

## 5.5. ANTITUMOUR

### 5.5.1. Introduction

(14) Antitumour (or anticancer or antineoplastic drug) is effective in treating malignant or cancerous disease. Alkylating agents, antimetabolites, natural products, and some hormones are major classes of anticancer drugs.

### 5.5.2. Vinca

Vinca (or sadabahar or periwinkle) is commonly grown in India. It has its origin in Madagascar. Two varieties of vinca, namely pink and the white coloured flower varieties are grown for their medicinal value.

#### Synonyms

Catharanthus, Periwinkle, and Sadabahar.

#### Biological Source

Vinca is the dried whole plant of *Catharanthus roseus* or *Vinca rosea*.

#### Family

Apocynaceae.

#### 5.5.2.1. Occurrence and Distribution

Vinca is native to Madagascar. It is grown as an ornamental plant in India, South Africa, U.S.A., Europe, Australia, and Caribbean Islands.

#### 5.5.2.2. Organoleptic Evaluation

Vinca is an erect, pubescent herb (figure 5.10), and has the following organoleptic features:

- 1) **Colour:** Leaves are green, roots are pale grey, and flowers are violet pink-white or carmine-red coloured.
- 2) **Odour:** Characteristic.
- 3) **Taste:** Bitter.
- 4) **Roots:** Branched tap-root.
- 5) **Leaves:** Simple, petiolate, ovate or oblong, uncostate, reticulate, entire, brittle with acute apex, and glossy appearance.
- 6) **Flowers:** Bracteate pedicellate, complete, hermaphrodite, 2-3cm in cymose axillary clusters.
- 7) **Fruits:** Follicles with several black seeds.

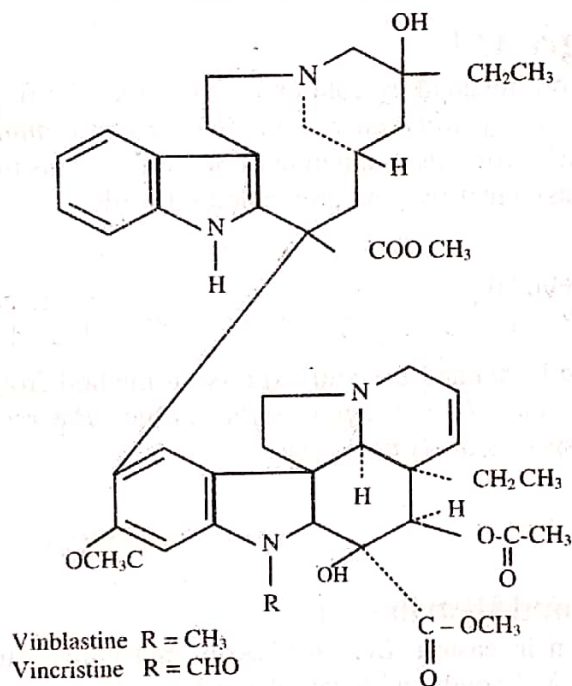


Figure 5.10: Vinca Plant

### 5.5.2.3. Chemical Constituents

Vinca contains a large number of **indole alkaloids**, of which around 20 dimeric indole dihydroindole alkaloids exhibit oncolytic activity, **vincristine** and **vinblastine** being the most significant ones. Vinblastine contains **catharanthine** (an indole alkaloid part) and **vindoline** (a dihydroindole alkaloid part).

Ajmalicine, lochnerine, serpentine, and tetrahydroalstonine are the other alkaloids of vinca. For extracting 1gm of vincristine, around 500kg of crude drugs is required as vincristine is present in very low content (0.0002%). Hence, vinca alkaloids are very expensive. The five-ring dihydroindole system present in their ring is found in other natural drugs also. Thus, synthesis of four-ring indole system is under process.



### 5.5.2.4. Chemical Tests

The crystals of vincristine sulphate ( $C_{46}H_{56}N_4O_{10} \cdot H_2SO_4$ ) are obtained from ethanol and are found to be unstable.

### 5.5.2.5. Therapeutic Efficacy

Vinca has the following therapeutic properties:

- 1) Its leaves and stems are a source of alkaloids, which have antitumour and anticancer properties.
- 2) Its leaves are used for controlling diabetes and high blood pressure.
- 3) Its alkaloids are sedative and tranquiliser.
- 4) It relieves muscle pain and depression.
- 5) It exhibits the property of detoxification and can counter the effect of poison, thus is used in wasp stings.
- 6) It controls nosebleeds, bleeding gums, mouth ulcers, and sore throats.
- 7) On internal administration it is helpful in gastritis, cystitis, enteritis, diarrhoea, diabetes, etc.
- 8) It ensures brain health as the active ingredients improve blood supply to the brain, increase the oxygen level brain can utilise.
- 9) It also raises the serotonin levels and prevents abnormal blood coagulation.
- 10) Vincamine alkaloid keeps the blood thin and acts as a memory enhancer, thus is used in preventing dementia.

## 5.6. ANTILEPROTICS

### 5.6.1. Introduction

Antileprotics refer to the leprostatic agents which are used against *M. leprosy* (bacteria causing leprosy). The infection caused by these bacteria lives within the patient's body for a long time. Leprosy, also known as **Hansen's disease**, is a chronic infection which causes disturbance or isolation from society. Leprosy is not diagnosed by any laboratory tests. It is characterised by lepromin skin reactions which occur by removing the organism from the body of infected person.

### 5.6.2. Chaulmoogra Oil

Chaulmoogra oil is the fatty oil obtained by cold expression from the fresh ripe seeds of *Hydnocarpus kurzii*, *Hydnocarpus weghtiana*, and *Hydnocarpus anthelmintica*. The *Hydnocarpus* is a tall tree which grows up to a height of 50-60 feet. This tree bears brown, velvety, spherical fruits, and asymmetrical and grey coloured seeds.

#### Synonyms

Hydnocarpus oil and gynocardia oil.

#### Source

Chaulmoogra oil is a fixed oil obtained by cold expression method from ripe seeds of *Taraktogenos kurzii* king and *Hydnocarpus anthelmintic* Pierre, *Hydnocarpus heterophylla* kurz, and other species of *Hydnocarpus*.

#### Family

Flacourtiaceae

#### 5.6.2.1. Occurrence and Distribution

The tree is abundantly grown in eastern Bengal, Assam, and upper Burma. It is also distributed along the eastern and southern slopes of the Pegu, Yoma, Martaban, in the forests of Sylhet, Chittagong, etc.

#### 5.6.2.2. Organoleptic Evaluation

The organoleptic features of chaulmoogra oil are (figure 5.11):

- 1) **Colour:** Yellow to brownish-yellow liquid.

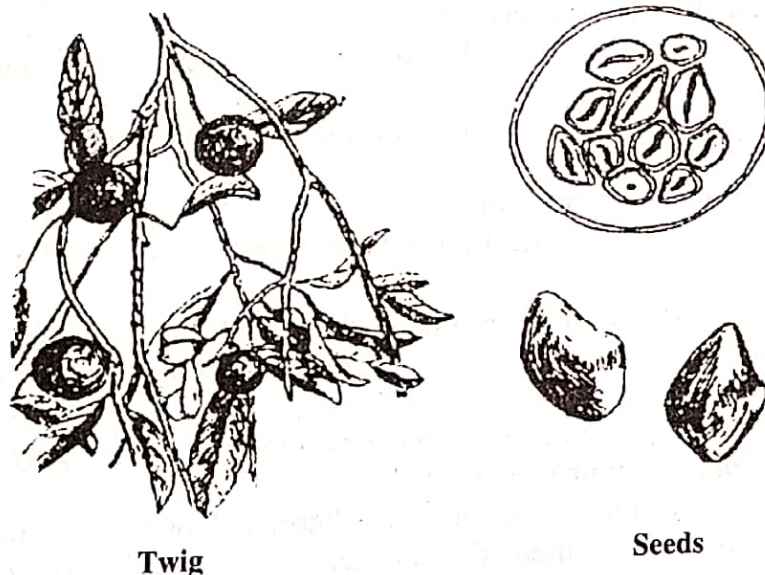
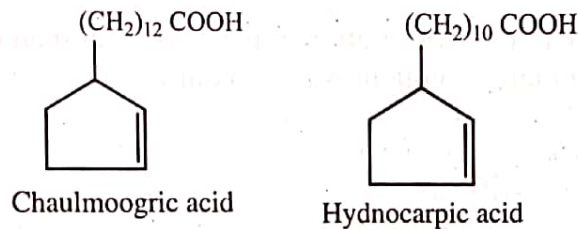


Figure 5.11: Seeds and Twig of *Hydnocarpus kurzii*

- 2) **Odour:** Characteristic.
- 3) **Taste:** Acrid.
- 4) **Shape:** Seeds are sub-ovoid and obtusely angular (figure 5.11).
- 5) **Length:** 2cm long.
- 6) **Solubility:** Slightly soluble in alcohol; soluble in chloroform, ether, benzene, and carbon disulphide.

### 5.6.2.3. Chemical Constituents

Chaulmoogra oil contains ester form of unsaturated fatty acids of **chaulmoogric acid** (27%) and **hydnocarpic acid** (48%), and **glycerides of palmitic acid**.



The glyceryl esters of **chaulmoogric acid** and **hydnocarpic acid** are also found to be present in this oil. These acids are different from other fatty acids in the respect that they have 5-membered carbon ring side chains whose length reduces with reduction in molecular weight. They are also optically active and dextrorotatory. They also contain palmitic acid in small amount.

### 5.6.2.4. Therapeutic Efficacy

The therapeutic uses of chaulmoogra oil are:

- 1) The unsaturated fatty acids of this oil are strong bactericides acting against *Mycobacterium leprae*, and *M. tuberculosis*.
- 2) The oil also treats psoriasis and rheumatism. It is recommended for external use only.

## 5.7. ANTIDIABETICS

### 5.7.1. Introduction

Antidiabetics are drugs used for controlling and stabilising the glucose level in the blood of individuals suffering from diabetes. These drugs are mainly used to control diabetes in an individual.

### 5.7.2. Pterocarpus

Pterocarpus is a genus of pantropical trees. It is having around 35 species, of which *P. marsupium* is one of the most famous members of this genus.

#### Synonyms

Bijasal, Indian kino tree, and Malabar kino.

#### Biological Source

Pterocarpus is the dried juice of *Pterocarpus marsupium* Linn. The juice is obtained from the stem and bark by making vertical incisions on them. The exuding juice is collected and dried.

#### Family

Leguminosae

### 5.7.2.1. Occurrence and Distribution

Pterocarpus is widely distributed in the hilly regions of Gujarat, Madhya Pradesh, Uttar Pradesh, Bihar, and Orissa. It is also cultivated in the forests of Karnal, Kerala, West Bengal, and Assam.

### 5.7.2.2. Organoleptic Evaluation

The organoleptic features of pterocarpus are:

- 1) **Colour:** Ruby-red.
- 2) **Odour:** Odourless.
- 3) **Taste:** Astringent.
- 4) **Size:** 3-10mm granules.
- 5) **Shape:** Angular grains.
- 6) **Extra Features:** Kino prices are angular, glistening, transparent, break with a vitreous fracture, is sparingly soluble in water (about 80-90%), and fully soluble in alcohol (90%).

### 5.7.2.3. Chemical Constituents

Kino is having around 70-80% of **kinotannic acid**, **kino-red**, **k-pyrocatechin** (catechol), **resin**, and gallic acid. Kinotannic acid is glucosidal tannin, and kino-red is a kinoin anhydride. Kinoin is an insoluble phlobaphene, which is produced when acted upon by the oxidase enzyme. Its colour is darker than kinotannic acid.

On boiling the juice, the oxidase enzyme is degraded, which prevents insolubilisation and darkening.

### 5.7.2.4. Chemical Tests

Pterocarpus gives the following chemical tests:

- 1) On treating the solution of pterocarpus with ferrous sulphate, a green colouration develops.
- 2) On treating the solution of pterocarpus with alkali (say potassium hydroxide), a violet colouration develops.
- 3) On treating the solution of pterocarpus with mineral acid, a precipitate develops.

### 5.7.2.5. Therapeutic Efficacy

Pterocarpus has the following therapeutic properties:

- 1) It acts as a powerful astringent,
- 2) It is used for treating diarrhoea, dysentery, and passive haemorrhage toothache.
- 3) The aqueous infusion of the wood is used in diabetes. The alcoholic as well as the aqueous extract of the drug shows hypoglycaemic action.

## 5.7.3. *Gymnema sylvestre*

The terms *gymnema* and *sylvestre* are derived from Latin origin with their meanings as **naked** and **from the forest**.

### Synonyms

Gymnema, Gurmarbooti, gurmar, gurmari, gudma, and Madhunashini.

### Biological Source

Gymnema is the leaves of a perennial woody climber plant, *Gymnema sylvestre* R. Br. It should contain not less than 1.0% of gymnemic acids calculated on gymnemagenin on dried basis.

### Family

Asclepiadaceae

### 5.7.3.1. Occurrence and Distribution

Gymnema is a woody climber and is widely distributed in the Deccan-peninsula, and in the northern and western parts of India. Sometimes it is cultivated for its medicinal properties.

### 5.7.3.2. Organoleptic Evaluation

The organoleptic features of gymnema are (figure 5.12):

- 1) **Colour:** Green.
- 2) **Odour:** Pleasant and aromatic.
- 3) **Taste:** Tasteless.
- 4) **Size:** 3-5 × 1-2cm.
- 5) **Shape:** Elliptic or ovate with acute or acuminate apex.
- 6) **Leaves:** On chewing the leaves, the taste glands can get paralysed for a few hours against sweet and bitter taste. Lower surface of the leaf is more pubescent with a rounded and cordate base. Non-glandular trichomes are found on both the surfaces.
- 7) **Flowers:** Small yellow coloured and appear in the form of cymes.



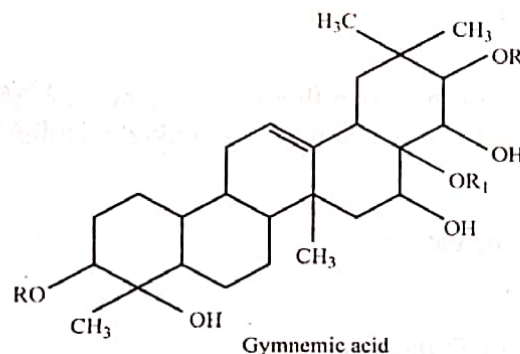
Figure 5.12: Gymnema Plant

### 5.7.3.3. Chemical Constituents

The leaves consist of pentriacontane, hentriacontane, phytin,  $\alpha$  and  $\beta$  chlorophylls, resin, tartaric acid, formic acid, butyric acid, mucilage inositol, d-quercitol, gymnemic acids (anti-sweet compounds), mixture of triterpene saponines and anthraquinone derivatives.

The leaves also contain alkaloids, betain, choline, trimethylamine, lupeol,  $\beta$ -amyrin, and stigmasterol.

**Gymnemic acid** (a mixture of 9 acidic glycosides) can be obtained by successive extraction using different solvents. The part of ethyl acetate of such gymnemic acid mixture shows paralysing effect on taste glands. Gypenosides are also isolated from leaves.



	R	R <sub>1</sub>	R <sub>2</sub>
<b>Gymnemic Acid I</b>	Tigloyl	Acetyl	Gluconic
<b>Gymnemic Acid II</b>	Methylbutyryl	Acetyl	Gluconic
<b>Gymnemic Acid III</b>	Methylbutyryl	H	Gluconic
<b>Gymnemic Acid IV</b>	Tigloyl	H	Gluconic

#### 5.7.3.4. Chemical Tests

Gymnema gives the following chemical tests:

- 1) Its dilute solution paralyses the taste buds for sweet and bitter taste.
- 2) When shaken with water, it produces a large amount of foam.
- 3) When added with dil. HCl, it forms a large amount of precipitate.

#### 5.7.3.5. Therapeutic Efficacy

Gymnema has the following therapeutic properties:

- 1) It is a stomachic, stimulant, laxative, and diuretic.
  - 2) It can also be used as an antidiabetic due to its hypoglycaemic effect produced by indirect stimulation of insulin secretion through pancreas.
  - 3) It prevents dental plaque and caries.
  - 4) It also has the property of reducing weight. (14)
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