferula asafoetida* and *Ferula foetida*

FAMILY: Umbelliferae

MORPHOLOGY: Asafoetida occurs in two forms: 1. **TEARS:** Tears either in round or flattened forms. **SIZE:** 1 to 3 cm(d); **COLOUR:** Dull yellow, grey or Brown. 2. **MASSES:** Most common form, tears agglutinate to form masses and also contain impurities like piece of fruit, root etc. **SURFACE:** Rough in general; **FRACTURE:** Brittle; **ODOUR:** Strong, persistent-Never-ceasing **TASTE:** Alliaceous, bitter and acrid. (Tears ; be separated by force)

CHEMICAL CONSTITUENTS: VOLATILE OIL

Isobutyl propanyl disulphide, also responsible for the bad smell.

RESINS – free Asaresinotannol and as well in combination with Ferulic acid.

GUM: The drug contains no free umbelliferone unlike Galbanum another species of *Ferula*. But then because of the presence of free Ferulic acid, asafetida answer combined Umbelliferone test.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a carminative (relieves excessive collection of gas in stomach).
2. As an expectorant [an agent that promotes removal of catarrhal (discharge) from the mucous membrane) matter and phlegm from bronchial tubes
3. As an antispasmodic (a drug that counteracts a sudden, violent, involuntary muscular contraction).
4. As a laxative (which induces active movement of bowels).

CHEMICAL TESTS:

1. Asafoetida forms an emulsion with water; with alcohol it is partially soluble.
2. When triturated with water, it forms yellowish orange emulsion.
3. On addition of H_2SO_4 to the freshly fractured surface, red or reddish brown colour is produced which changes to violet when washed with water.
4. Addition of 50% nitric acid to the fractured surface results in green colour
5. 0.2 g of the powdered asafoetida is added to 5 ml of 90% alcohol and boiled for 2 min. Cool and filter. To this is added 0.5 ml of 10% ammonia soln. No blue fluorescence is obtained because of the absence of free umbelliferone
6. **Combined Umbelliferone Test:** Triturate the drug (if in tear form) with sand Boil 0.5 g of the drug with 3 ml of HCL + 3 ml of water for 5 to 10 min. Filter and to the filtrate add an equal volume of alcohol and excess of strong soln. of ammonia. A blue fluorescence is produced because of the presence of combined umbelliferone.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

15. NUTMEG

SYNONYMS AND REGIONAL NAMES: S. Jatiphalam. H. Jayaphal, K. Jaikai;

BOTANICAL SOURCE: Nutmeg is kernels of seeds of *Myristica fragrans*
(Kernel: inner edible part of a seed)

FAMILY: Myristicaceae

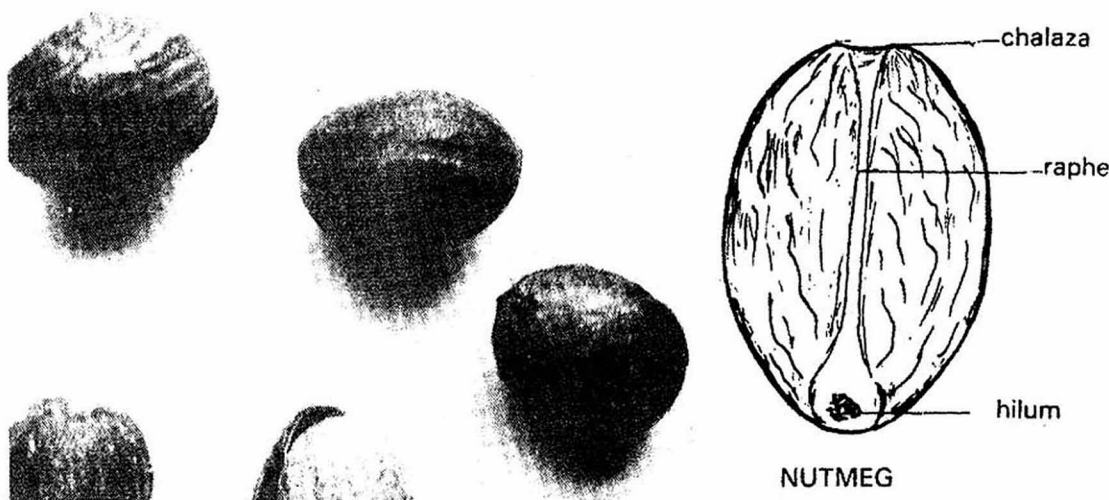
MORPHOLOGY:

SHAPE: Ovoid depending on the variety either broad or elongated;

COLOUR: Light brown, **SIZE:** 2 – 3 cm(l) and 1.5 – 2 cm(b);

SURFACE: Shows a network of shallow reticulate grooves and is marked with numerous small dark brown points and lines;

ODOUR: Aromatic and characteristic; **TASTE:** Aromatic and bitter.



CHEMICAL CONSTITUENTS:

VOLATILE OIL (4-16%) - Myristicin (4-8%), Pinene, Sabinene, Camphene, Safrole, Eugenol, Methyl eugenol, Soeugenol, Methoxy eugenol. Methyl isoeugenol,

FIXED OIL (25-30%)

SAPONIN etc.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Flavouring agent
2. Carminative (relieves excessive gas collected in stomach)
3. Digestive – increases appetite
4. Abortifacient (an agent promotes abortion).

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

16. CINNAMON

SYNONYMS AND REGIONAL NAMES: Ceylon Cinnamon San. Hin. Kan. Dalchini

BOTANICAL SOURCE: Cinnamon is dried inner bark of shoots of coppiced tree of *Cinnamomum zeylanicum*

FAMILY: Lauraceae

MORPHOLOGY:

SIZE: Varying length, 6–10 mm in diameter, thickness 0.5 mm;

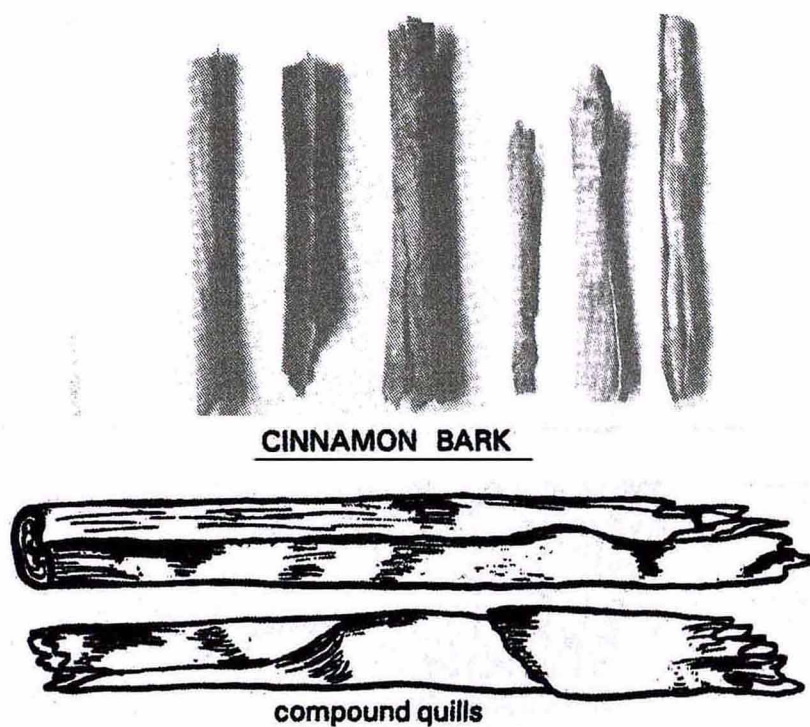
SHAPE: Single, double or compound quills;

EXTERNAL SURFACE: Yellowish brown

INTERNAL SURFACE: Wavy lines of pericyclic fibres;

COLOUR: Darker, straight striations; **FRACTURE:** Short and splintery;

TASTE: Warm, sweet and aromatic; **ODOUR:** Fragrant.



CINNAMON BARK

compound quills

CHEMICAL CONSTITUENTS: VOLATILE OIL-(0.8-1.4%)- Cinnamic aldehyde (60-75%)

Phenol (chiefly Eugenol, 4-10%)

Hydrocarbons, Alcohols etc.

PHLOBATANNIN and MUCILAGE

THERAPEUTICAL AND PHARMACEUTICAL USES:

Flavouring agent, mild astringent and powerful germicide (oil).

CHEMICAL TEST: When a drop of Ferric chloride solution is added to 5 ml alcohol containing one drop of cinnamon oil, a pale green colour is obtained because of following reaction Cinnamic Aldehyde + FeCl_3 ----> Brown colour. Eugenol (with phenolic OH group) + FeCl_3 ----> Blue; together gives an intermediate green colour.

Stimulant : A drug that temporarily quickens some vital process.

Germicide : An agent destroys microorganisms that may carry disease.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

17. CLOVE

SYNONYMS AND REGIONAL NAMES: Caryophyllum; Clove flower; Clove buds, Laung, San. Lavangaha; Hin.Laung; Kan. Lavanga;

BOTANICAL SOURCE: Clove consists of dried flower buds of *Eugenia caryophyllus*

FAMILY: Myrataceae

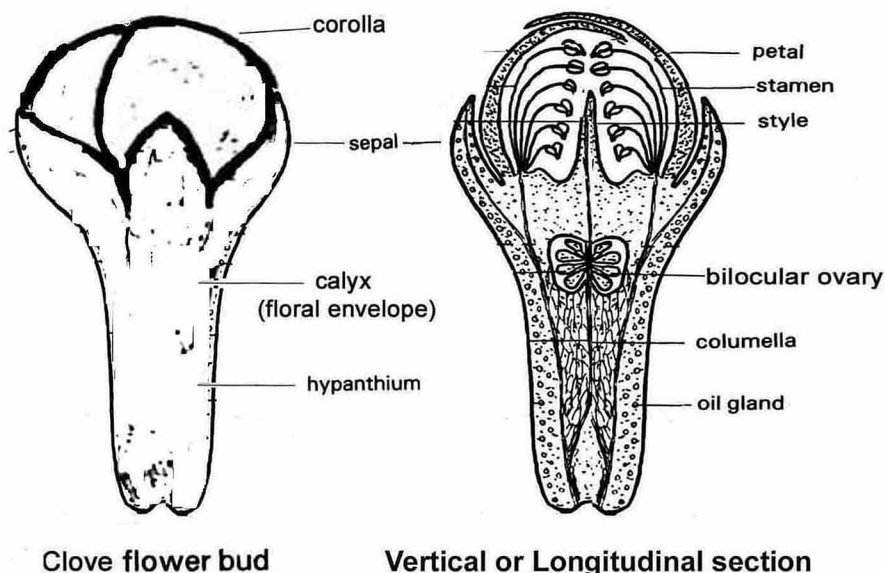
MORPHOLOGY:

COLOUR: Dark brown. **ODOUR:** Aromatic,

TASTE: Pungent and aromatic followed by numbness.

SIZE: 10 to 17mm long, 4mm in wide, and 2mm thick.

SHAPE: dome shaped corolla on the upper side, with 2 celled inferior ovary in it. Lower body is Hypanthium, surrounded by 4 sepals.



CHEMICAL CONSTITUENTS: VOLATILE OIL (16-21%)- Phenol chiefly Eugenol, (80-88%), Acetyl eugenol (10-15%), Humulen (5-12%), α and β - Caryophyllene
TANNINS-(10-13%)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Antiseptic. 2. Stimulant 3. Aromatic.

(c) Carminatives and G.I. regulators : Umbelliferous: Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper, Asafoetida, Nutmeg, Cinnamon, Clove.

18. CATECHU (Black)

SYNONYMS AND REGIONAL NAMES: S.Khadira, H.Khair, Kattha, K.Cachu

BOTANICAL SOURCE: Black Catechu consists of dried aqueous extract prepared from heart wood of *Acacia catechu* and *Acacia chundra*

FAMILY: Leguminosae

MORPHOLOGY:

COLOUR: Black or dark brown; FORM: Irregular masses or cubes;

SURFACE: Rough, dull or slightly glossy and porous;

FRACTURE: Very brittle breaking into powdery mass;

ODOUR: None, TASTE: Bitter to start with, turns sweet and finally astringent.
(Astringent: Sour or bitter in taste)



CHEMICAL CONSTITUENTS:

TANNINS – Catechins (2-12%), Catechutannic acid (25-60%), a condensation product of Acacatechin.

FLAVONOIDS – Quercetin and its derivatives.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Astringent (arrests discharges secretions).
2. Cooling and digestive mouth and gums.
3. Used in relaxed conditions of throat,

CHEMICAL TESTS:

1. Completely soluble in hot water and alcohol.
2. Test for Tannin: A 10% filtered aqueous solution of drug gives a dark green colour with a 5% solution of FeCl_3 . Colour changes to purple on making solution slightly alkaline with a soln. of NaOH .
3. To a few drops of fresh aqueous extract, 10 ml of lime water is added whereby a brown colouration is produced which on standing for a couple of minutes gives red precipitate.
4. With Vanillin, conc. HCl black catechu (dry powder) shows pink or red colour due to the production of phloroglucinol.

CATECHU (Pale)

SYNONYMS AND REGIONAL NAMES: Gambier, Gambir, H. Kattha, Catechu

BOTANICAL SOURCE:

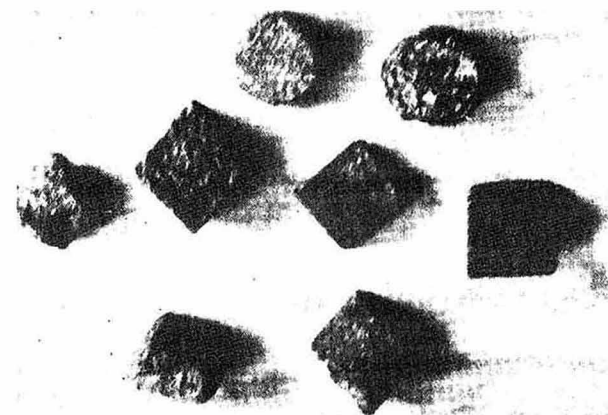
Pale catechu or Gambier consists of dried aqueous extract prepared from the leaves and shoots of *Uncaria gambier* Hunt.

FAMILY: Rubiaceae

MORPHOLOGY:

COLOUR: Dark reddish brown externally pale brown internally;

ODOUR: None, TASTE: Bitter to start with, turns sweet and finally astringent.
(Astringent: Sour or bitter in taste)



CHEMICAL CONSTITUENTS:

TANNINS (Condensed tannins) - Catechins (7-33%) Catechu, Tannic acid (22-50%),

FLAVONOIDS – Quercetin and a fluorescent substance – Gambir fluorescin.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Astringent
2. Used in cases of diarrhoea
3. Used in dye and tanning industries.

CHEMICAL TESTS:

Though pale catechu answers the tests of black catechu as well, it differs in answering positively two other tests based on the presence of (a) Gambir fluorescin and (b) Chlorophyll obtained from leaves and shoots of the plant.

1. Warm 0.3 g of powdered catechu in 2 ml alcohol. Filter. Add 2 ml of NaOH soln. and 2 ml of light petroleum to the filtrate. Shake and allow it to stand. On standing, two layers separate out and the petroleum layer emits a green fluorescence.
2. 1 g of the drug is extracted with 5 ml of Chloroform. On filtering a green colour can be seen in the filtrate.

(d) Astringents-Catechu.

19. HYOSCYAMUS

SYNONYMS AND REGIONAL NAMES: Henbane, Stinking night shade;
San. Parasikaya, Kurasani, Yamani; Hin. Khorasani ajowan;

BOTANICAL SOURCE: It consists of dried leaves and flowering tops of *Hyoscyamus niger*

FAMILY: Solanaceae

MORPHOLOGY OF HERB:

LEAVES: TYPE: Simple; **SHAPE:** Ovate, oblong to triangular **ovate**,
SIZE OF LAMINA: 30 cm(l), **MARGIN:** Irregularly dentate, **APEX:** Acute;
VENATION: Pinnate; **SURFACE:** Glandular and hairy; **COLOUR:** Light greyish green,
TEXTURE: Soft and sticky, **ODOUR:** Strong and characteristic; **TASTE:** Bitter and acrid.

MORPHOLOGY OF FLOWER

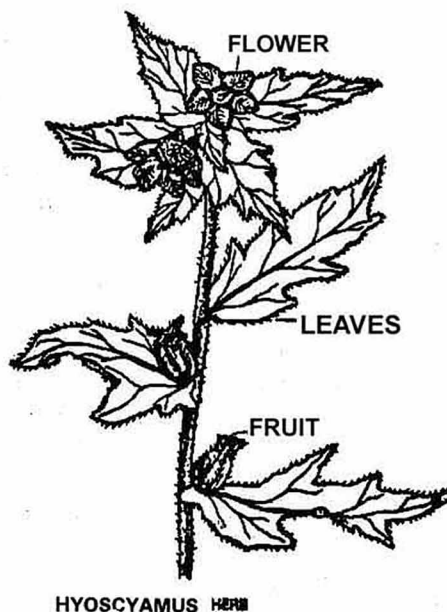
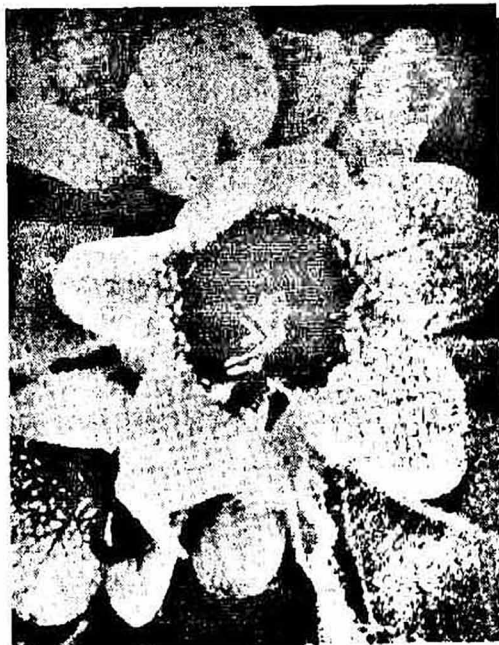
COLOUR: Yellow with purple veins; **SIZE:** 1.5 cm(l), 2.5 cm(d), calyx – 5 lobed persistent,
COROLLA: Funnel shaped and 5 lobed, **OVARY:** Superior.

MORPHOLOGY OF FRUIT:

SIZE: 1 cm(l); **SHAPE:** Ovoid – oblong.

TYPE: Pyxis, encircled by the calyx which protrudes above the fruit;

SEEDS: Numerous, reniform in shape and 1 mm(l), **SEED COAT:** Brown and reticulate.



CHEMICAL CONSTITUENTS:

ALKALOIDS - Tropane alkaloids (0.04 - 0.72%)

-Hyoscyamine (60%)- Scopolamine= Hyoscine (40%), Atropine, Apoatropine, Cuskygrine
FLAVONOIDS

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Mydriatic (dilation of the pupil).
2. Antispasmodic (arrests the involuntary muscular contraction).
3. Antimuscarinic effect (acts peripherally to produce parasympathetic inhibition).
4. Antisialagogue (a drug that arrests the flow of excess of saliva).
5. Cerebral sedative (reduces excitement).

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite,
Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

20. BELLADONNA HERB

SYNONYMS AND REGIONAL Deadly night shade, Belladonna leaf H. Sagangur, Angurshefa

BIOLOGICAL SOURCE: Belladonna Herb consists of leaves and other aerial parts, of *Atropa belladonna* and *Atropa acuminata*

FAMILY: Solanaceae

MORPHOLOGY: LEAVES; TYPE: Simple; FORM: Broadly ovate; COLOUR: Yellowish-green; ARRANGEMENT: Alternate; arranged in pairs on upper stems, each pair with a large and a small leaf; SIZE: 5 to 25 cm(l) 2.5-12 cm(b); MARGIN: Entire; APEX: Acuminate; SURFACE: Slightly hairy. PETIOLE: Petiolate, petiole 4 cm(l); FLOWERS: COLOUR: Purple; Size-2.5 cm(l) 1.2 cm(w); Arrangement of flowers-born singly upon short, draping pedicels arising in the axils of the pairs of leaves; Corolla-campanulate; Calyx-5 lobed, Stamens-5, epipetalous; Ovary-superior, bilocular with numerous ovules and axile placentation. Fruit; Colour-green to dark purplish black, Type-berry.



BELLADONNA HERB

CHEMICAL CONSTITUENTS: ALKALOIDS-Tropane alkaloids L-hyoscyamine D,L-hyoscyamine (Atropine), Scopolamine (10%), Apoa tropine(+), Belladonnine(+).

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Mydriatic (dilation of the pupil).
2. Antispasmodic (a drug counteracts a sudden, violent, involuntary muscular contraction).
3. Antimuscarinic (acts peripherally to produce parasympathetic inhibition).
4. Antisialagogue (a drug inhibits flow of excess saliva).
5. Cerebral sedative (reduces excitement).

VITALI TEST: drop of fuming HNO_3 added to a small portion of an extract of any Solanaceous drugs like species of *Atropa*, *Hyoscyamus* and *Datura* of the tropane alkaloids themselves and then evaporated to dryness on a water bath. Thereafter it is cooled and on addition of 2 drops of 5% alcoholic potassium hydroxide solution, purple colour is formed indicating the presence of tropane alkaloids.

Name	<i>Atropa belladonna</i> (Fam. Solanaceae)	<i>Phytolacca decandra</i> (Phytolaccaceae)	<i>Ailanthus glandulosa</i> (Simaroubaceae)
Leaf	Simple	Simple	Compound
Shape	Broadly ovate	Lanceolate	Triangularly ovate
Epidermal cells	Wavy wall with striated cuticle	Straight walls	Straight walls with strongly striated cuticle
Trichomes	Multicellular covering and glandular trichome	Absent	White, unicellular lignified covering trichomes
Stomata	Cruciferous	Ranunculaceous	Ranunculaceous
Calcium oxalate Crystals	Sandy balls	Acicular raphides	Cluster crystals

BELLADONNA ROOT

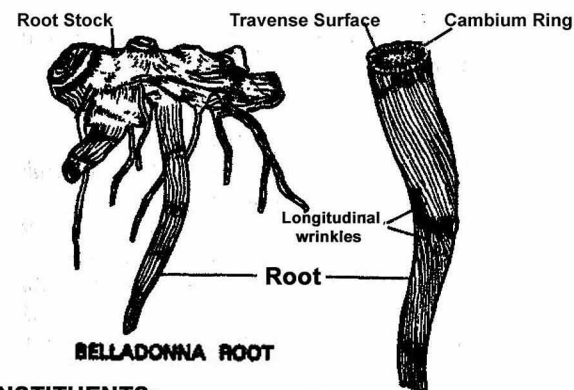
SYNONYMS Deadly night shade, Belladonna leaf H. Sagangur, Angurshefa

BIOLOGICAL SOURCE: Belladonna Root is the dried root or root and root-stock of *Atropa belladonna* and *Atropa acuminata*

FAMILY: Solanaceae

MORPHOLOGY:

ROOT; FORM: Simple or occasionally branched, sub-cylindrical, entire or Longitudinally split; COLOUR: Greyish brown; SIZE: 10 to 30 cm Long 4 cm wide at crown; SURFACE: Longitudinally wrinkled; FRACTURE: Short; ODOUR: No characteristic TASTE: Bitter.



BELLADONNA ROOT

CHEMICAL CONSTITUENTS:

ALKALOIDS-Tropane alkaloids L-hyoscyamine D,L-hyoscyamine (Atropine), Scopolamine (10%), Apoa tropine(+), Belladonnine(+)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Mydriatic (dilation of the pupil).
2. Antispasmodic (a drug that counteracts a sudden, violent, involuntary muscular contraction).
3. Antimuscarinic (acts peripherally to produce parasympathetic inhibition).
4. Antisialagogue (a drug that inhibits the flow of excess saliva).
5. Cerebral sedative (reduces excitement).

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

21. ACONITE

SYNONYMS AND REGIONAL NAMES: Aconite root, Bachnag, Monkshood. S. Visha, Hin. Mithazehar, Kan. Ativisha (Vatsanabhi).

BOTANICAL SOURCE: Aconite is dried tuberous root of *Aconitum napellus*

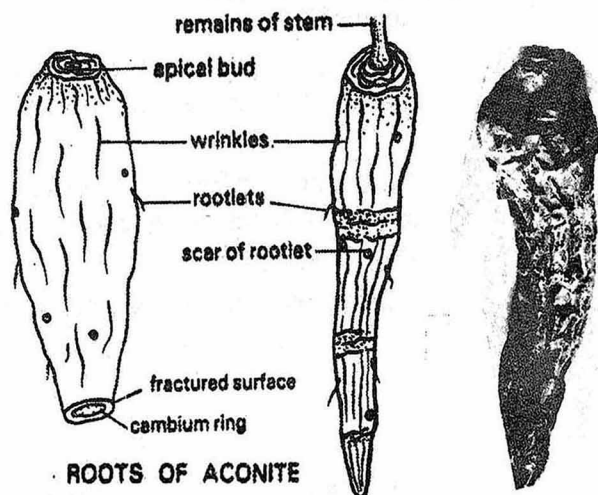
FAMILY: Ranunculaceae

MORPHOLOGY:-

SHAPE: Obconical; **SIZE:** 4-10 cm long and 3.5 cm wide at crown;

COLOUR: Dark brown; **Surface** – wrinkled;

FRACTURE: Short and mealy **ODOUR:** None; **TASTE:** Bitter, followed by a persistent tingling sensation. A poisonous drug.



CHEMICAL CONSTITUENTS: ALKALOIDS

- Diterpenoid type (easily hydrolysable ester alkaloids of terpenoid structures)
- Aconitine (Acetylbenzoylaconine)- Picroaconitine (Benzoylaconine)
- Aconine ($C_{23}H_{41}O_2N$) and - in traces Mesaconitine, Hypaconitine, Napelline, Neopelline, Neoline.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Most poisonous vegetable drug.
2. Tincture aconite is used in neuralgia (pain in the nerve) and rheumatism (pain in the joints or muscles, usually recurrent).
3. Cardiac irritant.
4. In Homeopathic medicines, aconite is used in fever and catarrhal ailments.
5. Local Analgesic (relieves pain) in an alcoholic, soapy or oily vehicle
Liniments (a solution made of an irritant drug meant to be rubbed on the skin as a counter irritant).

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

22. ASHWAGANDHA

SYNONYMS AND REGIONAL NAMES: Withania root, Winter cherry
S.:Ashwagandha, H.:Asgand, K.:Hiremaddina gadde.

BOTANICAL SOURCE: Ashwagandha consists of dried roots
and stem bases of *Withania somnifera*

FAMILY: Solanaceae

MORPHOLOGY:-

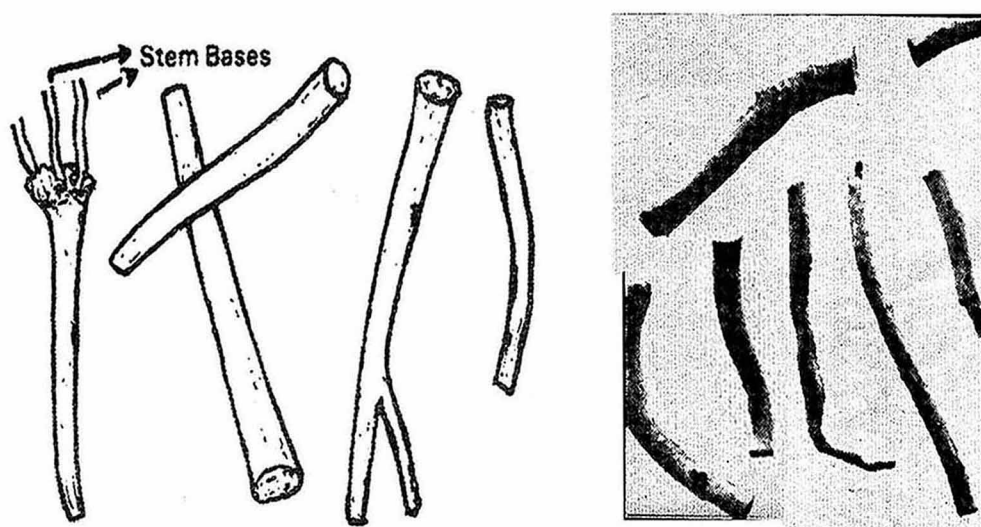
Form- Straight, unbranched and cylindrical,

Fracture- Short

Colour- Buff to grey yellow, Outer colour with longitudinal wrinkles.

Odour- Fresh roots smell similar to horse urine.

Taste- Bitter



ASHWAGANDHA ROOTS

CHEMICAL CONSTITUENTS:

and **STEROIDAL LACTONES**

ALKALOIDS - Pyrazole Alkaloids- Withasomnine -Withanine- Cuscohygrine-
Anahygrine- Anaferine.

STEROIDAL LACTONES- Withaferin A (0.2%), - Withanolides

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Sedative: (reduces excitement, pain etc.,)
2. Tonic, Stimulant, Aphrodisiac (arouses sexual desire) and Toning up uterus.
3. Withaferin is a bacteriostatic and antitumorous agent.
4. Ashwagandha is used in 109 drug preparations (Kapoor & Mitra)

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite,
Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

23. EPHEDRA

SYNONYMS AND REGIONAL NAMES: Ma-Huang, som

BOTANICAL SOURCE: Ephedra consists of young stems of *Ephedra gerardiana*

FAMILY: Gnetaceae

MORPHOLOGY:-

Ephedra plant is small woody shrub of 1 m height;

Size:- varies; Colour:- old plants straw coloured and young green;

Shape:- stems cylindrical and branched

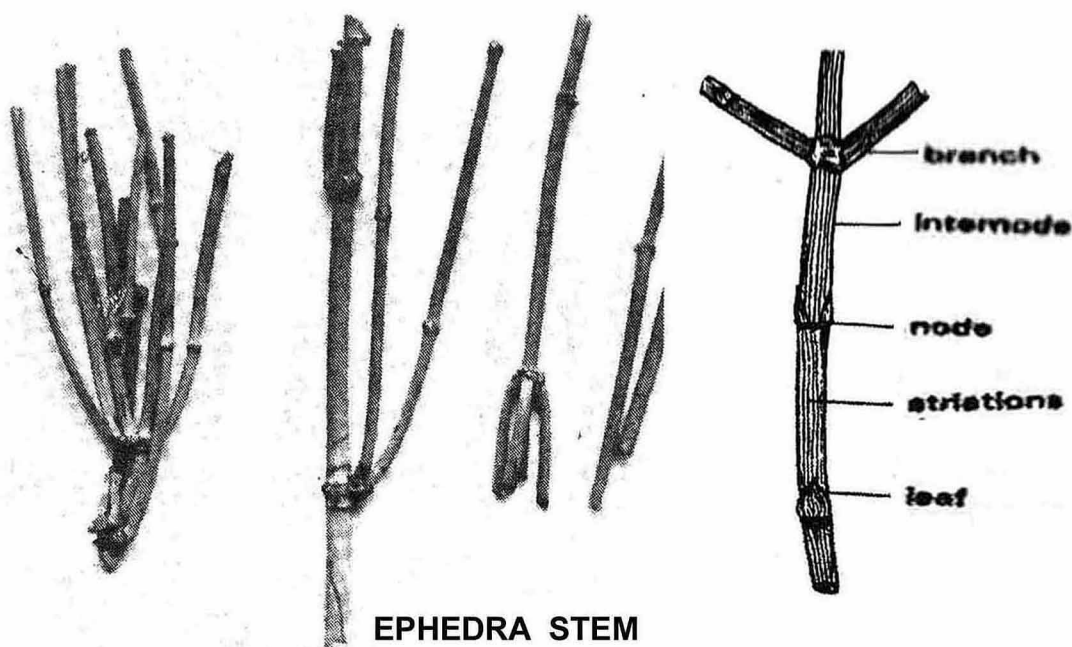
Surface:- main stem is woody and young twigs show striations;

Leaves: 2-toothed sheaths. scaly leaves are brownish, connate opposite and decussate with acute or obtuse apex;

Fracture:- fibrous in cortical region whereas pith shows brown powdery mass.

Odour: aromatic when fresh, no odour when dry;

Taste:- bitter and astringent.



CHEMICAL CONSTITUENTS:

ALKALOIDS (0.5-3.0%) - Alkaloidal amines - Ephedrine (30-90%)

- Pseudoephedrine - Nor-ephedrine etc.,

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Ephedrine is used in asthma as bronchodilator and Hay fever (it has an action similar to adrenaline).
2. It produces lasting increases of blood pressure, causes Mydriasis (dilation of the pupil) and diminishes Hyperemia (excess of blood in any part)

CHEMICAL TEST:

FOR EPHEDRINE: Dissolve 10mg in 1 ml of water, add 0.2ml of dil. HCl and 0.1ml of Copper sulphate solution followed by 1ml of sodium hydroxide soln. The resulting solution turns violet. Add 1ml of solvent ether and shake: the ethereal layer will turn purple and the aqueous layer blue.

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux vomica, Datura.

24. OPIUM

SYNONYMS AND REGIONAL NAMES: White poppy, S.Aphiphenā; H. Afim; K. Afeemu;

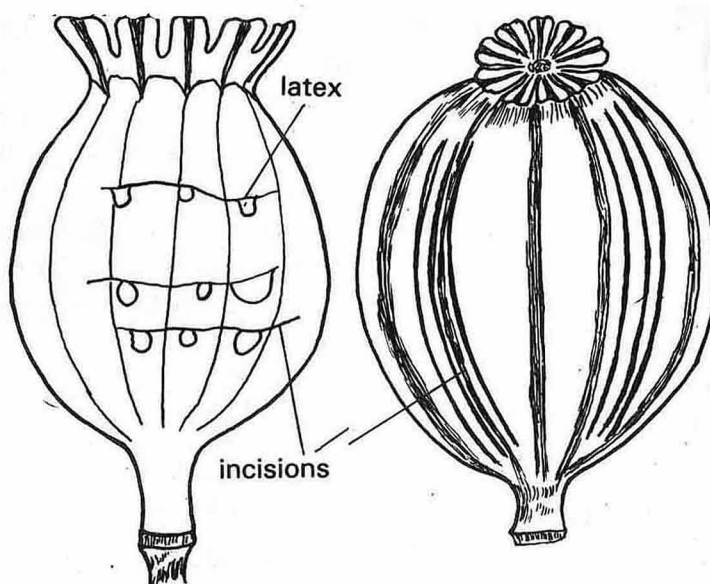
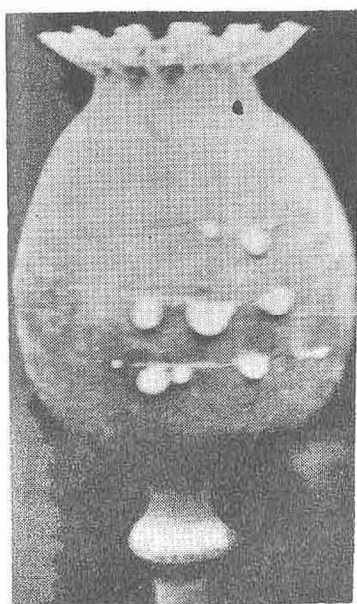
BOTANICAL SOURCE: Opium is air-dried latex obtained by incision unripe capsule of *Papaver somniferum*

FAMILY: Papaveraceae

MORPHOLOGY: FORM: Cubical pieces weighing about 900 g wrapped in tissue paper

TEXTURE: Hard and brittle internally dark brown, smooth and homogeneous;

ODOUR: Strong and characteristic; **TASTE:** Bitter.



POPPY CAPSULES

CHEMICAL CONSTITUENTS: ALKALOIDS

ALKALOIDS – Phenanthrene type – Morphine (10%), – Codeine (0.5%),
– Thebaine (0.2%)

– Benzylisoquinoline Type – Papaverine (1%), – Noscapine (6%),
– Narceine (0.3%) all in combination with Meconic acid (3 – 5%)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Analgesic (kills the pain).
2. Hypnotic (an agent that induces into a passive state or sleep) and Narcotic (a drug which produces sleep).
3. In case of cough and bronchitis.
4. In cases of Euphoria (a pleasant feeling of well-being with confidence and assurance).

CHEMICAL TESTS:

1. Since meconic acid is found only in Opium, a colour test based on this can be used to detect opium. Alkaloids of opium give a red colouration with ferric chloride soln. the colour being altered on addition of dil. HCl.

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

25. CANNABIS

SYNONYMS AND REGIONAL NAMES:

San.Ganjika, Bhanga; **Hin.**Ganja, Bhang Charas; **Kan.** Bhangi, Ganja

BOTANICAL SOURCE: Cannabis consists of dried flowering tops of cultivated pistillate plants of *Cannabis sativa*

FAMILY: Cannabinaceae

MORPHOLOGY: LEAF

FORM: Compressed rough dusky green masses consisting of the branches upper part of the stem bearing leaves and pistillate flowers of fruits matted together by resinous secretion. Upper leaves simple, alternate; lower leaves opposite and digitate consisting of 5 – 7 linear-lanceolate leaflets.

FRUIT: One seeded, supported by an ovate-lanceolate bract.

ODOUR: Strong and characteristic. **TASTE:** Acrid and pungent.



CANNABIS HERB

CHEMICAL CONSTITUENTS:

RESINS (2.5-15%)-- Tetrahydro cannabinol (THC)
Cannabidiolic acid (CBDA)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Sedative (calms down excitement)
2. Analgesic (pain killer)
3. Hypnotic (induces sleep)
4. Psychotropic (exerting an effect upon the mind)
5. Antibacterial agent.

(e) Drugs acting on nervous system:

Hyoscyamus, Belladonna. Aconite, Ashwagandha.
Ephedra, Opium, Cannabis, Nux vomica.

26. NUX VOMICA

SYNONYMS AND REGIONAL NAMES: Poison nut tree

San. Vishamushti Kan. Kasarkana

BOTANICAL SOURCE:

Nux Vomica consists of ripe seeds of *Strychnos nux-vomica*

FAMILY: Loganiaceae

MORPHOLOGY: SIZE: 10 – 30 mm diameter and 4 to 6 mm thick

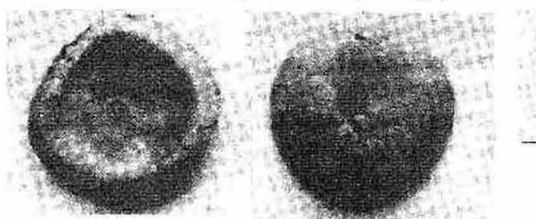
SHAPE: Disc shape, flat little depressed on one side and arched on other side

MARGIN: Rounded; **ODOUR:** None and **TASTE:** Very bitter.

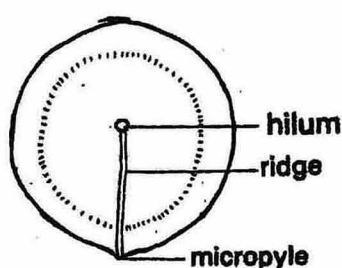
OUTER SURFACE: Greyish covered with numerous silky hairs, Hilum present at centre of one of flat surfaces.

Micropyle is seen as a small projecting point on margin.

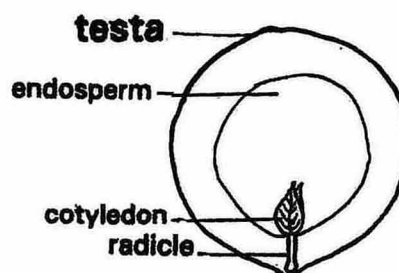
Hilum and micropyle are connected by a ridge;



NUX VOMICA SEEDS



Entire Seed



L.S. of Seed

CHEMICAL CONSTITUENTS:

ALKALOIDS (2.5 to 5%) – Indole type – Strychnine – Brucine

GLYCOSIDE – Monoterpene glycoside – Loganin

FIXED OIL (2 to 4%)

THERAPEUTICAL AND PHARMACEUTICAL USES:

Strychnine is therapeutically active whereas Brucine is less active or inactive.

1. Spinalcord stimulant. 2. In cases of neurasthenia (excessive fatigue of neurotic origin). 3. As a circulatory stimulant 4. Nerve and sex tonic. 5. Bitter stomachic (strengthening of stomach and promoting its action).

CHEMICAL TESTS:

Distinguishing test for Strychnine and Brucine: To the residue from an extract of the drug, on addition of 2 drops of sulphovanadic acid formation of purple red colour indicates the presence of strychnine. Addition of 2 drops of H_2SO_4 and a crystal of Pot dichromate to another sample, again purple colour changing to red indicates strychnine whereas formation of immediate red colour marks the presence of Brucine. Addition of 2 drops of HNO_3 to a sample of residue gives blood red colour showing the presence of Brucine. The blood red colour however disappears on adding to it a soln. of Stannous chloride.

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux vomica, Datura.

27. DATURA

SYNONYMS AND REGIONAL NAMES: Thorn apple leaves, Stramonium leaf
San. Ummatha, Hin. Datura, Pagal ka dawa, Kan. Ummathi

BOTANICAL SOURCE: Datura consists of leaves and flowering tops of
Datura metel and *Datura Stramonium*

FAMILY: Solanaceae

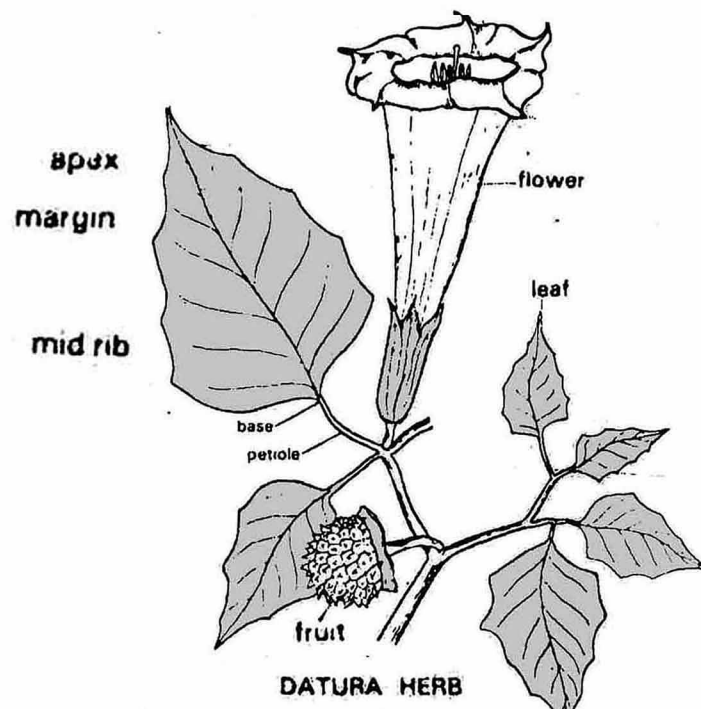
MORPHOLOGY: LEAF

Shape: Ovate to triangular ovate with acuminate apex

Margin: Sinuate dentate. **Size:** 8-25cm long 7-15cm wide

Odour: Strong unpleasant **Taste:** Bitter

FRUIT: sub-globose capsule covered with short and blunt spines,
2.5 to 3.2 cm(d) nodding or sub-erect. stem, branches,
main veins of leaves and also flowers are violet or purple coloured.
Double – flowered and triple flowered forms (outer corolla 5 teeth and
inner corolla 6 to 10 teeth)



CHEMICAL CONSTITUENTS: ALKALOIDS (2-3%) – Tropane Alkaloids -Hyoscyamine
FLAVONOIDS -Scopolamine
=Hyoscine

THERAPEUTICAL AND PHARMACEUTICAL USES:

Mydriatic (causes the pupil of the eye to dilate; used to aid eye examinations)

Antispasmodic: Drug relieves or prevent spasms (especially of the smooth muscles)

Cerebral sedative (reduces excitement).

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha.
Ephedra, Opium, Cannabis, Nux vomica, Datura.

28. RAUWOLFIA

SYNONYMS AND REGIONAL NAMES: Serpentina Root

San. Sarpagandha, Hin. Chota chand, Pagal ka dawa, Kan. Garuda Patala

BOTANICAL SOURCE: Rauwolfia consists of dried roots *Rauwolfia serpentina*

FAMILY: Apocynaceae

MORPHOLOGY:

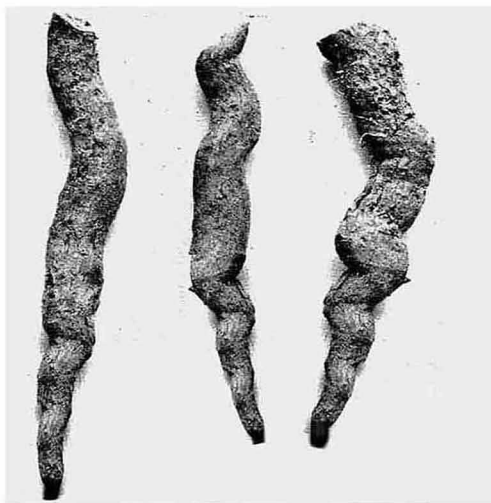
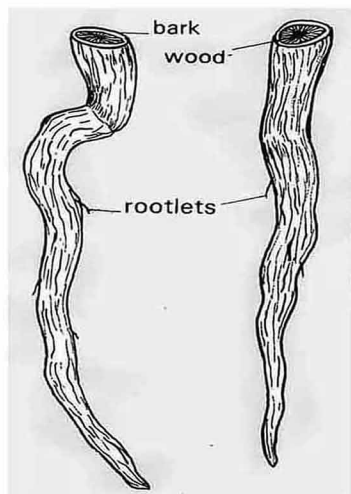
Rauwolfia with bark intact, collected in autumn

SIZE: 2 – 15 cm long and 3 to 22 mm diameter. tapered

SHAPE: Pieces are cylindrical. **COLOUR:** Outer surface is greyish yellow,

FRACTURE: Fracture short

ODOUR: Rauwolfia has no odour. **TASTE:** Bitter taste.



RAUWOLFIA ROOTS

CHEMICAL CONSTITUENTS: ALKALOIDS

- Indole Alkaloids (1.5 TO 3%) present mostly in bark

Weakly basic Indole type (pH 7 to 7.5)

--- Reserpine group- Reserpine-Resecinnamine-Deserpidine

Tertiary Indoline Alkaloids (pH8)

---Ajmaline group-Ajmaline-Ajamalicine

Strongly Basic Anhydronium Bases (pH11)

Serpentine group- Serpentine-Serpentine-Alstonine

THERAPEUTICAL AND PHARMACEUTICAL USES:

Antihypertensive (decreases blood pressure)

Sedative – calms down activities and excitement

(f) Antihypertensives - Rauwolfia.

29. VASAKA

SYNONYMS AND REGIONAL NAMES:

San. Vasika, Vasa, Sinmukhi Hin. Arusha Kan. Adusoge

BOTANICAL SOURCE: Vasaka consists of fresh and dried leaves of *Adhatoda vasica*

FAMILY: Acanthaceae

MORPHOLOGY: LEAF

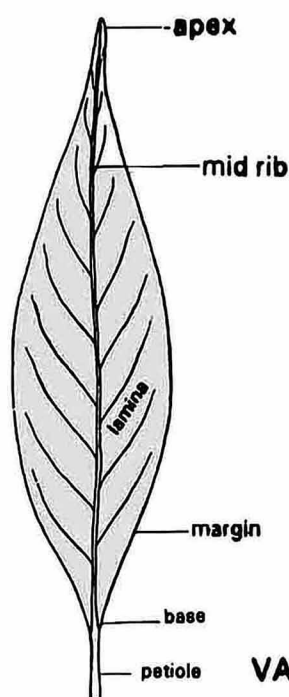
TYPE: Simple; **COLOUR:** Dark green; **CONDITION:** Entire when fresh, Crumpled or broken when dry. **SHAPE:** Lanceolate to ovate-lanceolate

PETIOLE: Petiolate. **MARGIN:** Entire. **APEX:** Acuminate. **BASE:** Acute and equal, **VENATION:** Reticulate;

UPPER SURFACE: Glabrous. **LOWER SURFACE:** Pale green and glabrous;

SIZE: 12-20 cm in length and 2.5 – 5 cm wide. **SHAPE:** Lanceolate;

ODOUR: Characteristic. **TASTE:** Bitter.



VASAKA LEAF

CHEMICAL CONSTITUENTS: ALKALOIDS- Quinazoline type -Vasicine (Peganine)- Oxyvasicine (6- Oxypeganine)-Vasicinone- Ketone (Oxidation product of vasicine)

ESSENTIAL OIL

--Adhatodic acid, Vasakin, an insecticide of unknown nature, etc.
the activity of drug lies only in Vasicinone.

THERAPEUTICAL AND PHARMACEUTICAL USES: Antitussives

Expectorant, Bronchodilator, Oxytotic, As an abortifacient

Vasakin, an insecticide of unknown nature, etc.

(g) Antitussives - Vasaka, Tolu balsam, Tulsi.

30. BALSAM OF TOLU

SYNONYMS AND REGIONAL NAMES: Balsam of Tolu

BOTANICAL SOURCE: Tolu Balsam is a solid or semi-solid balsam obtained by incision from trunk of *Myroxylon balsamum*. It contains not less than 35% and not more than 50% of total balsamic acids, calculated with reference to the dry alcohol-soluble matter.

FAMILY: Leguminosae

CHARACTERS AND MORPHOLOGY: COLOUR-Brownish yellow to brown;

ODOUR: Aromatic (vanilla smell);

SOLUBILITY: Insoluble in water; soluble in alcohol, ether, chloroform etc.

CHEMICAL CONSTITUENTS:

RESINS (80%) – Resin alcohols combined with Cinnamic acids and Benzoic acids. (Resin esters of Tolu resinotannols).

VOLATILE OIL (7.8%) – Benzyl benzoate

FREE ORGANIC ACIDS – Cinnamic acid (2 – 15%), Benzoic acid (8%).

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As an expectorant (an agent that promotes the removal of catarrhal matter and phlegm from the bronchial tubes).
2. Flavouring agent
3. As an antiseptic.

CHEMICAL TESTS

1. An alcoholic solution of the drug is acidic.
2. Green colouration is obtained by adding ferric chloride soln. to alcoholic (90%) soln. of Tolu.
3. Bring to boil 1 g of Tolu balsam in 5 ml. water, filter and heat the filtrate with 30 mg of KMnO_4 . Benzaldehyde odour can be noted.

ADULTERANT: Colophony as an adulterant is detected by cupric acetate reaction (see Colophony).

Note: It is reported that modern samples show an increase in benzoic acid content, a decreased cinnamic acid content and the absence of benzyl cinnamate. Some contained additional unreported constituents like cinnamaldehyde and benzyl alcohol. (Planta Med. 1979. 35(1), 61).

(g) Antitussives - Vasaka, Tolu balsam, Tulsi.

31. TULSI

SYNONYMS AND REGIONAL NAMES: Sacred Basil, Holy Basil

BOTANICAL SOURCE: Tulsi consists of Fresh or dried leaves of
Ocimum sanctum

FAMILY: Labiatae

MORPHOLOGY: LEAVES

TYPE: Elliptic- Oblong, Obtuse, or Acute,
Entire or serrate, pubescent on both sides
dotted with minute glands;

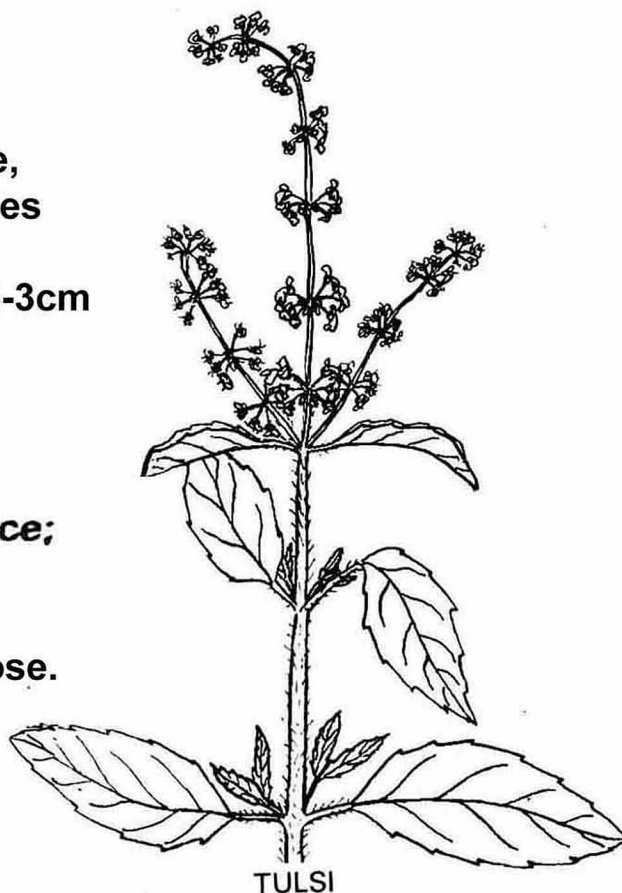
SIZE: LEAVES are 2.5-5cm Long and 1.5-3cm
Broad.

FLOWERS: COLOUR: Flowers are
Purplish or Crimson in
in racemes with **verticillate inflorescence**;

ODOUR: Characteristic;

TASTE: Aromatic.

SEEDS are Reddish-black and subglobose.



LEAVES (Purple type of *O. sanctum*): Opposite, exstipulate, petiolate. Petiole green with purplish tinge, 3.5 cm(l); slender, thin, less pubescent with narrow inconspicuous adaxial groove; lamina elliptic to oblong, 5 – 7 cm(l), 2.5 to 3.5 cm(b), margin narrowly or distantly serrate, apex acute or obtuse, almost glabrous except at veins, aromatic with pungent taste, venation pinnately reticulate with 5 – 7 lateral alternate pairs of veins, adaxial side dark green, abaxial side dull green, veins prominent on both surfaces; Odour – aromatic and Taste – pungent.

CHEMICAL CONSTITUENTS: VOLATILE OIL

ESSENTIAL OIL (0.7%)- Phenols (Eugenol 70%), Nerol, Eugenol Methyl Ether, Caryophyllene, Terpinene-4-ol-Decylaldehyde, r-Selinene
 α and β Pinene- Camphor and Carvacrol.

THERAPEUTICAL AND PHARMACEUTICAL USES: Antitussives

**Antibacterial, Insecticide, hypoglycaemic,
Analgesic, antipyretic, immunomodulator**

(g) Antitussives - Vasaka, Tolu balsam, Tulsi.

32. GUGGUL

SYNONYMS AND REGIONAL NAMES: Scented Bdellium, Gum guggul, Commiphora.

BOTANICAL SOURCE: Guggul is the oleo-gum-resin obtained by making deep incisions at the basal part of stem bark of *Commiphora weightii* and should contain not less than 1% and 1.5% Guggulsterones (Z & E). Guggul is one of the noted drugs from Ayurveda and Unani system. In recent times its demand in therapeutics has been substantially increased.

FAMILY: Burseraceae.

MORPHOLOGY: COLOUR: Brown to pale yellow or dull green.

ODOUR: Agreeable, aromatic and balsamic.

TASTE: Characteristic bitter.

SIZE: 0.5 to 2.5 cm in diameter.

SHAPE: Rounded or irregular masses or agglomerated tears. Tears are transparent, with waxy surface and brittle in nature. Guggul is gummy to touch and tears are normally with fractured surface.

SOLUBILITY: When triturated with water, it forms white emulsion. It is partly soluble in alcohol.

CHEMICAL CONSTITUENTS:

Guggul is the oleo-gum-resin portion of guggul contains steroids, diterpenoids, carbohydrates and aliphatic esters. They are present in a complex mixture form, but resin does not contain cinnamic acid, benzoic acid or their esters which are normally found in many oleo-gum-resin of pharmaceutical significance. The purified gum gives pentosan, pentose and furfural. Steam distillation of guggul

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. It is used as anti-inflammatory, anti-rheumatic hypolipidemic and hypo-cholesteremic drug.
2. It lowers low density lipoproteins and supports weight control. 'Guggulip' developed from *Commiphora mukul* is an antihyperlipidaemic product.

ADULTERANTS:

Guggul is found as adulterated with resins of various *Commiphora* species like *Commiphora abyssinica*, *Commiphora burghii*, *Commiphora molmol* and also with *Boswellia serrata*.

CHEMICAL TEST:

To the ethyl acetate extract of guggul add acetic anhydride boil, cool and add two ml of Sulphuric acid, green colour develops at the junction due to sterols.

(h) Antirheumatics - Guggul, Colchicum.

33. COLCHICUM

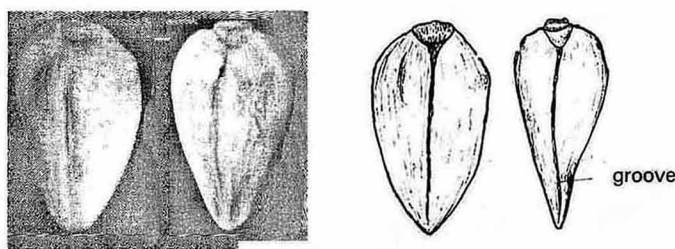
SYNONYMS AND REGIONAL NAMES: Indian Colchicum, Meadow Saffron
San.Hiranyatutha, Hin. Hirantutiya, Surinjan.

BOTANICAL SOURCE: Colchicum is Corm and ripe seeds of
Colchicum luteum and Colchicum autumnale

FAMILY: Liliaceae

MORPHOLOGY: **CORM:** Form :- conical on one side flattened on other with a groove in middle running throughout length of corm; Colour :- yellowish white
Surface :- smooth; Fracture :- short and mealy. Odourless and bitter taste.

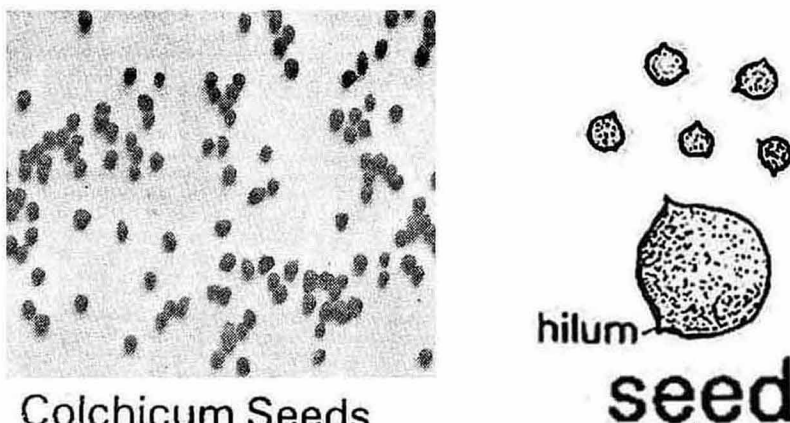
Corm: Solid swollen underground bulb-shaped stem or stem base and serving as a reproductive structure



Colchicum Corms

Seeds; Colour :- light brown; Form :- irregularly globular; Size :- 2-3 mm (d);
Peculiarities :- minutely pointed at hilum. Odourless and bitter taste.

Seed: A mature fertilized plant ovule consisting of an embryo and its food source and having a protective coat or testa



Colchicum Seeds

CHEMICAL CONSTITUENTS:

ALKALOIDS- Colchicine type containing tropolone ring (0.5 to 1.0%)
- Colchicine (0.8% in seeds and 0.6% in corms)- Demecolcine.

THERAPEUTICAL AND PHARMACEUTICAL USES: Antirheumatics
In treatment of Gout (inflammation of the joints)

CHEMICAL TEST:

The alkaloid colchicine present both in corm and seed, yields yellow colour with Conc. HCl or 60-70% H₂SO₄

(h) Antirheumatics - Guggul, Colchicum.

34. VINCA

SYNONYMS AND REGIONAL NAMES: *Vinca rosea*, *Lochnera rosea*,
Sadaphuli, Rattanjot, Billaganneru

BOTANICAL SOURCE: Vinca is the whole plant of *Catharanthus roseus*

FAMILY: Apocynaceae

MORPHOLOGY: Type – Annular or perennial herb; (lasting three seasons)

Size – 0.5 to 1 m(l) Leaves -ovate, oblong, glossy above glaucous below;

Flowers – 2 – 3 in cymes, axillary and terminal clusters.

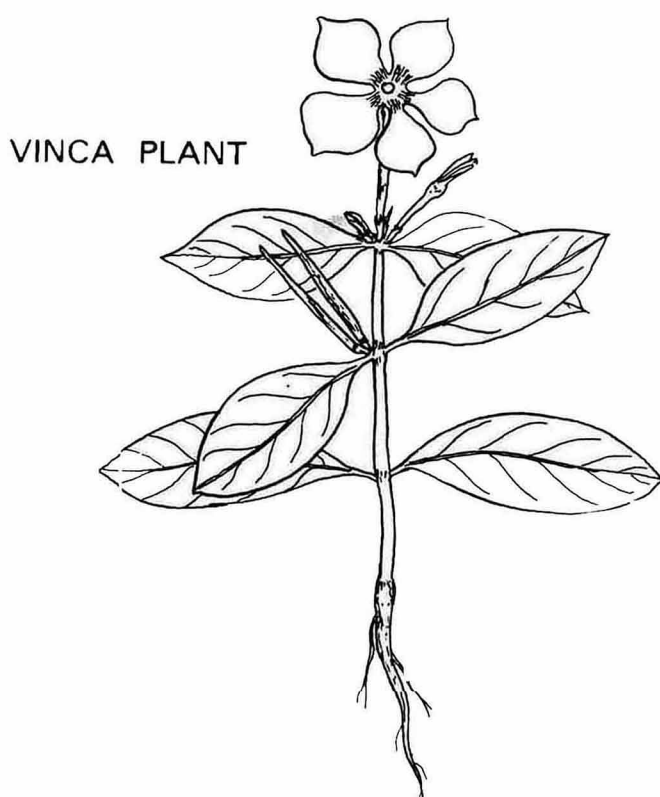
Based on the flower colour, Fruit – a follicle, cylindrical and many seeded.

Three varieties are known namely

1. *Catharanthus alba* – white flowers.

2. *Catharanthus ocellata* – red flowers.

3. *Catharanthus roseus* – pink flowers.



CHEMICAL CONSTITUENTS: ALKALOIDS - (roots 0.85%, leaves 0.67%, stems 0.31%)

Indole and Indoline alkaloids - Ajmalicine, Lochnerine, Serpentine and Tetrahydroalstonine = Dimeric Indole bases of Monoterpene types- Vinblastine- Vincristine.

THERAPEUTICAL AND PHARMACEUTICAL USES:

antitumour = anticancer

(i) Antitumour - Vinca.

35. CHAULMOOGRA OIL

SYNONYMS AND REGIONAL NAMES: Chaulmoogra tel.

BOTANICAL SOURCE: Chaulmoogra Oil is the fatty oil obtained by cold expression from the fresh ripe seeds of *Hydnocarpus kurzii* or other species of *Hydnocarpus*.

FAMILY: Flacourtiaceae

MORPHOLOGY:

NATURE: COLOUR: Yellow to brownish yellow;

STATE: Below 25°C a white soft solid;

ODOUR: Characteristic, similar to that of rancid butter;

TASTE: Acrid.

CHEMICAL CONSTITUENTS: Mixture of Glycerides

FATTY ACIDS – Hydnocarpic acid (35.3%) – Chaulmoogric acid (22.7%) –
Gorlic acid (22.8%) – Oleic acid (14.8%) – Palmitic acid (4%).

THERAPEUTICAL AND PHARMACEUTICAL USES:

In the treatment of leprosy and tuberculosis.

(j) Antileprotics - Chaulmoogra Oil.

36. PTEROCARPUS

SYNONYMS AND REGIONAL NAMES:

Bijasal; Indian kino tree, Red sandal wood, Malabar kino are Rakta chandan.

BOTANICAL SOURCE:

Pterocarpus consists of the dried juice of the plant *Pterocarpus marsupium* obtained by making vertical incisions to the stem bark collected, and dried.

FAMILY: Leguminosae

MORPHOLOGY:

COLOUR: Ruby-red ODOUR: Odourless TASTE: Astringent

SHAPE: Angular grains SIZE: 3 - 10 mm granules

The pieces of kino are angular, glistening, transparent, breaking with vitreous fracture. It is partly soluble in water (about 80 - 90 per cent), completely soluble in alcohol (90 per cent).



Pterocarpus Flowering Plant

CHEMICAL CONSTITUENTS:

Kino contains about 70 - 80 per cent of kinotannic acid, kino-red, k-pyrocatechin (catechol), resin and Gallic acid. Kinotannic acid is glucosidal tannin, while kino-red is anhydride of kinoin. Kinon is an insoluble phlobaphene and is produced by the action of oxidase enzyme. It is darker in colour than kinotannic acid.

Crystalline principle santal, pterocarpin and homopterocarpin are also present in the wood. If the juice is boiled during drying, enzyme gets destroyed and thus, insolubilisation and darkening is prevented.

CHEMICAL TESTS

1. When the solution of drug is treated with ferrous sulphate, green colour is produced.
2. With alkali (like potassium hydroxide) violet colour is produced.
3. With mineral acid, a precipitate is obtained.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Kino is used as powerful astringent and also in the treatment of diarrhoea and dysentery, passive haemorrhage toothache and in diabetes. It is used in dyeing, tanning and printing.

The aqueous infusion of the wood is of considerable benefit in diabetes. Both the alcoholic and aqueous extracts of heartwood are known to possess hypoglycemic action. For the treatment of diabetes the cups made of wood are available with sales outlets of Khadi and Gramodyog Commission.

37. GUDMAR

SYNONYMS AND REGIONAL NAMES: *Gymnema*, Madhunashini.

BOTANICAL SOURCE:

Gymnema consists of leaves of a perennial woody climber plant known as *Gymnema sylvestre*. It contains not less than 1.0 per cent of Gymnemic acids calculated on Gymnemagenin on dried basis.

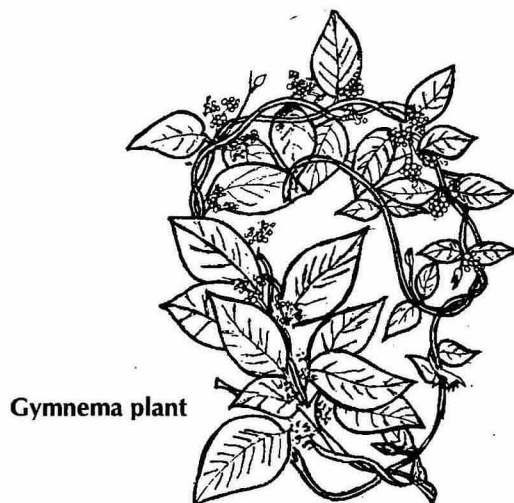
FAMILY: Asclepiadaceae.

MORPHOLOGY:

TYPE: It is a woody climber found in India, common in Deccan-peninsula and also in Northern and Western parts of India. It is occasionally cultivated for medicinal purposes.

COLOUR: Green ODOUR: Pleasant and aromatic odour TASTE: Tasteless

SIZE: 3 - 5 × 1 - 2 cm SHAPE: Elliptic or ovate with acute or acuminate apex



EXTRA FEATURES:

The leaves when chewed, have remarkable property of blocking taste glands for few minutes against sweet and bitter taste.

Lower surface of leaf is more pubescent and base is rounded or cordate. Non-glandular trichomes are present on both surface of leaf. It bears small yellow coloured flowers in cymes form.

CHEMICAL TESTS:

1. Dilute solution anaesthetises sweet taste buds.
2. Gives copious foam after shaking with water and on addition of dil. hydrochloric acid voluminous precipitate.

CHEMICAL CONSTITUENTS:

Leaf contain pentriacontane, hentriacontane, phytin, α and β chlorophylls, resin, tartaric acid, formic acid, butyric acid, mucilage inositol, d-quercitol, gymnemic acids (anti-sweet compounds), mixture of triterpene saponines and anthraquinone derivatives.

Plant is reported to contain alkaloids, betain, choline and trimethylamine in the leaves.

Lupeol, B-amyrin, stigmasterol are also present in the leaves.

Gymnemic acid is a mixture of at least nine closely related acidic glycosides fractionated by successive extraction with different solvents. Ethyl acetate fraction of such gymnemic acid mixture has a blocking effect on taste glands. Gypenosides have also been isolated from leaves.

	R	R ₁	R ₂
Gymnemic acid I	Tigloyl	Acetyl	Gluconic
Gymnemic acid II	Methylbutyryl	Acetyl	Gluconic
Gymnemic acid III	Methylbutyryl	H	Gluconic
Gymnemic acid IV	Tigloyl	H	Gluconic

THERAPEUTICAL AND PHARMACEUTICAL USES:

Gymnema is used as antidiabetic, stomachic, stimulant, laxative and diuretic. The Antidiabetic formulations of this drug are commercially available. Hypoglycemic effect is due to stimulation of insulin secretion by pancreas. Dental plaque and caries are prevented by Gymnemic acid acids. Recently the drug has received world attention due to its weight-lowering properties.

Indian exports of *Gymnema* extracts during 1996-1997 was reported to be Rs. 65 lakhs.

The leaves of *G. hirsutum* and *G. montanum* of Western ghats are the substitute for *Gymnema*. *G. tingens* and *G. acuminatum* are other species of *Gymnema*.

(k) Antidiabetics - Pterocarpus, *Gymnema*, *Sylvestro*.

38.GOKHRU

SYNONYMS AND REGIONAL NAMES: **Calthrop, Caltrap;**
San. Gokhura, Gokshura; Hin. Chhota-Gokhru;

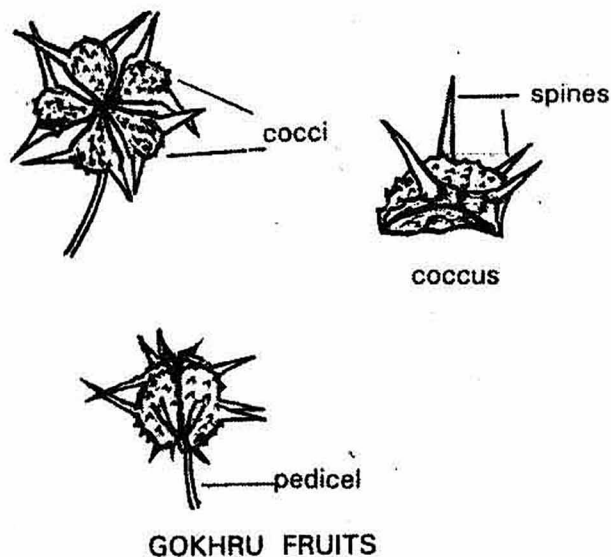
BOTANICAL SOURCE:

Gokhru consists of the fruits of *Tribulus terrestris*

FAMILY: Zygophyceae

MORPHOLOGY:

FORM: Globose, consisting of usually 5 hairy, often muriculate, woody cocci, each with 2 very sharp rigid spines and 2 shorter ones. Seeds several in each coccus, with transverse partitions between them.



CHEMICAL CONSTITUENTS: **GLYCOSIDES- Saponin glycosides- steroid saponins steroid sapogenins- Furostanol bis glycoside protodiosin which on acid hydrolysis yields the Spirostanol diosgenin, a trace of tigogenin, glucose and rhamnose; - Hecogenin - Neotigogenin.**

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Diuretic.
2. Cooling tonic and aphrodisiac.
3. In painful micturition (urination), Calculous affections, urinary discharges and impotence.
4. Gokhru is used in 65 drug preparations (Kapoor & Mitra).

(1) Diuretics - Gokhru, Punarnava.

39. PUNARNAVA

SYNONYMS AND REGIONAL NAMES: *Boerhaavia repens*, Hog weed,
Hin. Besha kapori; Kan. Sanadika, Komme, Gajjeru

BOTANICAL SOURCE: Punarnava consists of fresh or dried plant of *Boerhaavia diffusa*

FAMILY: Nyctaginaceae

MORPHOLOGY:

TYPE: Perennial herb, pubescent or nearly glabrous with stout rootstock and many erect or procumbent branches. The tap root is long, fusiform and tapering. Stem prostrate or ascending, divaricately branched, slender, cylindrical, thickened at the nodes, often purplish.

LEAVES: At each node in unequal pairs, the larger 2.5 to 3.7 cm(l), the smaller 12 to 18 mm(l), both nearly as broad as long, ovate or sub orbicular, rounded at apex, green and glabrous above but usually white with minute scales beneath. Margin entire somewhat undulate, often coloured pink, base rounded or subcordate, slender petiole nearly as long as blade.

FLOWERS: Small, pinkish red, 4 to 10 together in small umbels, arranged on slender long stalked corymbose, axillary or terminal panicles, bracteoles small, acute, perianth greenish on lower side, pinkish on the upper side, stamens 2-3, slightly exerted,

FRUIT: 6 mm(l), clavate, rounded broadly and bluntly 5 ribbed, viscidly glandular.

CHEMICAL CONSTITUENTS:

ALKALOID(0.04%) – punarnavine, KNO_3 , K_2SO_4 , Chlorides etc. (6.5%).

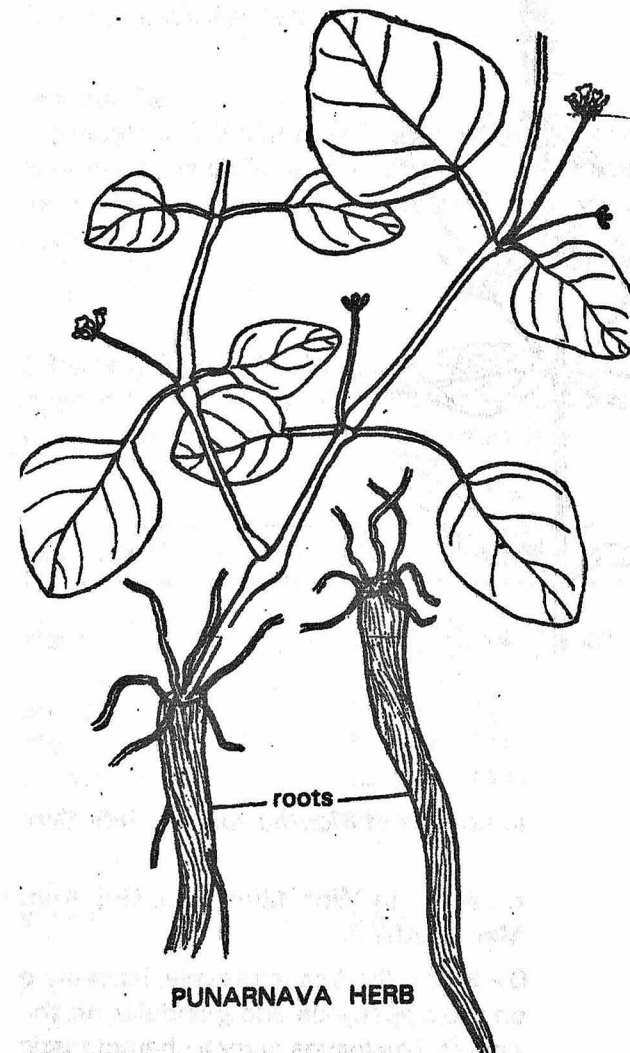
STEROLS – β -sitosterol, α -sitosterol, palmitic acid, ester or β -sitosterol, tetracosanoic, hexacosanoic, stearic and archidic acids.

ALLANTOIN – a nitrogenous compound, Hentriacontane and ursolic acid.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Diuretic. 2. Extensively used in cases of edema and ascites (those due to early cirrhosis of liver and chronic peritonitis).
3. Punarnava is used in 52 drug preparations (Kapoor & Mitra).

Punarnava is a controversial drug. Though *B. diffusa* is now well accepted all over as punarnava, *B. erecta*, *B. repens*, *B. repanda* and *B. verticillaster* are also used and sold as punarnava. To add to the confusion, *Trianthema decandra*, *T. pentandra*, *T. portulacastrum* and *T. monogyna* (Fam. Ficoideae) also appear in market as punarnava.



(1) Diuretics - Gokhru, Punarnava.

40. IPECAC

SYNONYMS AND REGIONAL NAMES: Ipecacuanha

BOTANICAL SOURCE: Ipecac consists of dried root and rhizome of *Cephaelis ipecacuanha* and *Cephaelis acuminata*

FAMILY: Rubiaceae

MORPHOLOGY:

Shape: – cylindrical

Colour: – reddish brown to dark brown, inner wood is yellow;

Size: – 5 – 15 cm(l), 4 – 6 mm(t);

1.

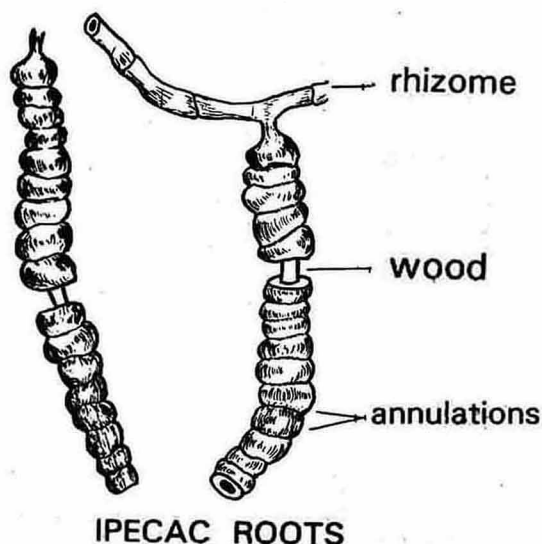
Surface: – annulated externally and the annulations are broad, rounded and completely encircle the root.

Annulated bark often gets separated from the wood;

Fracture: – short (bark), splintery (wood);

Fractured surface – wide greyish bark and small dense wood,

Odour: – slight and **Taste:** – bitter.



CHEMICAL CONSTITUENTS: ALKALOIDS – Isoquinoline alkaloids (2 to 6%)

– Emetine (1.4 – 1.7%) – Cephaeline (0.5 – 1.2%)

– Psychotrine (0.05%)

– Psychotrine methylether and – Emetamine.

THERAPEUTICAL AND PHARMACEUTICAL USES: Antidysentrics

In amoebic dysentery.

Expectorant in dry bronchitis.

Emetic (causes vomiting).

CHEMICAL TEST:

Test for Emetine: To 0.5 g of the powdered Ipecac add 20 ml HCl and 5 ml water. Filter and to the filtrate add 0.01 g of potassium chlorate; formation of yellow colour is due to emetine.

(m) Antidysentrics - Ipecacuanha.

41. BENZOIN

SYNONYMS AND REGIONAL NAMES: Gum benzoin, San. Sriloban;
Hin. Luban; Kan. Lobana; Sambrani.

BOTANICAL SOURCE:

Benzoin is a balsamic resin obtained from *Styrax benzoin* Dryand or *S. paralleloneurus* Perkin, known in commerce as Sumatra Benzoin, or from *S. tonkinensis* (Pierre) Craib ex Hartwigh, known in commerce as Siam Benzoin (Fam.

It contains not less than 25% of total balsamic acids, calculated with reference to dry alcohol soluble matter.

FAMILY: Styraceae

MORPHOLOGY: FORM: Appears as hard masses consisting of tears embedded in a translucent, reddish brown matrix. Size – varies; Surface – rough but smooth tears; Fracture – brittle; Odour – aromatic, balsamic and pleasant and Taste – slightly acid.

CHEMICAL CONSTITUENTS:

SUMATRA BENZOIN

Balsamic acids – Cinnamic acid 20%

– Benzoic acid 10%

Triterpenoid acids – Siarresinolic acid (19 hydroxy oleanolic acid)

– Sumaresinolic acid (6 hydroxy oleanolic acid)

Alcohol soluble extractive – not less than 70%

SIAM BENZOIN

Balsamic acids – Cinnamic acid in traces

– Benzoic acid 10%

Coniferyl benzoate – 70%

Vanillin and some triterpenoid acids

Alcohol soluble extractive – not less than 90%

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Expectorant 2. Antiseptic 3. Tincture

is used in cosmetic solutions and as an inhalation aid in respiratory diseases.

CHEMICAL TESTS

1. Solubility: Insoluble in water but partially soluble in alcohol.
2. Benzoin when gradually heated, evolves white fumes of cinnamic and benzoic acids which on condensation form crystalline sublimate.
3. Siam benzoin gives a green colouration when its alcoholic extract is added to an alcoholic soln. of FeCl_3 . Sumatra benzoin however, does not answer.
4. 2 g of coarse Sumatra benzoin is heated with 10 ml of 1% KMnO_4 soln. whereby bitter almond odour (oxidation of cinnamic acid) of benzaldehyde is produced. Siam benzoin because of its small quantity of cinnamic acid does not answer this test.

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

42. MYRRH

SYNONYMS AND REGIONAL NAMES: Myrrha, Arabian or Somali Myrrh
San. Vola, Rasagandha, Saindhava Hin. Bol Kan. Bolā

BOTANICAL SOURCE:

Myrrh is oleo-gum-resin obtained by incision from stem of *Commiphora molmol*

FAMILY: Burseraceae

MORPHOLOGY:

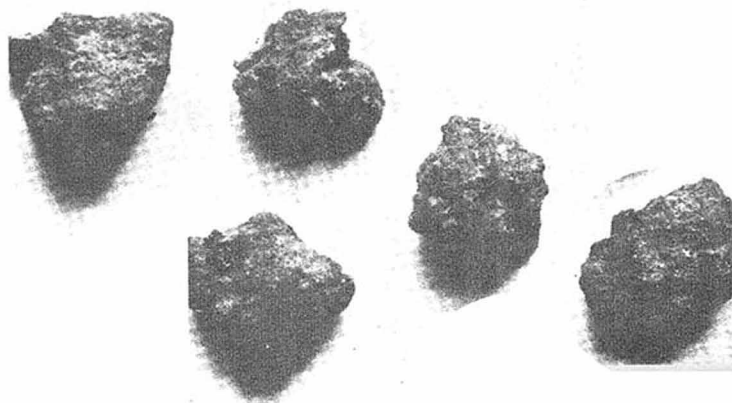
FORM: Irregular rounded tears or lumps of agglutinated tears;

COLOUR: Reddish yellow or reddish brown; **SIZE:** Variable;

SURFACE: Rough, covered with fine yellow powder;

FRACTURE: Brittle, fractured surface brown, shining, oily and with whitish marks;

ODOUR: Aromatic; **TASTE:** Bitter.



CHEMICAL CONSTITUENTS:

VOLATILE OIL (2.5 – 8%)

Phenol-eugenol – cuminic aldehyde, – α pinene – limonene and sesquiterpenes

RESIN (25 – 40%) – Resin acids like, α - β - γ -commiphoric acids

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Flavouring agent 2. Carminative (relieves excessive gas collected in the stomach) 3. Digestive – increases the appetite 4. Abortifacient (an agent that promotes abortion).

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

43. NEEM

SYNONYMS AND REGIONAL NAMES: Margosa.

BOTANICAL SOURCE: Neem consists of all aerial parts of plant known as *Azadirachta indica*, family

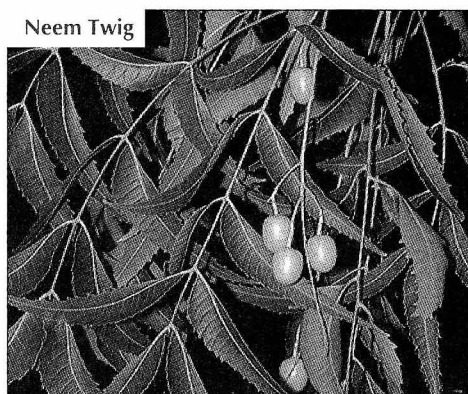
FAMILY: Meliaceae.

GEOGRAPHICAL SOURCE: Neem is found in India, Pakistan, Bangladesh, Sri Lanka, Thailand, Malaysia, Africa and East Africa, Mauritius, Fiji, South

MORPHOLOGY:

LEAVES: Alternate, exstipulate, imparipinnate leaflets 20 - 25 cm in length lanceolate closely clustered towards the ends of branches. The leaves have serrate margin, green colour and bitter to test.

Bark: Moderately thick, rough, brown in colour longitudinally and obliquely furrowed. Internally starchy white, laminated with characteristic smell of neem and bitter in taste.



CHEMICAL CONSTITUENTS:

Good number of chemicals isolated from the plant belong to the classes diterpenes (sugiol), nimbiol (bark), triterpenes : β -sitosterol, stigmasterol (leaf), Limonoids : Meliantriol (seed oil) Nimbidin (seed oil), Nimbendiol (seed oil) and azadirachtin (seed), sulphurous compounds : Number of cyclic tri and tetrasulphides (leaves), flavonol glycosides : Nimaton, quercetin, myrecetin, kaempferol. Neem leaves contain not less than 1.0% w/w of Rutin.

Leaves	: Azadirachtin	- insect repellent		
	Meliantriol	- anti-feedant	Salanin	- anti-feedant
Seeds	: Nimbin	- Antiviral action		
	Nimbidin	- Antiviral action	Azadirachtin	- Insect repellent
Flowers	: Nimbosterol, Myricitin, Kaempferol	- Insecticidal		
Fruits	: Deacetyl azadirachtinol	- Paralyzes insects swallowing mechanisms		
Bark	: Nimbin, Nimbinin, Nimbidin	- Antiviral		
	Margolone, Margolonone	- Antibacterial		
Roots	: Excellent for reforestation			
	Compounds with antibacterial and antifungal properties.			

The neem oil contains 2% of bitters, which are sulphur containing compounds nimbin, nimbidin, nimbinin and nimbidol. Azadirachtin-k, new tetraterpenoid has been isolated from seed kernels of neem alongwith other compounds such as nimbolide, olichinolide B, nimbin, 6-deacetyl-nimbin, salanin and azadiradione.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Recently, it has been studied scientifically and reported that it contains different chemicals which have insect repellent, insecticide, antifeedant, nematocide and antimicrobial properties. The seed oil has spermicidal activity.

Important Commercial Neem Products Margosan - O - U.S.A. ; Vepaside - India
Neem oil - Spermicidal agent.
Neem cake - Anti-nematodes

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

44. TURMERIC

SYNONYMS AND REGIONAL NAMES: Curcuma, Indian Saffron, San. Haldi, Haridra, Hin. Haldi, Kan. Arisina,

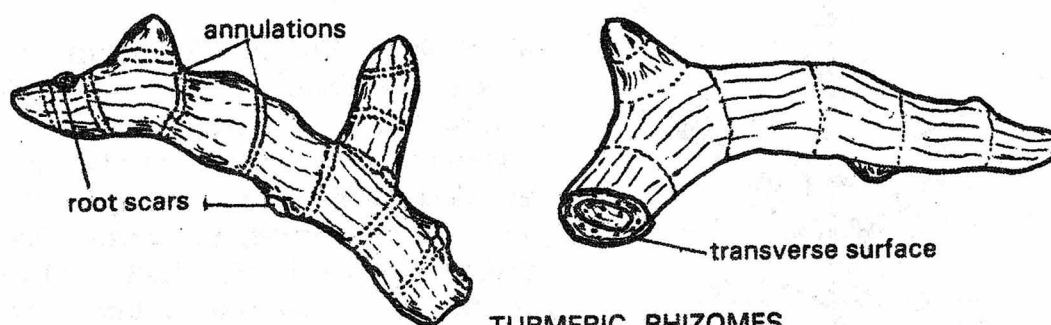
BOTANICAL SOURCE:

Turmeric consists of the dried rhizomes of *Curcuma longa*

FAMILY: Zingiberaceae

MORPHOLOGY:

FORM: Primary rhizomes ovate, oblong or pyriform and are called in commerce as 'bulb' or 'round turmeric'; whereas the lateral rhizomes are more cylindrical and often short, branched and they are called 'long turmeric'. Colour – yellow to yellowish brown externally, yellow to yellow orange internally. Size – the round form is about half as broad as 'long'. The long forms are about 4 to 7 cm(l) and 1 to 1.5 cm(w); Surface – root scars and annulations are seen, Fracture – horny; Odour – aromatic; Taste – aromatic and bitter.



TURMERIC RHIZOMES

CHEMICAL CONSTITUENTS:

CURCUMINOIDS (non-volatile colouring matter – 5%)

Curcumin, a diferuloylmethane – desmethoxy curcumin, a dicinnamoylmethane
Bidesmethoxy curcumin

VOLATILE OIL (5%) – sesquiterpenes (60%) like-1-cycloisoprenmyrcene

- zingiberene (25)%, tumerone, ar-tumerone, α atlantone, γ atlantone
- phellandrene, sabinene, and so also cineole, borneol and curcumone

SUGARS – arabinose (1%), fructose (12%) and glucose (28%)

Bitter substances, fixed oil and acids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Choloretic and cholagogue
2. Anti-inflammatory agent
3. Aromatic, stimulant, tonic and carminative
4. Anti-fertility agent 5. In respiratory diseases 6. To lower the blood cholesterol level
7. Externally applied in pains and bruises 8. As a colouring agent
9. In cosmetics 10. Anti-microbial.

CHEMICAL TESTS:

1. Con. H_2SO_4 or a mixture of H_2SO_4 with alcohol (90%) imparts a deep crimson colour to turmeric
2. Boric acid colours to reddish brown which on addition of alkalies becomes greenish blue.

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

45. CINCHONA

SYNONYMS AND REGIONAL NAMES: Cinchona bark, Jesuit's bark, Peruvian bark

BOTANICAL SOURCE: Cinchona is bark of trees of *Cinchona calisaya*,
Cinchona ledgeriana, *Cinchona officinalis*, *Cinchona succirubra*

FAMILY: Rubiaceae

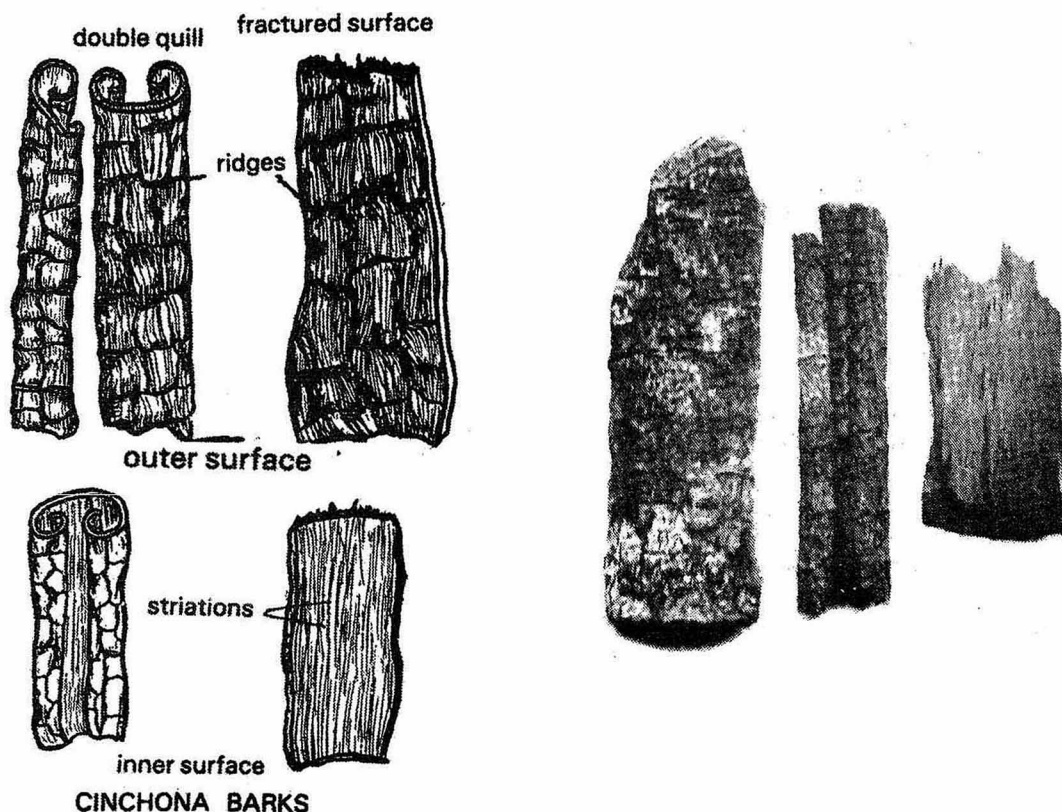
MORPHOLOGY:

CONDITION: Dry, **SHAPE:** Flat, channelled, single quill or double quill

SURFACE: Rough, **SIZE:** Varies, **OUTER SURFACE:** Reddish brown,

INNER SURFACE: Dark reddish brown, **FRACTURE:** Short and fibrous

TASTE: Bitter and astringent; **ODOUR:** Characteristic.



CHEMICAL CONSTITUENTS: ALKALOIDS (6-7%)-Quinoline alkaloids, Quinine (50-60%), Quinidine, Cinchonine, Cinchonidine

QUINOVIN- a bitter glycoside also responsible for the bitter taste, yields on hydrolysis quinovalc acid and quinovose, a sugar derivative.

TANNINS- Phlobatannins.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Antimalarial in nature, Compound cinchona tincture, bitter stomachic, antipyretic, Quinine and its salts are used in treatment of malaria, Quinine is a protoplasmic poison, especially for protozoa like plasmodium vivax, p. falciparum, p. malarie and p. fatal and used as powerful antimalarial drug. Quinidine is primarily a cardiac depressant and used to prevent certain arrhythmias and tachycardia. Quinidine is valuable prevention of atrial fibrillation.

Substitutes: Cuprea bark (*Remijia pedunculata*), contains quinine, quinidine

CHEMICAL TESTS

Thalleioquin Test: Residue of bark extract + 1 drop of dil. H_2SO_4 + 1 ml H_2O . To this mixture bromine water is added dropwise till permanent yellow tinge is obtained and then on addition of 1 ml dil. ammonia soln. emerald green colour is obtained indicating the presence of quinoline alkaloids.

(o) Antimalarials - Cinchona.

46. ERGOT

SYNONYMS AND REGIONAL NAMES: Ergot of Rye *Secale cornutum*

BOTANICAL SOURCE:

Ergot is the dried sclerotium of *Claviceps purpurea* developed on Rye plants, *Secale cereale* L (Fam. Graminae). It contains not less than 0.19% of the total alkaloids of Ergot, calculated as ergotoxine, of which not less than 15.0% consists of water soluble alkaloids of Ergot, calculated Ergometrine.

FAMILY: Hypocreaceae)

MORPHOLOGY: SCLEROTIUM; SHAPE: Fusiform, slightly curved, tapering towards both ends, occasionally straight, 3 or 4 sided; **COLOUR:** Dark violet to black; **SIZE:** 1.5 to 4 cm(l) and 2 to 7 mm(b); **SURFACE:** Longitudinal furrows and transverse cracks conspicuous on concave side; **FRACTURE:** Short, fractured surface shows a thin dark purple outer layer of tissues and a whitish or pinkish white, central zone with darker lines radiating from the centre; **ODOUR:** Faint and characteristic; **TASTE:** Characteristic and unpleasant.

CHEMICAL CONSTITUENTS:

ALKALOIDS Indole type (0.1 to 0.8%).

1. Water soluble	2. Water Insoluble (ether soluble)	
Ergometrine grp.	a) Ergotamine grp.	b) Ergotoxine grp.
Ergometrine	Ergotamine	Ergocristine
Ergometrinine	Ergotaminine	Ergocristinine
	Ergosine	Ergocryptine
	Ergosinine	Ergocryptinine
		Ergocornine
		Ergocorninine

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Oxytocic (hastens the child delivery) – Ergometrine grp.
2. Antiepinephrine activity (an agent that neutralizes the action of adrenaline only) – Ergotamine grp.
3. In the treatment of persistent migraine (a type of headache).
4. Sympathicolytic (a drug that neutralizes the action of sympathetic nervous system).

ERGOT OF RYE



(p) Oxytocics - Ergot.

Further, all alkaloids are derivatives of either lysergic acid or isolysergic acid. In the *Ergometrine* alkaloids, lysergic acid or its isomer is linked to an *Amino alcohol*. The water insoluble alkaloids are polypeptides in which lysergic acid or its isomer is linked to *Amino acids*. If the amino acids involved in Ergotamine group are for instance XYZ, the amino acids in Ergotoxine group are XMZ. Only the lysergic acid derivatives (d-series) whose words end in 'ine' are active. The alkaloid derivatives (d-series) whose words end in 'nine' are inactive. Though the proportion of different groups is different in different races of ergot, the polypeptides are more than the other group.

Prof. Wagner of West Germany however presents the chemical constituents in a different way. According to him around 30 alkaloids are known to occur and these are classified chiefly into two groups – (a) *Lysergic acid* (therp. important) alkaloids and (b) *Clavine alkaloids* (therp. not important). The basic ring for both types is 'ergoline'. The lysergic acid alkaloids are further divided into two groups – (a) Acid amide alkaloids – Ergometrine.. water soluble (b) Peptide alkaloids – Ergotamine and Ergotoxine – water insoluble.

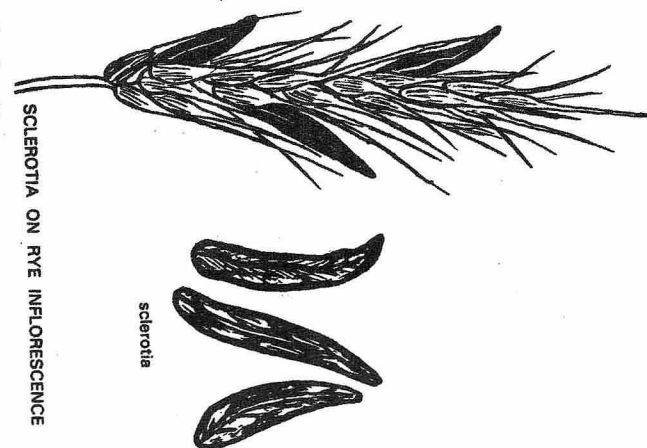
Besides the drug also contains 30% fat which in turn contains about 35% Ricinoleic acid ester. The cell walls are chitinous in nature.

STORAGE:

Ergot is eaten by insects, moulds and bacteria. After collection it should be thoroughly dried, kept entire and stored in a cool place. If powdered and not immediately defatted the activity decreases, but if defatted and carefully stored in an airtight container, it will remain active for a long period. Bad sample of ergot deteriorates completely.

CHEMICAL TEST

Ergot alkaloids – Apply a spot of an extract of ergot dissolved in chloroform to a piece of filter paper and allow to dry. Spray with 1% soln. of p – dimethylamino-benzaldehyde in a mixture of equal parts of ethanol and HCl and warm the paper in hot air. Ergot alkaloids and LSD give a purple colour.



47. SHARK-LIVER OIL

SOURCE: Shark-liver Oil is the oil obtained from the fresh or carefully preserved livers of the shark—*Hypoprion brevirostris*. It contains in 1 g not less than 6000 International Units of Vitamin 'A' activity.

NATURE: Colour – pale yellow to brownish yellow; Odour – fishy and Taste – fishy and bland; Solubility – miscible in light petroleum (50° – 60°), ether, chloroform and slightly soluble in alcohol.

CHEMICAL CONSTITUENTS: Vitamin A and glycerides of saturated and unsaturated fatty acids. The concentration of Vitamin A ranges from 15000 to 30000 units per gram.

(q) Vitamines - Shark liver Oil and Amla.

48. AMLA

SYNONYMS AND REGIONAL NAMES: San. Amlika; Hin. Amla, Aonla Kan. Nellikai;

BOTANICAL SOURCE:

Amla consists of the fresh or dried fruit of *Emblica officinalis*
Phyllanthus emblica Linn. (Fam.

FAMILY: Euphorbiaceae

MORPHOLOGY: TYPE OF FRUIT: Drupe (tricarpellary); **COLOUR:** Pale green to yellow and pink when ripe; **Form** – globose, spherical, fleshy, 6 grooved; **Size** – 1.3 to 1.6 cm(d), mesocarp – fleshy and edible and endocarp stony; **Odour** – none; **Taste** – pleasantly sour.

CHEMICAL CONSTITUENTS:

TANNINS (13 of them), **PHYLLEMBELIN**

– Gallic acid, Ellagic acid and Glucose

Rich source of **PECTINS** and **VITAMIN C** (600-921 mg/100 g).

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Liver tonic 2. As an aperient (a gentle purgative) 3. In the treatment of jaundice, dyspepsia and cough 4. Cooling, diuretic, astringent and in biliousness 5. It is one of the ingredients of 'Triphala' 6. Richest known source of Vitamin C (ascorbic acid) – Antiscorbutic (counteracting scurvy – disease due to deficiency of ascorbic acid) 7. Antibacterial and Antifungal 8. A mild cerebral depressant 9. Antispasmodic 10. Used in gastritis syndrome to antagonize gastric acid secretions.

(q) Vitamines - Shark liver Oil and Amla.

49. PAPAYA

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE:

Papain is a mixture of proteolytic enzymes derived from the latex of unripe fruit of tropical melon tree, *Carica papaya*, belonging to family

FAMILY: Caricaceae

METHOD OF PREPARATION:

For processing of papain, the latex of these fruits is collected in aluminium trays. To the collected latex, potassium metabisulphite (5 g/kg of latex) is added. The extraneous matter is cleared out by passing through sieves and latex is dried in vacuum shelf drier at 55 - 60°C. It is also processed by spray-drying method. This dried latex is called papain.

DESCRIPTION

Papain is available as light brown or white coloured amorphous powder with typical odour and taste. It shows maximum proteolytic activity between pH 5 - 6. It is soluble in water and glycerine.

CHEMICAL NATURE

The different proteolytic enzymes present in papain are the mixture of papain and chymopapain, proteolytic enzymes act on polypeptides and amides.

IDENTIFICATION TEST

1. It decolourises aqueous potassium permanganate solutions.
2. It causes curdling of milk (Proteolytic activity).

THERAPEUTICAL AND PHARMACEUTICAL USES:

It is used in clarification of beverages and as a meat tenderiser. It is employed in cheese manufacture as a substitute of rennin. It is also used for degumming of silk fabrics in textile industry and in leather industry for removing hairs of skins and hides.

Medicinally, it is used as an anti-inflammatory agent. It has shown relieving symptoms of episiotomy.

One NF unit of papain represents the activity which releases equivalent of 1 µg of tyrosine from a standard casein substrate.

In 1995-96 and 1996-97, India has exported pure papain of ₹ 132 lakhs & ₹ 143 lakhs respectively.

(r) Enzymes - Papaya, Diastase, Yeast.

50. DIASTASE

SYNONYMS AND REGIONAL NAMES: Amylase

SOURCE:

Diastase is one of the amylolytic enzymes present in saliva: i.e. salivary diastase or *ptyalin* and pancreatic diastase or *amyllopsin*, found in digestive tract of animals (Also known as *animal diastase*).

It is also formed during the germination of barley grains and known as *Malt diastase*.

Several other amylolytic enzymes or carbohydrates of commercial importance are known, many of them are also used in therapeutics.

Zymase, maltase, sucrase, cellulase, invertase, hyaluronidase, lysozyme are amongst the important amylolytic enzymes.

DESCRIPTION:

It is a yellowish white, amorphous powder obtained from the infusion of malt. Diastase has faint characteristic odour.

SOLUBILITY:

It is soluble in water forming colloidal solution, it is precipitated by alcohol.

PROPERTIES:

Like other enzymes, it is thermolabile and sensitive to a temperature more than 45°C. Diastase is active between 35° - 40°C. It is active in solution having pH range of 6 - 7. Acidic range of pH up to 4 causes its deactivation.

Diastase catalyses the hydrolysis of 1, 4-glycosidic linkages of polysaccharides: such as starch and glycogen. Diastase can convert 50 times its weight of potato starch into sugars.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Diastase from various sources is used as digestant. It is used in the production of predigested starchy foods and also for the conversion of starch to fermentable sugars in fermentation and brewing industries.

(r) Enzymes - Papaya, Diastase, Yeast.

51. YEAST

SYNONYMS AND REGIONAL NAMES: Brewer's yeast, Baker's yeasts.

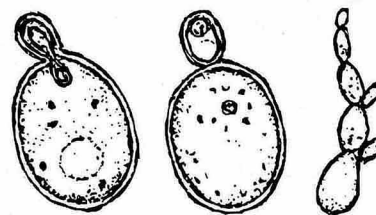
BOTANICAL SOURCE: Yeast is a unicellular fungal microorganism *Saccharomyces cerevisiae*. The natural habitat of this microorganism is food juice, bread and several fermented, or fermenting media. On large scale, yeast is produced by using citrus, molasses, molasses wort, grain wort, etc.

Yeast is a collective term for fungi which under normal conditions of growth contain a vegetative body of simple individual cell. It is a unicellular fungus rarely forming mycelia containing small but, definite nuclei and reproducing by budding and ascospore foramen or otherwise. About 350 species are known until now. Yeasts are classified according to their uses whereto they are put or based on their morphological characters. Wine yeast, baker's yeast, brewer's yeast; distiller's yeast are the common examples of various types of yeast. In pharmaceutical industry, either the brewers' yeast or the baker's yeast is used. Yeasts can also be classified as per their morphological character based on formation of ascospore; formation of true or pseudomycelium and reproduction by budding or fission.

Yeast forming ascospore is known as Ascomycetes and that which does not form ascospore is called as *fungi imperfecti*.

FAMILY: Saccharomycetaceae.

DESCRIPTION: COLOUR: Whitish powder **ODOUR:** Characteristic
Unicellular microorganism measuring less than 1.5 μ .



Budding yeast

MICROBIAL LIMITS

One gram should comply for absence of *E.coli* and salmonella.

MANUFACTURE OF YEAST:

Various substrates are used for the commercial production of yeast as mentioned above. But common and industrially used are beet and cane-molasses. A suitable strain like *S. cerevisiae* is grown and it is transferred to sterilized substrate. The equipment is sterilized to get rid of bacteria and other microorganisms. The nutrient medium on which the yeast is grown is continuously added to the culture medium.

It is confirmed that the sugar content of nutrient medium is not more than 1 per cent. The pH is kept in between 4 to 4.5 and temperature at 25 to 30°C. Nitrogenous nutrients like ammonium sulphate and super phosphate are added to the nutrient medium and fermentation is allowed to take place for about 11 hours. Yeast is separated in centrifuge, washed with sterilised cold water, press filtered and finally dried. The moisture content of the final product is maintained at 75 per cent and it is filled in containers and stored at low temperature.

CHEMICAL CONSTITUENTS:

The yeast contains about 65 to 85 per cent of moisture, nitrogenous compounds (proteins), glycogen, fat, vitamins and ash. Vitamins reported are from vit B group i.e. thiamine, riboflavine, nicotinic acid, pantothenic acid, folic acid, biotin, etc. The enzymes invertase, diastase, Zymase and maltase are present in yeast.

THERAPEUTICAL AND PHARMACEUTICAL USES:

The yeast is used in manufacture of alcohol, beer and various wines and in the bread industry to raise dough. Irradiated yeast has been used as a source of Vitamin D. Glutathione and invertase are also manufactured from yeast. It is a good source of protein. During 1995 - 96 and 1996 - 97 India has exported yeast of ₹ 89 lakhs and ₹ 36 lakhs respectively.



(r) Enzymes - Papaya, Diastase, Yeast.

52. PEPPERMINT OIL

SYNONYMS AND REGIONAL NAMES: *Oleum mentha piperita*, Colpermin, Mentha oil.

BOTANICAL SOURCE:

Mentha oil obtained by steam distillation of fresh flowering tops of plant known as *Mentha piperita*. Mentha oil contains not less than 4.5% and not more than 10% w/w of esters calculated as menthyl acetate, not less than 44% of free alcohols calculated as menthol and not less than 15% and not more than 32% of ketone calculated as menthone.

FAMILY: Labiatae.

MORPHOLOGY:

COLOUR: Colourless to yellow., **ODOUR:** Characteristic and pleasant.

TASTE: Pungent followed by cooling sensation.

SOLUBILITY: It is soluble in 70 per cent alcohol, ether and chloroform and insoluble in water.

CHEMICAL CONSTITUENTS:

Peppermint oil contains chiefly *l*-menthol to the extent of 70 per cent in free, as well as, in the form of esters, depending upon variety (like American, Japanese, Indian). American peppermint oil contains 80 per cent menthol while Japanese oil contains 70 - 90 per cent. Other important constituents of the peppermint oil are menthone, menthofuran, jasmone, menthyl isovalerate, menthyl acetate and several other terpene derivatives. The other terpenes include *l*-limonene, isopulegone, cineole, pinene, camphene, etc. Jasmone and esters are responsible for pleasant flavour, while menthofuran causes resinification and develops dirty smell.

Mentha oil is obtained by steam distillation from *Mentha arvensis* var-*piperascens* (Japanese Mint), commercially cultivated in U.P., Himachal Pradesh, Punjab, Haryana, Jammu and Kashmir and Central India. It contains about 80 per cent *l*-menthol. It is also cultivated in Japan, Brazil and California. The yield of oil is upto 1.2 per cent v/w, as compared to 0.8 per cent v/w *M. piperita*.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Peppermint or Mentha oil is used as carminative, stimulant and flavouring agent. It has mild antiseptic properties too. It is used in toothpaste, tooth powders, shaving creams and different pharmaceutical dosage forms. It is also consumed in preparation of chewing gums, candies, jellies, perfumes and essences.

CHEMICAL TEST:

A few drops of peppermint oil are mixed with 5 ml of nitric acid solution (prepared by adding 1 ml of nitric acid to 300 ml of glacial acetic acid, heat on water bath. Within five minutes liquid develops – blue colour, which on further heating deepens and shows copper colours fluorescence after some time it becomes golden yellow.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.

53. LEMON PEEL

SYNONYMS AND REGIONAL NAMES: Lemon peel;
San. Jambira; Hin. Kambira-ka-chilka; Kan. Nimbe-sippe;

BOTANICAL SOURCE:

Lemon Peel is outer part of ripe or nearly ripe fruit of *Citrus limon*
fruit is gathered when green and nearly ripe.

FAMILY: Rutaceae

MORPHOLOGY: TYPE:

Fresh fruits: Colour – greenish yellow on outer surface;
Nature – smooth, oily, glossy and more or less pitted; Small amount of white
spongy pericarp is seen on inner surface; Odour – sweet and aromatic
Taste – bitter.

CHEMICAL CONSTITUENTS:

VOLATILE OIL (2 – 5%) — Aldehydes like Citral and Citronellal
— Terpenes like Limonene (90%) etc.

FLAVONOIDS – Neohesperidin and Naringin

VITAMIN C

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Flavouring agent.
2. Pharmaceutical aid.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil,
Lemon grass Oil, Sandalwood.

54. ORANGE PEEL

SYNONYMS AND REGIONAL NAMES:

San. Nagaranga; Hin. Naranji- ka-chilka; Kan. Musambi sippe;

BOTANICAL SOURCE:

Orange Peel is the dried outer part of the pericarp of the ripe or nearly ripe fruits of *Citrus chysocarpa* *Citrus aurantium*

FAMILY: Rutaceae

CHEMICAL CONSTITUENTS:

VOLATILE OIL (2.5%) – Limonene – Citral – Citronellal

– α Terpineol – Linalyl-and-Geranylacetate.

VITAMIN C GLYCOSIDE – Flavonoid Glycosides (5 to 14%) – Hesperidin
– Neohesperidin.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil,
Lemon grass Oil, Sandalwood.

55. LEMONGRASS OIL

SYNONYMS AND REGIONAL NAMES: Indian Oil of Verbena, Indian Melissa Oil;
Hin. Gandhbina ka tel;

BOTANICAL SOURCE: Lemongrass Oil is volatile oil obtained by steam distillation from Leaves of *Cymbopogon citratus*

FAMILY: Graminae

NATURE: COLOUR- Dark yellow to brownish red; Odour – strong and characteristic.

CHEMICAL CONSTITUENTS:

Citral (65 to 86%) – geraniol, myrcin (12 – 20%) – methyl heptenone.
dipentene – citronellal – linalool, α -terpineol.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. In the commercial production of Citral.
2. In the soap industry.
3. As a taste corrector in liquor industry.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil,
Lemon grass Oil, Sandalwood.

56. SANDAL WOOD OIL

SYNONYMS AND REGIONAL NAMES: East Indian sandal wood oil.

BOTANICAL SOURCE:

Sandal oil is obtained by distillation from the heart-wood of *Santalum album*

FAMILY: Santalaceae.

GEOGRAPHICAL SOURCE:

The plants are found in India and Malaysia. Sandalwood tree is an evergreen plant of 10 - 12 m height found widely distributed in India.

MORPHOLOGY: COLOUR: Pale yellow to colourless viscid liquid

ODOUR: Characteristic, persistent. **TASTE:** Unpleasant.

SOLUBILITY: It is very slightly soluble in water and soluble in alcohol and chloroform.

CHEMICAL CONSTITUENTS:

Oil of sandal contains about 95 per cent of two isomeric sesquiterpene alcohols, α - santalol (b.p. 300 - 301°C) and β - santalol (b.p. 170 - 171°C). Additionally, the oil contains an aldehyde santalol $C_{16}H_{22}O$, santene, santenone, teresantol, santalone and santalene. The oil is present in elements of wood. It is not present in or secreted by any special types of cells or glands.

STANDARDS OF QUALITY

Specific gravity : 0.973 - 0.985

Optical rotations : 15° - -20°

Refractive index : 1.500 - 1.510

Esters : Not less than 2 per cent w/w as santolyl acetate

Alcohols : Not less than 90 per cent w/w as santalol



Sandal wood plant

THERAPEUTICAL AND PHARMACEUTICAL USES:

Sandal wood oil is used for symptomatic treatment of dysurea and in diminishing the frequency of micturition marked in the tuberculosis of the bladder. It is mainly used as a perfume in preparation of cosmetics and incense sticks.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.

57. HONEY

SYNONYMS AND REGIONAL NAMES: Honey, H.S.Madhu; Kan. Jenu tuppa;

BIOLOGICAL SOURCE:

Honey is a sugary secretion deposited in honey comb by bee *Apis dorsata* and *Apis indica*, *Apis florea*

FAMILY: Apidae

MORPHOLOGY:

NATURE: Viscous, translucent liquid; **COLOUR:** Yellowish to dark brown; **ODOUR:** Agreeable; **TASTE:** Sweet; **SOLUBILITY:** Soluble in water and alcohol.

CHEMICAL CONSTITUENTS: CARBOHYDRATES – Invert sugars 70 – 80% (equimolar mixture of dextrose and fructose), sucrose (0.1 – 10%).
Enzymes, vitamins, micro elements and mineral substances and organic acids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a pharmaceutical aid.
2. Nutrient and demulcent (soothing).
3. Laxative.
4. As a pill excipient (in the preparation of pills).

CHEMICAL TESTS:

1. TEST FOR REDUCING SUGARS:

0.5 g of honey is dissolved in 10 ml of water and boiled after adding Fehling's soln. A heavy red ppt. of copper oxide is seen indicating presence of reducing sugars.

2. SELIVANOFF'S TEST:

To test soln. a crystal of resorcinol is added and also equal volume of con. HCl. on warming over a water bath, ketoses like honey, fructose etc., give rose colour.

3. DETECTION OF DEXTRIN:

1 ml of honey is mixed with 4 ml of alcohol whereby more than a slight turbidity indicates the presence of dextrin from added glucose.

(DEXTRIN: Any of various polysaccharides obtained by hydrolysis of starch; a tasteless and odourless gummy substance that is used as a thickening agent and in adhesives and in dietary supplements)

4. FIEHE'S TEST: (To Detect Adulteration)

Artificial invert sugar sucrose and commercial liquid glucose are used as adulterants of honey. Release of furfural, which is not present in the natural honey, on acidic hydrolysis is detected in this test:

10 ml of honey is shaken thoroughly with 5 ml of ether till they are miscible and later separate on standing. The upper ethereal layer is evaporated to dryness in a porcelain dish. In natural honey, a transient red colouration is obtained on addition of 1 drop 1% resorcinol HCl while in artificial invert sugar, red colouration persists for sometime.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

58. ARACHIS OIL

SYNONYMS AND REGIONAL NAMES: Peanut, Earthnut, Groundnut.
San. Buchanaka; Hin. Munghphali; Kan, Nela Kadale;

BOTANICAL SOURCE:

Arachis Oil is a fixed oil obtained by expression from seeds of cultivated varieties of *Arachis hypogaea*

FAMILY: Leguminosae

NATURE:

Arachis oil is a non-drying oil; **COLOUR:** Almost colourless or yellowish;

FORM: Liquid; **ODOUR:** Nut like; **TASTE:** Bland.

CHEMICAL CONSTITUENTS:

LIPIDS – Mixture of glycerides.

– Oleic, Linoleic, Palmitic, Stearic, Archidic, Behenic and Lignoceric acids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a solvent for intramuscular injection
2. As a pharmaceutical aid
3. As a cooking oil
4. A valuable lubricant
5. In the preparation of soaps.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

59. STARCH

BOTANICAL SOURCE:

Starch consists of polysaccharide granules obtained from grains of

1. Maize	<i>Zea mays</i>	Graminae
2. Rice	<i>Oryza sativa</i>	Graminae
3. Wheat	<i>Triticum aestivum</i>	Graminae
4. Potato	<i>Solanum tuberosum</i>	Solanaceae

CHEMICAL CONSTITUENTS: CARBOHYDRATES

– Polysaccharides Water soluble 'Amylose' – Water insoluble 'Amylopectin'

'Amylose and Amylopectin' are two structurally different polysaccharides.

Amylose is a linear molecule consisting of 250-300 glucose units. Amylopectin consists of 300-1000 or more glucose units. Amylopectin is both linear and branched at points. Pasty nature and adhesive property of starch is due to Amylopectin.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. It is mainly used as a dusting power
2. As a pharmaceutical aid.
3. Used as an antidote for iodine poisoning.
4. Source of food-nutrition.
5. Protective and demulcent.
6. In paper-sizing and textile industry and in laundry practice etc.
7. It is the starting product from which liquid glucose, dextrose, dextrans are made.
8. Acts as a basis for identification of drugs in Pharmacognosy.

CHEMICAL TEST:

Boil a few mg of starch powder in 10 ml of water. On cooling a translucent viscous fluid or jelly is observed which turns deep blue on addition of solution of iodine. The colour disappears on warming and re-appears on cooling.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

60. KAOLIN

SYNONYMS AND REGIONAL NAMES: China clay, Porcelain clay, San. Gairika, Krishnamrittika. Hin. Chikminati

SOURCE:

Kaolin or hydrated aluminium silicate is a pure variety of clay, powdered and freed from gritty particles and other impurities.

CHEMICAL CONSTITUENTS:

ALUMINIUM SILICATE and in traces magnesium, Calcium and Iron

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Light Kaolin is used in cases of some gastric and intestinal affection.
2. Heavy Kaolin is used as a Pharmaceutical aid in Poultices and as pill excipient

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

61. PECTIN

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE:

Pectin is a purified carbohydrate product obtained from the dilute acid extract of the inner portion of the rind of citrus fruits, apple fruits, etc. A number of fruits and their juices are rich in pectins (Lemon 2 to 5%). Purified pectin is obtained from these fruits by extracting with dilute acids.

MORPHOLOGY:

NATURE: FORM: Powder; COLOUR: Yellowish white; Odourless

TASTE: Mucilaginous;

Molecular weight – around 25,000 – 90,000; Solubility – soluble in water in the proportion of 1:20, the resulting soln. being viscous, colloidal and acidic whereas in a different proportion with water namely 1:9, it forms a stiff gel.

CHEMICAL CONSTITUENTS:

It is a linear polymer of galacturonic acid with 1:4 α linkage. Around 50% of the carboxyl groups are esterified with methanol. In some, the OH groups are partly acetylated.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. In the treatment of diarrhoea and gastroenteritis.
2. In the treatment of wounds (2% sterile solution).
3. As a substitute for blood plasma.
4. In conjugation with Kaolin as an absorbant of intestine toxins.
5. To dampen and mask the taste. in the preparation of pills and tablets.
6. As a thickening agent
7. In the preparation of Heparinoids.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

62. OLIVE OIL

SYNONYMS AND REGIONAL NAMES: *Oleum Olivae*.

BOTANICAL SOURCE: Olive Oil is the fixed oil expressed from the ripe fruit of *Olea europaea* Linne,
FAMILY: **O**leaceae.

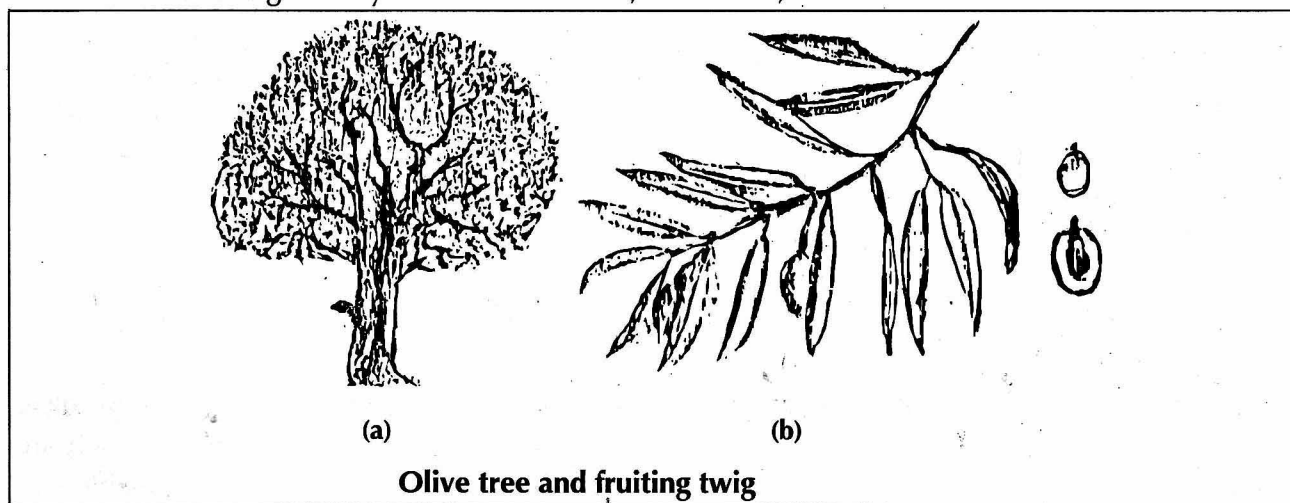
GEOGRAPHICAL SOURCE:

Olive tree, from which the oil is obtained, is native to Palestine and the countries near to Mediterranean sea. It is cultivated in United States and Southern Australia.

Olive oil is very commonly used in various countries along the Mediterranean sea. Among the largest producers of olive oil, Italy, Spain and Greece are the leading countries. The others are United States, Turkey, Tunisia, Morocco and Syria.

METHOD OF PREPARATION

It is prepared by crushing and pressing the ripe fruits called "Olives". The entire olive consists of 20 - 30 per cent oil and the fruit pulp has 60 - 80 per cent oil. The hydraulic presses are used to squeeze the oil out of fruit under low pressure. This type of technique is called cold pressing and it generates very little amount of heat, because of which it gives the best quality oil called 'virgin olive oil'. The further pressing gives low quality oil. The oil that comes from the last pressing is called olive residue and is generally used for cosmetics, medicines, etc.



MORPHOLOGY:

COLOUR: Pale yellow or greenish-yellow, ODOUR: Slight and characteristic

TASTE: Bland, faintly acrid

SOLUBILITY: It is slightly soluble in alcohol and miscible with carbon disulphide, chloroform and

CHEMICAL CONSTITUENTS:

The olive oil contains the triglycerides mainly in the form of Olein, palmitin and linolein.

CHEMICAL TEST:

Under ultra-violet radiation it gives deep golden-yellow colour, while refined oil at gives pale blue fluorescence Discolouring with charcoal removes fluorescence.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Externally, it is an emollient and soothing agent for inflamed surfaces. It is used to soften the skin and crusts in eczema and psoriasis; it is also used as an ingredient of ear wax.

Internally, it is used as nutrient, demulcent and as mild laxative. It is used as a vehicle for oily suspensions for injection.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

63. LANOLIN

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE:

Lanolin is obtained by purifying fat like substances from the wool of the sheep *Ovis aries*. The water content should be between 25 – 30% hence the name hydrous wool fat.

FAMILY: Bovidae

NATURE: COLOUR: Yellowish white; **CONSISTENCY:** -Ointment like;
ODOUR: Characteristic.

CHEMICAL CONSTITUENTS: LIPIDS

Fats – Cholesterol, isocholesterol, esters of fatty acids like lanopalmitic, lanoceric, carnaubic, oleic, myristic etc.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Water absorbable ointment base.
2. Emollient base for creams, ointments and cosmetics.

Note: Wool Fat or Anhydrous Lanolin is Lanolin containing not more than 0.25% of water.

CHEMICAL TEST:

Test is based on the presence of cholesterol. 0.5 g of Lanolin is dissolved in 5 ml of chloroform. Addition of 1 ml acetic anhydride and 2 drops of H_2SO_4 results in a deep green colour.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

64. BEESWAX

SYNONYMS AND REGIONAL NAMES: Beeswax San. Madhūjan Hin: Mom Kan. Mena

BOTANICAL SOURCE:

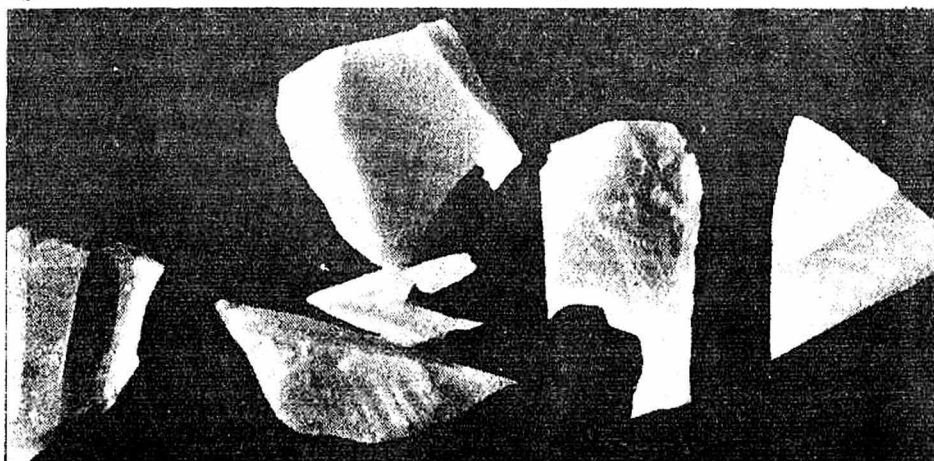
Yellow beeswax is the purified wax from the honey comb of the bee *Apis dorsata* L. and possibly other species of *Apis* White beeswax is however prepared from yellow beeswax by bleaching with certain chemicals.

FAMILY: Apidae

MORPHOLOGY:

COLOUR: White or Yellow; Fracture – brittle and granular;

SOLUBILITY: Soluble in chloroform, ether and in both essential and fatty oils, but insoluble in water. M.P. 62° to 64°. Ref. Index to 80°, 1,4380 to 1,4420, Sp. Gravity 0.958 to 0.970. Odour – honeylike, Taste – Waxy.



CHEMICAL CONSTITUENTS: LIPIDS – Wax
Myricyl palmitate (80%)
Wax-acids – Cerotic acid (15%)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a pharmaceutical aid
2. In the preparation of plasters, ointments and polishes.

CHEMICAL TEST

Fats, fixed oils and resins are often added to beeswax. These can be detected by the following test:

SAPONIFICATION CLOUD TEST:

Boil 0.5 g beeswax for 10 min. in 8 ml of 10% Sodium hydroxide soln. Make up the original volume, filter through glass wool and acidify with HCl. If fats, fatty acids or resins are present a ppt. is formed. Fats may be saponified by boiling with aq. sodium hydroxide. Waxes are saponified by strong alcoholic potash, but are practically unaffected by aq. alkali.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

65. ACACIA

SYNONYMS AND REGIONAL NAMES: San. Vabbula, Babbula; Hin. Babul; Kan. Gondu;

BOTANICAL SOURCE:

Acacia is dried exudation from stem and branches of *Acacia senegal* and certain other species of *Acacia*

FAMILY: Leguminosae

MORPHOLOGY:

Form – rounded or ovoid tears; Size – variable; Colour – colourless to slight yellowish tint; Fracture – brittle; Fractured surface – glossy; Odour – none; Taste – bland and mucilaginous.

CHEMICAL CONSTITUENTS:

CARBOHYDRATES – Polysaccharides – Arabin (a mixture of calcium, magnesium and potassium salts of arabic acid), Arabin on hydrolysis gives D – galactose, L-arabinose, L-rhamnose and D-glucuronic acid.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Demulcent
2. Emulsifying agent
3. Suspending agent
4. Binding agent.

CHEMICAL TESTS:

1. Solubility: Soluble in water and insoluble in alcohol.
2. A hot aqueous soln. of the gum is acidic.
3. A 10% aqueous soln. of the gum gives with dil. soln. of lead subacetate white precipitate.
4. Test for reducing sugars: Boil a soln. of gum in dil. HCl. Make the resulting soln. alkaline by adding a few ml of caustic soda. When Fehling's soln. is added to the resulting soln. and heated, a red ppt. of cuprous oxide is formed indicating the liberation of reducing sugars.
5. To a boiled soln. of gum in dil. HCl, barium chloride soln. is added when a white ppt. of barium sulphate is not obtained (distinction from Agar).
6. On adding Iodine soln. to an aqueous soln. of gum, no blue or brown colouration is obtained (absence of starch and dextrin).
7. On adding ferric chloride soln. to an aqueous soln. of the gum, no bluish-black colour is produced indicating the absence of tannins.
8. An aqueous soln. of gum is added to 0.5 ml of H_2O_2 soln. and 0.5 ml of alcoholic benzidine (1%). On vigorous shaking a blue colour is produced due to oxidase enzyme (this test however is not be performed in the lab. as it is alleged that benzidine is carcinogenic).

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

66. TRAGACANTH

SYNONYMS AND REGIONAL NAMES: Gum Tragacanth, Hin. Anjira.

BOTANICAL SOURCE:

Tragacanth is the dried gummy exudation obtained from the stem of *Astragalus gummifer*

FAMILY: Leguminosae

MORPHOLOGY:

FORM: flattened, lamellated, tough ribbon shaped pieces of horny structures, more or less curved or contorted; **COLOUR:** White or faint yellow; **SIZE:** about 2.5 cm(l); **FRACTURE:** Short; **ODOUR:** None; **TASTE:** Insipid and mucilaginous.

CHEMICAL CONSTITUENTS:

CARBOHYDRATE – a complex polysaccharide

- water soluble Tragacanthin (30 to 40%)
- water insoluble Bassorin (60 to 70%)

Tragacanthin in turn consists of (a) tragacanthic acid + (galacturonic acid + xylose + fucose + galactose) and (b) Arabinogalactan + (arabinose + galactose + galacturonic acid + rhamnose in small quantities)

Tragacanth also contains 3% starch and cellulose.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Used as a demulcent (soothing)
2. Suspending agent
3. Binding agent
4. Emulsifying agent
5. Laxative.

SUBSTITUTES AND ADULTERANTS:

1. Sterculia gum also called, Indian Tragacanth or Karaya gum is a substitute and official in some Pharmacopoeias. It is a dried gummy exudation obtained from the stem of *Sterculia urens* (Fam. Sterculiaceae). It is pathological in origin and used as a bulk laxative. In some properties it resembles Tragacanth and therefore erroneously called Indian Tragacanth. The gum occurs in irregular translucent, striated, occasionally vermiform pieces, white to brown to purple in colour; at times small fragments of bark may be attached. It has acetic acid odour. With water it forms colourless, transparent jelly. Some important differences between tragacanth and sterculia are tabulated below:

2. *Katira gum*: This appears in commerce as karaya gum. It is derived from *Cochlospermum gossypium* (Fam. Cochlospermaceae). The gum contains calcium oxalate crystal on the basis of which it is possible to distinguish this from others.

CHEMICAL TESTS:

1. Solubility – Partially soluble in water (distinction from Acacia & Agar).
2. On warming Tragacanth in a soln. of alcoholic potash a canary yellow colour is obtained. (distinction from Sterculia).
3. Greenish colour is obtained after boiling Tragacanth with strong iodine soln.
4. On mounting a small amount of the powdered drug in ruthenium red, it is not stained (Distinction from Agar and Sterculia).
5. Test for reducing sugars; To 4 ml of the aqueous soln. of Tragacanth, 1 ml of dil. HCl is added and heated on a water bath for 30 minutes. Divide this into two portions. To one portion of the resulting hydrolyzed mixture, 1.5 ml of NaOH is added to neutralize and again reheated with 3 ml of Fehling's solution whereby a red ppt. is formed indicating the presence of sugars. To the other portion a few ml of barium chloride soln. is added whereby no ppt. is formed (distinction from Agar).
6. On boiling 1 g with 20 ml of water, a mucilage is formed. Addition of a few drops of fresh lead acetate soln. to 1 ml of this muclilage, white ppt. is seen (distinction from Acacia).

Parameters	Tragacanth <i>Astragalus gummifer</i> (Leguminosae)	Sterculia <i>Sterculia urens</i> (Sterculiaceae)
a. Odour	not characteristic	marked acetic acid odour
b. Iodine test	starch present	absent
c. Ruthenium Red	no action	stains pink, mucilage present
d. Solubility in water	swells to gelatinous mass and becomes adhesive	low solubility but swells to many times to original volume becomes quite brittle
e. When boiled with solution of potash	canary yellow colour	slightly brownish colour
f. When hydrolysed with 5% phosphoric acid, has the volatile acidity	2 – 3%	not less than 14%
g. Melthoxy value	30 – 40	zero

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

67. SODIUM ALGINATE

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE:

Sodium Alginate or Algin is the purified carbohydrate product obtained from brown algae *Laminaria* species using dil. alkali.

FAMILY: Laminariaceae

MORPHOLOGY:

NATURE: Cream coloured powder, forms a viscous and colloidal soln. in water
Odourless and slightly sour in taste.

CHEMICAL CONSTITUENTS:

CARBOHYDRATE – Sodium salt of alginic acid. Alginic acid is a long chain polyuronide composed of 1 – 4 linkage residues of D-mannuronic acid and L-guluronic acids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. In cosmetics
2. In dermatological preparations.
3. In dental preparations
4. In adhesive paste
5. In textile industry
6. As a general emulsifier
7. In food industry.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

68. AGAR

SYNONYMS AND REGIONAL NAMES: Agar-Agar, Japanese isinglass

BOTANICAL SOURCE:

Agar is the dried colloidal concentrate from a decoction of various red algae, particularly species of *Gelidium* and *Pterocladia* and *Gracilaria*

FAMILY: Gelidiaceae

MORPHOLOGY:

FORM: Thin, membranous strips or flattened bands; **ODOUR:** None; **COLOUR:** Colourless, translucent, greyish yellow; **Size**—30–50 cm(l) and 4 mm(w); **SURFACE:** micaceous crinkled; **TASTE:** Mucilaginous

CHEMICAL CONSTITUENTS: GLYCOSIDES:

CARBOHYDRATES—Polysaccharides. Heterogenous polysaccharides consisting of two components (a) *Agarose* (b) *Agaropectin*.

(a) *Agarose* (70%), a neutral galactose polymer.

It is free from sulphate. The gel strength of Agar is due to this component. Agarose also called as Agarobiose is a disaccharide consisting alternate residues of 1, 4- α -linked 1, 3- β -D-galactose and 3,6-anhydro-L-galactose. While the disaccharide unit is called agarobiose or neoagarobiose, the linear chain is called agarose. In other words, (agarobiose)_n=agarose.

(b) *Agaropectin*, an acidic sulphonated component wherein

1, 3 linked D-galactose and the galacturonic acid (an uronic acid) are partly esterified with sulphuric acid. Agaropectin comprises 90% and more of sulphur. In addition, the sulphate group may also get linked to calcium, magnesium, potassium or sodium.

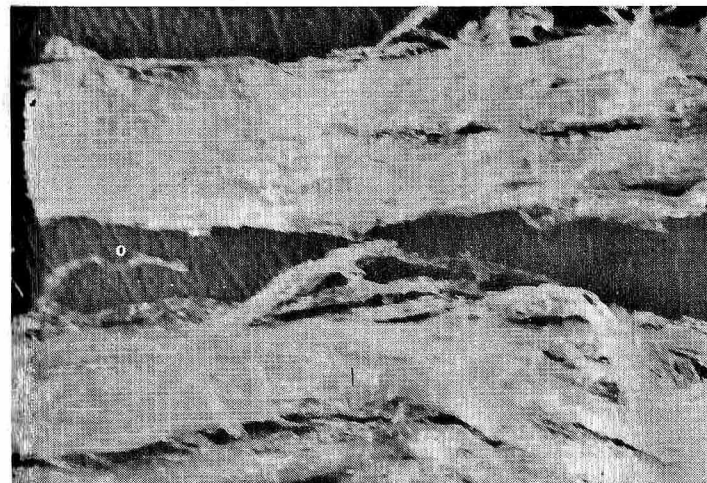
THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a bulk laxative (an agent to induce active movement of the bowels) and in chronic obstipation (unmanageable constipation). Generally it is given in combination with other anthraquinone vegetable drugs.
2. In the preparation of vaginal capsules and suppositories (a cone shaped capsule like structure with the medicine in it, to be introduced into rectum, urethra or vagina).
3. To prepare nutrient media in bacteriological culture.
4. In industrial applications like emulsions, sizing, silk textiles, adhesives and thickening ice cream.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

CHEMICAL TESTS

1. **Solubility test:** Agar powder when treated with cold water swells whereas in boiling water dissolves which however on cooling forms gel. (distinction from Acacia and Gelatin).
2. **Test for Mucilage:** Agar powder takes pink colour on treatment with a soln. of Ruthenium Red. The test is to be performed on a slide and to be observed under a microscope
3. **Test for Sugars:** A mixture of equal volumes of dil. HCl and aqueous soln. of Agar is heated on water bath for about 30 min. To a portion of the resulting mixture so obtained, 3ml of 10% caustic soda soln. and 2 ml of Fehling's soln. are added and the mixture is heated on a water bath whereby reduction takes place (formation of red ppt. of cuprous oxide) due to the reducing sugars present.
4. **Sulphate test:** A soln. of barium chloride is added to the other portion of the resulting mixture whereby a white ppt. of barium sulphate is obtained (distinction from Acacia and Tragacanth).
5. On warming a small quantity of Agar in KOH soln. a canary yellow colour is obtained.
6. Powder Agar is distinguished from that of Acacia and Tragacanth by getting a deep crimson to brown colour with N/20 Iodine soln.
7. A 0.2% soln. of Agar does not give any ppt. with an aqueous soln. of tannic acid (distinction from Gelatin).
8. Agar is incinerated to ash. Add dil. HCl and see under the microscope, when skeletons and spongy spicules of diatoms are seen.
9. Agar, when mixed with even a very small quantity of gelatin, gives a precipitate or turbidity on adding 3 ml. of 1% soln. of trinitrophenol to an equal volume of 1% soln. of agar.



69. GUAR GUM

SYNONYMS AND REGIONAL NAMES: Guar Cellupectinoid.

BOTANICAL SOURCE:

Guar Gum is obtained from refined endosperm of seed of *Cyamopsis tetragonolobus*

FAMILY: Leguminosae

CHEMICAL CONSTITUENTS:

CARBOHYDRATE

Gums – Guaran, the water soluble portion of the gum and yields on hydrolysis galactose 35% and mannose 60 to 65%.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. As a protective colloid.
2. As binding and disintegrating agent in tablet formulations.
3. In bulk laxatives.
4. As appetite depressent.
5. In peptic ulcer therapy.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

70. GELATIN

SYNONYMS AND REGIONAL NAMES: Gelatina, Gel foam, Puragel

SOURCE:

Gelatin is a product obtained by partial hydrolysis of collagen, derived from skin, tendons, ligaments, white connective tissues and bones of animals with in boiling water

FAMILY:

MORPHOLOGY:

NATURE: Occurs in thin sheets, strips as granular powder. High grade gelatin is light yellow, semi-crystalline substance without any odour or taste.

SOLUBILITY: In cold water it swells up and slowly dissolves on warming to form viscous soln.

COLOUR: Light yellow, **ODOUR:** Odourless, **TASTE:** Tasteless, **SIZE:** 2-3mm,

SHAPE: Semi crystalline, **EXTRA FEATURES:** Protein is available in the form of flakes sheets, shreds or a coarse or fine powder. it has a characteristic odour and Light Yellow to amber colour.

CHEMICAL CONSTITUENTS:

Protein – Glutin – Amino acids.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. In capsule preparations
2. In making suppositories
3. As culture medium in Bacteriology
4. Source of Protein in nutritional experiments.
5. As a substitute for blood plasma
6. Zinc oxide is added to form zinc gelatin which is used in topical protectant.

CHEMICAL TESTS

1. Ammonia is evolved when heated with soda-lime powder.

Preparation of the test soln.

Dissolve 0.5 g of Gelatin in 100 ml water by heating and use this soln. for the following tests –

2. On addition of Millon's reagent to a few ml of the test soln., a white ppt. is produced which turns red on heating.
3. To 1 ml of test soln. add 1 ml of 10% mercuric sulphate in 10% sulphuric acid. Boil gently for 30 sec. Add 2 drops of 1% sodium nitrite soln. Red ppt. or colour is obtained.
4. **Biuret Test:** To 3 ml of test soln. NaOH (1 ml of 5%) is added to make it strongly alkaline – A violet or pink colour is developed on addition of 2 drops of 1% CuSO_4 .
5. To a few ml of test soln. few drops of 10% Tannic acid is added whereby white to whitish buff coloured ppt, is formed which does not dissolve on heating.
6. Yellow ppt. is formed on adding picric acid to test soln.

These above tests distinguish Gelatin from Agar. In Agar these tests are negative.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

71. LICORICE

SYNONYMS AND REGIONAL NAMES: *Glycyrrhizae Radix*, Liquorice root;
San. Yasthimadhu; Hin. Jetimadhu, Mulethi; Kan. Jhesta Madhu;

BOTANICAL SOURCE:

Licorice consists of the dried, peeled or unpeeled, root and stolon of *Glycyrrhiza glabra* and other species of *Glycyrrhiza*.

FAMILY: Leguminosae

MORPHOLOGY:

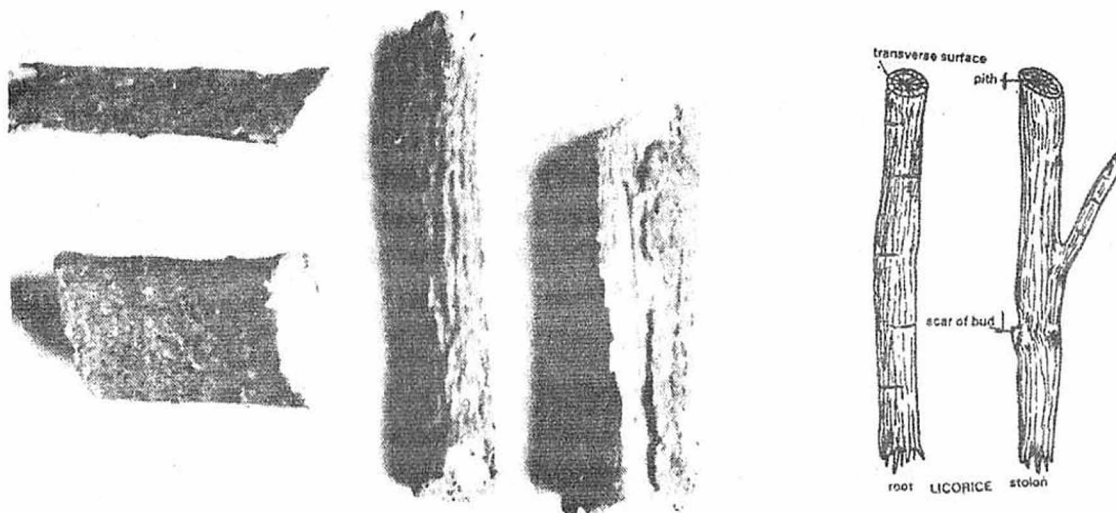
CONDITION: Dry, occurs in the peeled or unpeeled forms;

SHAPE: Cylindrical; Surface (outer) – yellowish brown with longitudinal wrinkles (unpeeled); Peeled ones are yellow coloured with fine longitudinal ridges. In case

of stolons, scars of buds can be seen. **FRACTURE:** Coarsely fibrous in the bark region and splintery in the wood; Fractured surface shows long fibres projecting outwards.

In stolons pith may be seen in the transverse surface; **ODOUR:** Characteristic and

TASTE: Sweet.



CHEMICAL CONSTITUENTS:

GLYCOSIDES: Saponin glycoside – 18 β Glycyrrhizin (3–9%)

18 β Glycyrrhetic acid (aglycone)

Flavonoids – Liquiritin – Liquiritigenin

– Isoliquiritin – Isoliquiritigenin

Coumarin derivatives – Herniarin – Umbelliferone

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Demulcent (soothing) and expectorant (promotes the removal of catarrhal matter and phlegm from the bronchial tubes).
2. Laxative in combination with other drugs.
3. As an anti-inflammatory agent in dermatological practice (in peptic ulcer).
4. Spasmolytic agent (arrests involuntary muscular contraction).
5. To mask the bitter taste.
6. Licorice is used in 141 drug preparations (Kapoor & Mitra).

CHEMICAL TEST:

Licorice on treatment with sulphuric acid gives yellow colour due to the conversion of flavonoid glycoside liquiritin to chalcone glycoside isoliquiritin.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

72. GARLIC

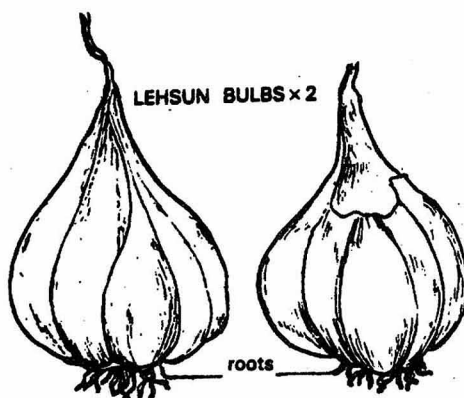
SYNONYMS AND REGIONAL NAMES: Garlic, H. Lehsun; K. Belluli;

BOTANICAL SOURCE: Garlic is the fresh compound bulb of *Allium sativum*

FAMILY: Liliaceae

MORPHOLOGY:

TYPE: Sub-globular compound bulb with several cloves, enclosed in silky white or pinkish papery envelope of skin. Cloves are attached to a flat, circular, hard axis with numerous thin wiry roots from its underside and short cylindrical outgrowths from upper surface. Each clove is ovoid, surrounded by two papery scale leaves, outer one whitish and loose, inner one pink and adherent, but easily separable from solid portion of clove; papery scale leaves enclose two whitish, fleshy scales, inner is thinner and smaller than outer. Foliage leaves present in centre are yellowish green; **ODOUR:** Strongly alliaceous and **TASTE:** Strongly pungent and alliaceous.



CHEMICAL CONSTITUENTS: ESSENTIAL OIL (0.1 to 0.3%)

- Alliin, a sulphur containing amino acid
- Allicin – Allyl sulphide
- Polysulphides responsible for the unpleasant smell of the oil.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Flavouring agent.
2. Anti-bacterial.
3. In cases of hypertension and atherosclerosis (thickening of arterial wall).
4. In the treatment of malignant tumours.
5. Carminative, gastric stimulant and aids in digestion and absorption of food
6. Oil of garlic is used as an insecticide.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

73. PICRORHIZA

SYNONYMS AND REGIONAL NAMES: San. Katuka; Hin. Kutki, Kuru;

BOTANICAL SOURCE:

Picrorhiza consists of dried roots and rhizomes of *Picrorhiza kurroa* Royle cut in small pieces and freed from attached rootlets.

It is called 'Indian Gentian' because of its bitter taste.

FAMILY: Scrophulariaceae

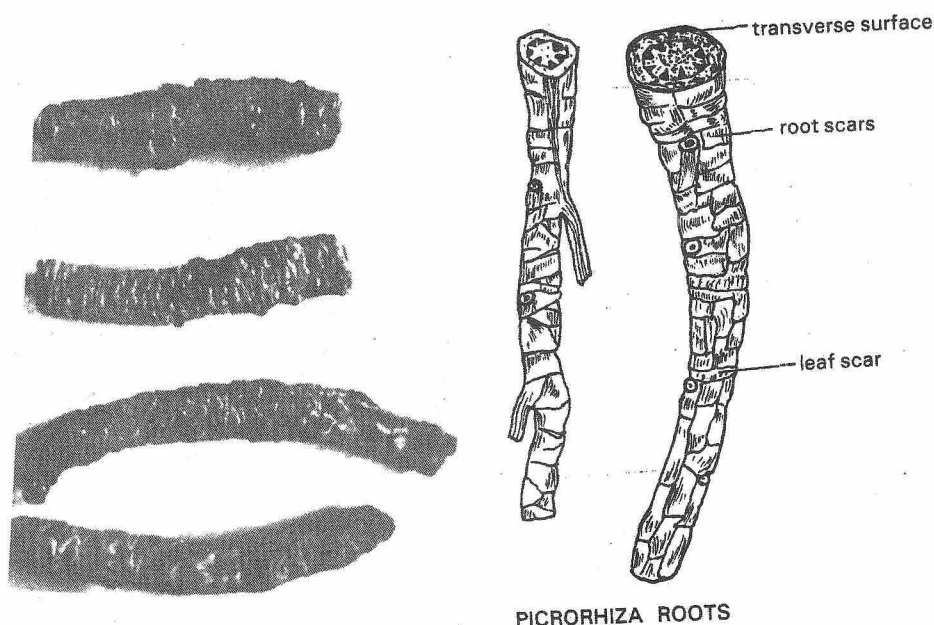
MORPHOLOGY:

FORM: Light, cylindrical, straight or slightly curved;

COLOUR: Greyish brown; SIZE: 2 to 5 cm(l), 4 to 8 mm(w);

SURFACE: Remains of dark brown and longitudinal wrinkles, aerial stems are often seen; so also a few small root scars and numerous semi-amplexicaul scale leaves are seen both on upper and lower surfaces;

ODOUR: Slightly unpleasant and very bitter to taste.



CHEMICAL CONSTITUENTS:

GLYCOSIDES:—Iridoid glycosides—Picrorrhizin, Picroside A containing cinnamic acid—Kutkoside containing vanillic acid—Kurrin (0.5%), nonbitter product—Kutkiol an alcohol—Kutkisterol a sterol and Cathartic acid.

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Bitter tonic and used as a substitute for Gentian.
2. Febrifuge, Antiperiodic, Cholagogue (an agent increases flow of bile) and Stomachic.
3. Mild laxative.
4. In malaria associated with constipation.
5. Live ailment, jaundice and hepatitis.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

74. DIOSCOREA

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE:

Dioscorea consists of tubers of a number of wild and cultivated *Dioscorea* species like *Dioscorea deltoidea*, *Dioscorea prazeri* & *Dioscorea floribunda*

FAMILY: Dioscoreaceae

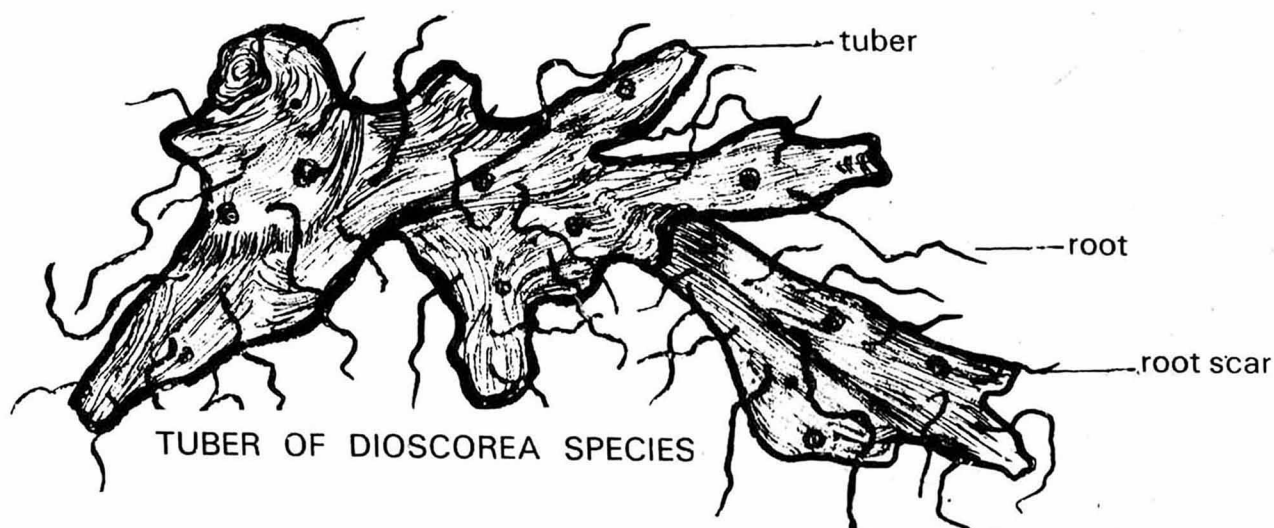
MORPHOLOGY:

Rhizomes of *Dioscorea deltoidea*

SHAPE: Horizontal tubers, digitate, chestnut brown with recoiling roots;

Dioscorea prazeri; stout horizontal creeping, freely branched, branches

SIZE: About 10 cm(l), 1.5 to 2 cm(w), grey brown-blackish, fresh white or creamy



CHEMICAL CONSTITUENTS:

GLYCOSIDES - Saponin glycosides - Steroidal sapogenins.

- Diosgenin (5% on dry weight basis)

Glycoside of Prazerigenin

-a new saponin glycoside with diosgenin and 3 glucose molecules

THERAPEUTICAL AND PHARMACEUTICAL USES: Steroid precursors.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhpushpi, Pyrethrum, Tobacco.

75. LINSEED

SYNONYMS AND REGIONAL NAMES: Flax seed

San. Atasi bija, Hin. Alsī; Kan. Atasi bija, Agashi

BOTANICAL SOURCE: Linseed is dried ripe seed of *Linum usitatissimum*

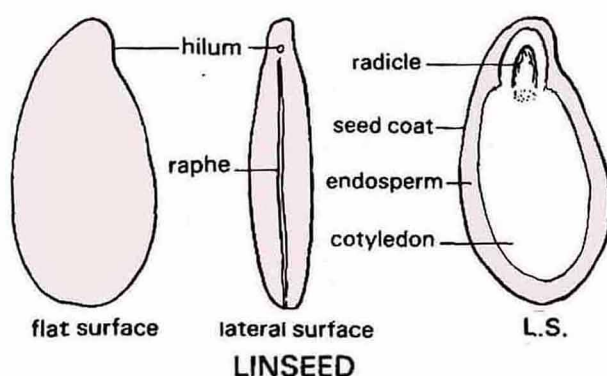
FAMILY: Linaceae

MORPHOLOGY:

SHAPE: Ovoid or flattened **SIZE:** 4–6 mm(l) 2–3 mm(w);

COLOUR: Brown; **SURFACE:** Smooth shining and minutely pitted; hilum and micropyle in a slight depression just below pointed end.

ODOUR: Odourless and **TASTE:** Mucilaginous and oily in taste.



CHEMICAL CONSTITUENTS: FIXED OIL (30 - 40%)

MUCILAGE (6%) - yielding on hydrolysis-- Galactose (8-12%)--- Arabinose
-Galacturonic acid-- Mannuronic acid (30%)

PROTEIN (25%)

GLYCOSIDE -Cyanogenetic glycosides -Linamarin -Lotaustralin

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Externally as a poultice.
2. Internally as Demulcent (soothing).
3. Laxative and in cases of Hemorrhoids.
4. To extract 'linseed oil'

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

76. SHATAVARI

SYNONYMS AND REGIONAL NAMES: Hin. Shakakul satavari Kan. Shatavari

BOTANICAL SOURCE: Shatavari is a tuberous roots of *Asparagus racemosus*

FAMILY: Liliaceae

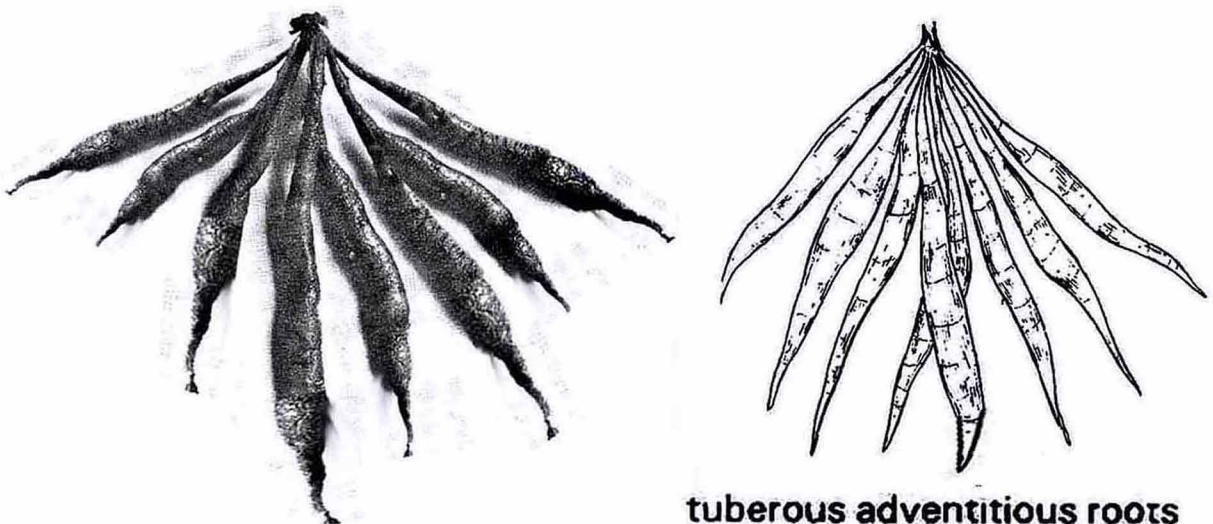
MORPHOLOGY:

TYPE: Fasciculated; **FORM:** Adventitious roots arising from a single point, become fleshy and tuberous, tapering towards the base and swollen at the middle;

COLOUR: Silver white or light ash in colour; **SIZE:** 5 – 15 cm(l) and maximum diameter 1 – 2 cm; **SURFACE:** More or less smooth

in fresh samples and fine longitudinal wrinkles in dry samples;

FRACTURE: Complete.



tuberous adventitious roots

ASPARAGUS ROOTS (SHATAVARI)

CHEMICAL CONSTITUENTS: GLYCOSIDES:

SAPONIN GLYCOSIDES - Saponin A₄, A₅, A₆, A₇, A₈

SAPONIN A yields on hydrolysis Sarasapogenin, Glucose and Rhamnose.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Antioxytotic, As a galactagogue,

Anticancer, diuretic, aphrodisiac and nutritive tonic

1. Oxytotic: A drug that induces labour by stimulating contractions of the muscles of the uterus
2. Galactagogue: Agent that induces milk secretion
3. Diuretic: Any substance that tends to increase the flow of urine, which causes the body to get rid of excess water
4. Aphrodisiac: Any substance that tends to increase the flow of urine, which causes the body to get rid of excess water

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhpushpi, Pyrethrum, Tobacco.

77. SHANKHAPUSHPI

SYNONYMS AND REGIONAL NAMES: S. & K. Vishnukranti H. Shankhpushpi

BOTANICAL SOURCE: Shankhpushpi consists of plant *Evolvulus alsinoides*

FAMILY: *Convolvulaceae*

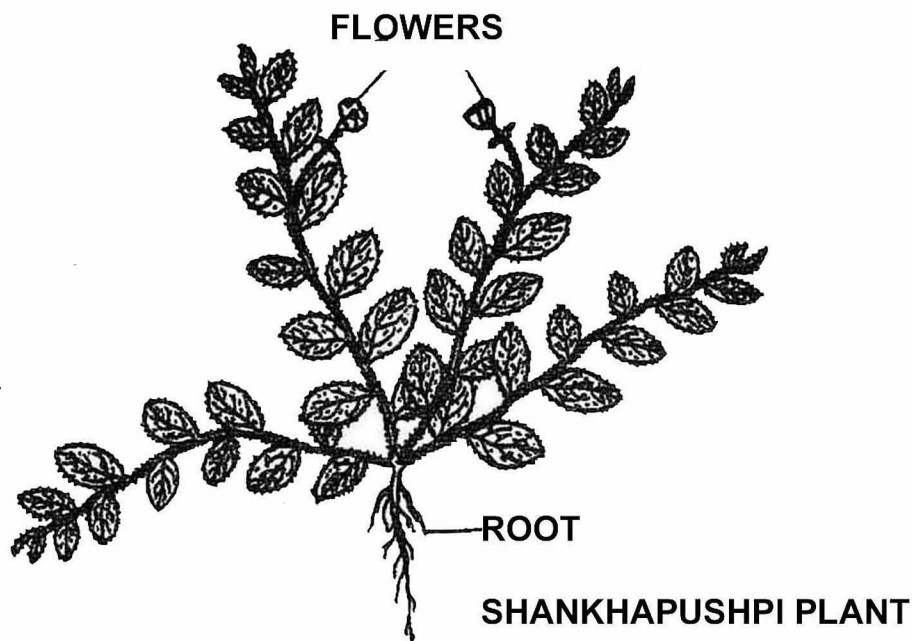
MORPHOLOGY:

Perennial Herb (all seasons) TYPE: Free falling,

Wiry branches arising from a small woody root-stock,

LEAF: Simple, Ovate, Elongated, Stalkless, Directly attached, alternate, tapering pointed apex. FLOWERS: Lone, Light blue,

FRUIT: Four angled capsule.



CHEMICAL CONSTITUENTS: ALKALOIDES

Betaine, evolveine and one another water soluble base. The water Extract also contains proteins; aminoacids. carbohydrates, phenolic compounds, sugars and tannins

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Bitter tonic,
2. Dysentery, 3. Sedative, 4. Leaves made as cigarettes and smoked in chronic bronchitis and asthma.
5. Anthelmintic and antiphlogistic (diminishing inflammation)

Note: Five more plants are also named Shankhpushpi as most contravercial drug.

1. *Canscora decussata*
2. *Clitoria ternatea*
3. *Crotalaria verrucosa*
4. *Convolvulus microphyllus*.
5. *Convolvulus pluricaulis*,

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhpushpi, Pyrethrum, Tobacco.

78. PYRETHRUM

SYNONYMS AND REGIONAL NAMES: Insect flower

BOTANICAL SOURCE: Pyrethrum consists of the dried, closed or half open flower (flower heads) of *Chrysanthemum cinerariifolium*. Pyrethrum contains not less than 0.7% of total pyrethrins (pyrethrin I and pyrethrin II).

FAMILY: Compositae

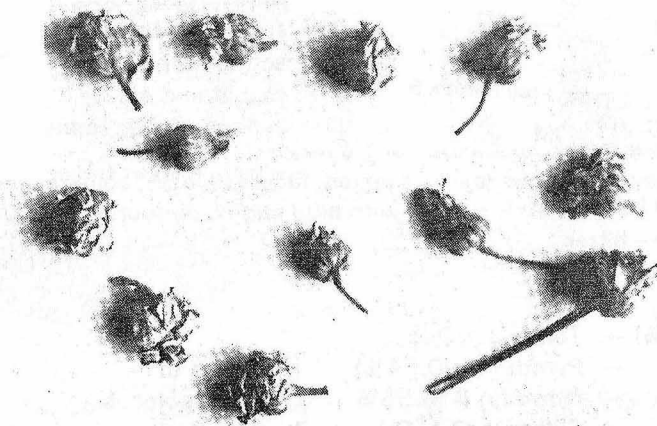
MORPHOLOGY:

TYPE: Type of inflorescence capitulum or head;

COLOUR: Yellow to yellowish brown;

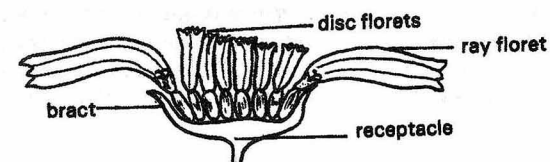
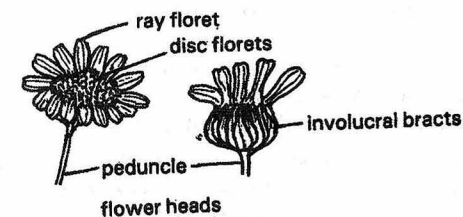
SHAPE: 6–9 mm(d) when closed and 12 mm when open;

FORM: Flower head hemi-spherical flat with 2–3 rows of involucre bracts which are lanceolate and thick. Two types of florets are seen on the flower head; i) the ray (ligulate) florets forming outer whorl.

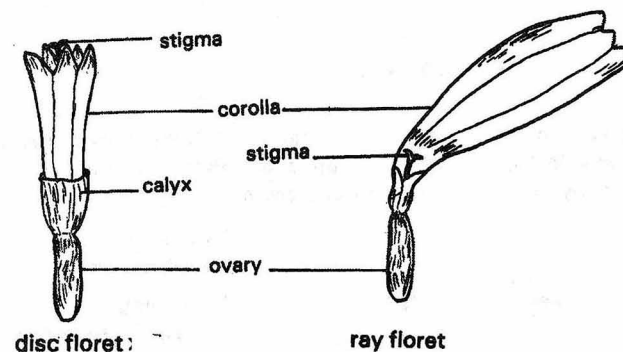


ii) Disc (tubular) florets occur in the centre. L. S. of Head;

Receptacle—convex or nearly flat, devoid of paleae and measures 5–8 mm in diameter; Peduncles short and longitudinally striated; Involucre—3 rows of yellowish green bracts; outer bracts lanceolate, inner bracts spatulate, longer than outer ones, bracts hairy on outer surface. Ray florets—uniseriate 15–23, unisexual (pistillate); Corolla—cream or straw coloured, ligulate, oblong, gamopetalous, 3-small rounded teeth at apex, middle one being smallest. Disc floret—200–300, smaller in size, actinomorphic, bisexual and epigynous. Calyx forms a thin whitish membranous tube. Corolla tubular, gamopetalous with 5 short lobes at the apex; Stamens—5, syngenesious (anthers united, filaments free), epipetalous, Gynoecium—oblong and inferior, style—short with bifid stigma; Odour—faint but characteristic and Taste—bitter,



PYRETHRUM L.S. of capitulum



CHEMICAL CONSTITUENTS:

INSECTICIDES (0.4–2%) — Terpene esters:	
— Pyrethrin I (0.64%)	} Esters of Pyrethrolones
— Pyrethrin II (0.65%)	
— Cinerin I (0.15%)	} Esters of Cinerolones
— Cinerin II (0.23%)	
— Jasmolin I	} Esters of Jasmolones
— Jasmolin II	

ESSENTIAL OIL (0.3%)

THERAPEUTICAL AND PHARMACEUTICAL USES:

1. Contact insecticide (Insects coming in contact with insecticides are killed) in powder form, sprays, aerosol, coil, cream and ointment.
2. To kill human and animal skin parasites as well as intestinal parasites.
3. Used against flies and insect pests.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

79. TOBACCO

SYNONYMS AND REGIONAL NAMES:

BOTANICAL SOURCE: Tobacco consists of dried leaves of *Nicotiana tabacum*

FAMILY: Solanaceae.

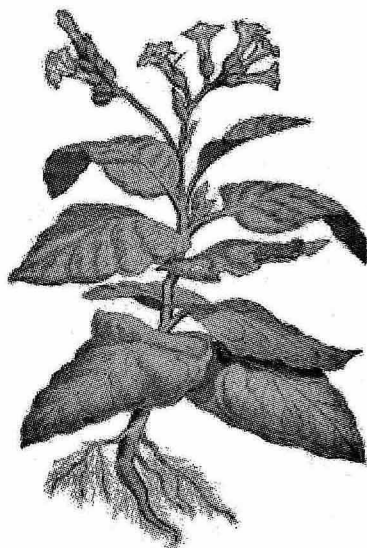
MORPHOLOGY:

Leaves are usually sessile, sometimes petiolate and with frilled wing.

Plant TYPE: Strong very hard, ever green and viscid annual, 1 to 3 metres in height. It has thick erect stem and few branches. It bears about 20 leaves which are approximately 80 cm in length. Flowers are light-red, white or pink in colour; fruits are capsules, elliptic, ovoid, 1.5 to 2.0 cm in Size, Seeds are spherical and 0.5 mm in diameter and brown in colour. Various varieties are known to be cultivated in India. Few of them are bidi tobacco, cigar tobacco, chewing and hookah tobacco,

SIZE: 60 - 80 cm in length, 35 - 45 cm in width **SHAPE:** Ovate, elliptic or lanceolate

COLOUR: Green or slightly brown **ODOUR:** Characteristic to Nicotine **TASTE:** Bitter



Tobacco plant

CHEMICAL CONSTITUENTS: ALKALOIDS:

Tobacco contains pyridine-piperidine type of alkaloids, among which most prominent is Nicotine other alkaloids are Nornicotine and anabasine.

THERAPEUTICAL AND PHARMACEUTICAL USES:

Nicotine exerts stimulant effects on heart and nervous system. It is not used medicinally. It is Powerful quick acting poison. Even 40 mg dose orally is fatal to humans.

Rectified tobacco seed oil is used as edible oil in European countries.

Nicotine is used in the manufacture of nicotinic acid and Nicotinamide.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.