

THE UNANI
PHARMACOPOEIA
OF
BANGLADESH

PART - I
VOLUME - I

First Edition: June, 2016



GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF HEALTH & FAMILY WELFARE
DIRECTORATE GENERAL OF HEALTH SERVICES
DEPARTMENT OF HOMEO AND TRADITIONAL MEDICINE
& ALTERNATIVE MEDICAL CARE (AMC)
MOHAKHALI, DHAKA-1212.

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MOHAKHALI, DHAKA**

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Foreward

In Bangladesh, Unani system of medicine has been used in medical practice from nineteenth century have played a significant role in maintaining human health. Many people of our country meet their health care needs by this system, due to the easy access and cost effectiveness in comparison to conventional medicine. To strengthen the system, the government of Bangladesh has appointed Unani 119 medical Officer/Lecturers at different upazila Health complexes, district & medical college Hospitals under the alternative medical care (AMC) operation plan of DGHS.

Unani pharmacopoeia in the basic requirement of Unani Practitioners for preparation of Unani medicine in management of common diseases, so that they can provide rational and cost-effective treatment for all the patients. I am very delighted to know that an Unani pharmacopoeia (part:1 volume: I) is going to be published for Unani practitioners. This will be a good resource for Unani practitioners for the management of common ailments faced by the Unani physicians in upazilla , district & medical college Hospitals and also in private sector. I cordially thank to all experts of Unani medicine who were involved for the development of the pharmacopoeia (part:1, volume: I) consisting of 50 monographs of single drugs under HPNSP (2017-2023). I request all physicians and the authority to follow the instructions inserted into the pharmacopoeia for the betterment of Unani system, since it will play significant role deliberately in health care delivery system along mainstream treatment protocol.

Finally I would like to express my thanks to line director, PM & all DPM, Alternative medical care (AMC) & other officials who contributed immensely and developed their time to the development of this pharmacopoeia

I wish all the best.

Professor Dr Abul Bashir Mohammed Khurshid Alam.
Director General
Directorate General of health Service
Mohakhali, Dhaka.

Forward

Unani is a cost effective treatment system alongside of conventional treatment system. Unani has its own principles and philosophy. For fulfilling the aims of ‘treatments for all’ for all citizens of bangladesh by Government of Bangladesh, Unani can play an important role. The demand for unani medicine is growing up rapidly throughout the country. Unani pharmacopoeia is essential for practitioners as quality of medicine is very important. Unani practitioners may depend on local drugs made by local manufacturers, when they maintain standards of quality, safety, purity and strength of unani drugs by following unani pharmacopoeia.

I would like to express my thanks to all, who contributed immensely to the development of the Unani Pharmacopoeia Part-I, Vol - I, under HPNSP (2017-2023). I wish their effort & success.

Dr. Md. Abu Zaher
Line Director,
Alternative Medical Care (AMC), DGHS,
Mohakhali, Dhaka.

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Legal Notice

Unani Pharmacopoeia of Bangladesh (UPB), Part I, Vol I, is the book of standards for single drugs included therein and the standards prescribed in the The Unani Pharmacopoeia of Bangladesh (UPB.), Part I, Vol.I, would be official. If considered necessary these standards can be amended and the Chairman of the Unani Pharmacopoeia Committee authorized to issue such amendments. Whenever such amendments are issued the The Unani Pharmacopoeia of Bangladesh (UPB), Part I, Vol.I, would be deemed to have been amended accordingly.

Abbreviations and Acronyms

AMC	: Alternative Medical Care
DGHS	: Directorate General of Health Services
ECNEC	: Executive Committee of the National Economic Council
HNPSP	: Health, Nutrition and Population Sector Program
HNPSDP	: Health, Nutrition and Population Sector Development Program
Kg.	: Kilogram
L	: Liter
M	: Meter
Mm.	: Millimeter
Mg.	: Milligram
ml.	: Milliliter
OP	: Operation Plan
PIP	: Programme Implementation Plan.
PM	: Program Manager
TLC	: Thin Layer Chromatography

Preface

Unani system of Medicine had its own origin in the fifth and fourth centuries B.C. under the patronage of Hippocrates in Greece (Unan). Later on it was introduced by Arabs in to Indian subcontinent. In our country this system of medicine is practiced since long and is playing an active role in preventing and curing the ailments.

A major portion of our people are living in the rural areas. They prefer to use Unani drugs and Medicinal plants for their treatment due to its effectiveness, negligible adverse effects, easily availability, inexpensiveness etc. Due to its negligible side effects and environment friendly nature, the developed countries are also emphasizing on the use of Unani natural drugs and Medicinal plants for treatment of their people. Bangladesh Government has included Unani Medicine in National health & drug policy so that mass production of medicines in the Unani Pharmaceutical units can be produced on commercial scale. In view of the new trend in Unani Pharmaceutical field, Government of Bangladesh considered it expedient to utilize the existing Drug Act 1982 also control to a limited measure the Unani, Ayurvedic and Homeopathic drugs by amending the Act.

It is mentionable that Bangladesh National Formulary of Unani Medicine was first published in 1992 by the Bangladesh Board of Unani and Ayurvedic Systems of Medicine and after that it was edited in 2011. Many of medicinal plants were included in that formulary for preparing the Unani medicine. So for ensuring the quality of Unani medicine and authentication of medicinal plants or raw materials are very important. So department of Homeo & Traditional Medicine under DGHS has taken step to prepare the Unani Pharmacopoeia of Bangladesh, Part I, Volume I consisting of 50 monographs of single medicinal plants under HPNSDP (2011-2016).



Dr. Monowara Sultana
Chairman

Unani, Ayurvedic & Homeopathic Pharmacopoeia National Committee

INTRODUCTION

Bangladesh is a developing country where more than 80% of the inhabitants live in rural areas. A major portion of our people are even used the plants as home remedies in the rural and remotest parts of the country since long but they do not know the scientific therapeutic value of the drugs according to the role of human body system and dosages as well as correct identification of the crude herbal drugs. The system of Unani had never been static, its practitioners had been innovative and dynamic in the therapeutic practice and carried on clinical trials out of the local flora and discovered newer medicine with same therapeutic values. The modern world has slowly started the appreciating value of herbal medicines and understanding the basic comprehensive philosophy of Unani. Not only that, they have already been included traditional herbal medicine in their health programme and used for treatment of their patients randomly because its effectiveness, negligible adverse effects, easily availability, inexpensiveness and environment friendly. There are medicine in Unani like herbs/plants, animal & mineral. Most of the ingredients used in Unani medicine are plant based and a small portion are from mineral and animal origin. A uniform nomenclature or common name or group used for the identification of plants which the ancient philosophers used as sources of drugs has yet not been established. According to the demand of medical practitioner and science a standard general classification of Unani drugs, fixed recognized rules for the determination of dosage and preparation of Unani Pharmacopoeia is essential as far best which will be regulated by the Government of Bangladesh. The demand for plant based medicine is growing rapidly within the country and abroad. The Government of Bangladesh, Ministry of Health & Family Welfare appreciated the needs for prescribing quality Unani medicines and the act was amended in 1982 accordingly. A huge number of Unani practitioners practicing throughout the country by poly herbal Unani drugs manufactured by Unani pharmaceutical industries. But for development of quality Unani medicine, no Pharmacopoeial laboratory for Unani medicine has yet been established in Bangladesh. Considering the necessity of legal document of quality of drugs Director, Homeo and Traditional Medicine had been taken an initiative to prepare the Unani Pharmacopoeia under HNPS since 2003–2011 which was recognized by ECNEC. Considering this the Line Director, Alternative Medical Care (AMC) & Director Homeo and Traditional Medicine proposed a body of National Unani Pharmacopoeia Committee headed by Director General of Health Services consisting of experts on Unani, Ayurvedic, Homeopathic and other sciences including experts of

pharmacognosy, chemistry and pharmacy. Director General of Health Services accepted that National Committee in 06 January 2005 and three subcommittees (for Unani / Ayurvedic / Homeopathic) had been appointed by the National Committee. But unfortunately at that time HNPSP(2003-2011) The Unani Pharmacopoeia of Bangladesh had not been prepared. Now under HNPSDP(2011-2016) the Unani Pharmacopoeia of Bangladesh, Part-1, Volume-1 is going to publish after a great effort of the Unani Pharmacopoeia sub-committee. There will be 50 monographs of single medicinal plants in The Unani Pharmacopoeia of Bangladesh, 2016.

PHARMACOPOEIA NATIONAL COMMITTEE

1. **Dr. Monowara Sultana**
Director, Homeo & Traditional Medicine and Line Director, AMC
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2. **Professor (Dr.) Md. Saiful Islam**
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Mohakhali, Dhaka.
15. Dr. Md. Akhter Alam
Assistant Director, Homeo & Traditional Medicine Member Secretary
Directorate General of Health Services, Mohakhali, Dhaka.

Functions:

1. Three Pharmacopoeias (Unani-1, Ayurvedic-1 & Homeopathic-1) will be prepared according to OP (Operation plan) of PIP (Programme Implementation Plan) under HNPSDP (2011-2016) which is recognized by ECNEC.
2. Necessary steps have to be taken for preparation of three complete Pharmacopoeias by three subcommittees within the limitation of OP.
3. Activities for preparation of three Pharmacopoeias will be completed within the period (2011-2016) of OP under HNPSDP and be submitted to the Director General of Health Services..
4. If necessary, member/members may be Co-opted in the committee.

UNANI PHARMACOPOEIA SUBCOMMITTEE

- | | |
|--|------------------|
| 1. Dr. Shariq Hasan Khan
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Govt. Unani and Ayurvedic Medical College, Mirpur-13, Dhaka. | Convenor |
| 2. Dr. Alamgir Hossain
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| 4. Dr. Md. Hassan Imam
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| 5. Dr. Mamun Hossain Onadi
Production Officer Govt. Unani & Ayurvedic Medical College & Hospital,
Mirpur 13, Dhaka, | Co-opt member |
| 6. Dr. Aramul Hoque Prodhan
Lecturer,
Govt. Unani and Ayurvedic Medical College, Mirpur-13, Dhaka. | Co-opt member |
| 7. Dr. Abu Bakar Siddique
Medical Officer (Unani), DGHS, Mohakhali, Dhaka | Member Secretary |

Functions:

To prepare a Unani Pharmacopoeia of single and combination preparation

Unani Pharmacopoeia subcommittee will be carried out scientific works to generate data on monographs of single drugs.

To prepare monographs on single drugs the following information will be included:

- a) Taxonomical title
- b) Natural order/Family
- c) Tibbi/Unani name
- d) English name

- e) Bengali name
- f) Hindi/Ayurvedic name
- g) Description
- h) Parts used
- i) Habitat
- j) Active constituents
- k) Effects
- l) Pharmacological activities
- m) Dosage
- n) Side-effects
- o) Temperament
- p) Correction
- p) Alternatives

To prepare a Unani Pharmacopoeia the subcommittee had carried out scientific works to generate data on various monographs of single drugs. Plant origin of Monograph is now being brought out. The Unani Pharmacopoeia of Bangladesh Part I comprise of 50 monographs of Unani single drugs of plant origin, which go into one or more. In compiling the monographs, the title of each drug had been given in Bangla and then comes the definition of the drug providing its identity in scientific nomenclature and very brief information about its source, occurrence, distribution and precautions in collection.

It will however, be worth mentioning that there is always a wide variation in crude drugs (raw materials) of plant origin in respect of their chemical contents, due to varied climatic conditions, geographical distribution, source and season of collection and lack of scientific methods of storage and preservation. Therefore, the variation in the chemical data created a great difficulty in fixing the standards for single drugs. However, the data has been fixed up by working out as many samples as possible procured from different sources.

Ulat-Kambal

Taxonomical title of the Botanicals	: <u><i>Abroma Augusta Linn</i></u>
Natural order / Family	: Sterculiaceae
Tibbi Name	: Ulat-Kambal
English Name	: Devil's Cotton
Hindi / Ayurvedic Name	: Ulat kambal
বাংলা নাম(Bengali name)	: উলট কবল(Ulot Kombol)

Description : A large spreading bush with fibrous bark and irritant hairs. It occurs wild or cultivated in India. Bark renders pale soft glossy fibers. Air dried bark of root in 0.5 mm to 1m thick. Outer surface of the bark is dull brown and longitudinally wrinkled with small warty markings.

Parts Used : Root, root bark (aqueous extract), leaves and stem.

Habitat : It grows in Bangladesh, Pakistan, Myanmar, India and all over the world.



Active Constituents: Abromine, friedelin and abromasterol A, taraxerol, β – sitosterol, magnesium salt.

Effects : Uterine tonic, emmenagogue, resolvent, diuretic, spasmogenic, cardiac depressant.

Pharmacological Activity : Generally administered in cases of menstrual disorders, various types of Dysmenorrhoea and pain of menstruation. It relieves functional uterine debility, metritis, leucorrhoea and to treat sterility in women. Single administration (douche) regulates menstrual flow and serves as uterine tonic. infusion of fresh leaves and stems in cold water is effective in gonorrhoea. Single administration during the menses is regarded as effective in bringing the conception in young married women.

Dosage : Aqueous extract of 2 – 4 gram bark.

Fresh viscid juice or aqueous extract (approximately 70 ml) of bark as douche before breakfast, or twice a day or as prescribed by the physician

Side-effects : Described as spasmogenic and cardiac depressant, however, following the use of recommended doses of the herb or products in which it is included, no side effects.

Temp : Warm and dry in first order.

Correction : Rain water and Black pepper.

Alternatives : Sterculia foetida Linn.

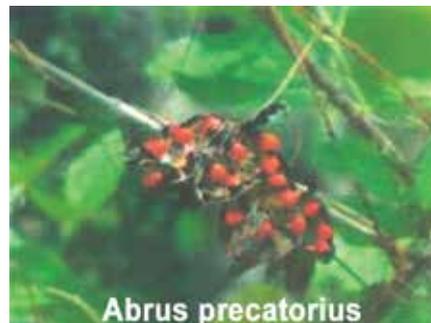
Ainuddique

Taxonomical title of the Botanicals	: <u><i>Abrus precatorius</i></u>
Natural order / Family	: Papilionaceae
Tibbi Name	: Ainuddique
English Name	: Jequirity / Indian Liquorice
Hindi / Ayurvedic Name	: Roti dana
বাংলা নাম(Bengali name)	: রুতি দানা(Roti Dana)

Description : It is a deciduous climbing Plant with compound leaves grows to about 4 m. The plant is a protected species in some countries. Its flowers are racemes of pink blossoms. The fruit is a pod with oval seeds, which are rounded at the ends. They are about 3 mm in diameter, hard, red and glossy with a large black dot at one end. One variety has white seeds.

Parts used : The medicinal parts are the leaves, root and seeds.

Habitat: The plant originated in India and is found today in all tropical regions of the world.



Active ingredients : Toxic lectins : abrine and isolectins.

Effects : Jequirity is an irritant and abortifacient.

Pharmacological activities : Jequirity is used for coughs as well as inflammations and conditions of the upper respiratory tract and lungs. It is also used in hepatitis.

It is noted that Jequirity was used for chronic conjunctivitis and as a contraceptive in folk medicine, but is no longer used for these purposes.

Dosage :

15 to 30 mg. Or as directed by the herbalist.

Side-effects:

The drug is very poisonous because it contains the toxic lectin, abrine and isolectins.

Side-effects : Severe poisonings among adults following the intake of one half to two seeds, as well as cases of death among children following the consumption of two seeds, have been recorded. Besides gastrointestinal emptying, counter-measures include, administration of large amounts of fluid, monitoring of the circulatory system, administration of anti-epileptic drugs and possibly artificial respiration.

Temp : Hot and dry.

Correction : Milk, Rain Water.

Alternatives : White Indian Liquorice

Kanghi

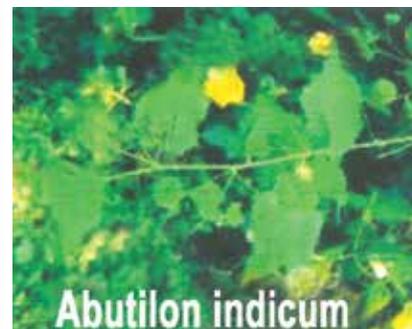
Taxonomical title of the Botanicals	: <u><i>Abutilon Indicum</i></u>
Natural order / Family	: Malvaceae
Tibbi Name	: Kanghi
English Name	: Country mallow
Hindi / Ayurvedic Name	: Oti bala
বাংলা নাম(Bengali name)	: বেড়েলা(Berela)

Description : A hairy under-shrub with golden yellow flowers, abundant throughout the tropics. Leaves are rich in mucilage. Leaves upto 9 x 5 cm, cordate, ovate, acuminate, toothed. Flowers are yellow in colour. Seeds brown-black, densely and minutely scorbiculate. The bark has a *sharply bitter taste*. Seeds are *mucilaginous*.

Parts Used : Root, leaves, seeds, bark, flowers

Habitat : Karachi, Mirpur Sakro, South-west of Khozdar, Kashmir, Indus delta and weedy places in plains and lower hills of the Punjab.

Active Constituents: Mucilage comprising tocopherol oil, caffeic acid, cineole, geraniol .



Effects : Demulcent, astringent, styptic, carminative, resolvent, diuretic, lithontriptic, useful in piles, gonorrhoea and gleet. Leaves mucilage is useful in chest affections as sedative. Useful in *genitoUrinary complaints*.

Pharmacological Activity : Infusion of roots and leaves are prescribed in fever as cooling medicine and diuretic, in chest affections, gonorrhoea and urethritis. infusion of roots is beneficial in relieving strangury, haematuria and leprosy. Decoction of leaves is used as an eye

and mouth wash in toothache. In case of tender gums, for stones and in inflammation and abscesses of the eye.

A decoction is employed to clean wounds, also as enema, in vaginal infections. Lotions considered to be emollient, diuretic, sedative and aphrodisiac. Juice of leaves is given in catarrhal billious diarrhoea. Plant is considered as depurative, stimulant to circulation, good for skin eruption and deafness.

Dosage : Leaves 6 grams (approx.) , seeds 7 – 12 grams (approx.)

Side-effects : Not reported.

Temp : Warm and dry in second order.

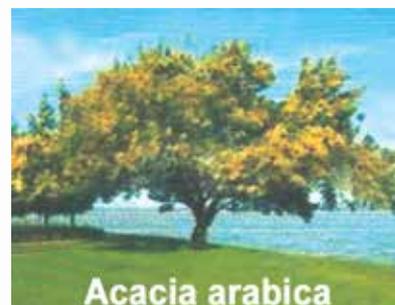
Correction : Rain water

Alternatives : Althaea Officinalis

Babul gum

Taxonomical title of the Botanicals	: <u>Acacia arabica</u>
Natural order / Family	: Mimosaceae
Tibbi Name	: Babul gum / Gande mugilan
English Name	: Gum-Arabic
Hindi / Ayurvedic Name	: Babla atha
বাংলা নাম(Bengali name)	: বাবলা(Babla)

Description : Acacia arabica is a 6 m high tree with a compact, round to flat crown.. Older branches are bare, younger ones measuring 15 to 20 mm in diameter are covered in hairy down. The bark is black and fissured ; the coloring in the fissure changes to red-brown. There are stipule thorns at the nodes. The leaflets of the double-pinnate leaves are in 3 to 12 pairs on the bare to downy petiole, which is covered with glands. The leaflets are oblong, blunt and bare or thinly ciliate. The flowers are yellow and sweetly scented. Two to 6 inflorescences peduncles with capitula-like inflorescences grow from the axils of the upper leaflets. The flowers have short calyces with numerous overlapping sepals. The completely fused petals are almost twice as large as the sepals. The fruit is a 12 to 16 cm long and 1.5 cm wide pod. The pod is straight or lightly curved, flat to convex and pinched in to create segments. It is matte-black to dark-red. The seeds are 7 x 6 mm and the same color as the pod. The bark is collected from plants that are at least 7 years old and then left to mature for a year



It is noted that the bark of the Australian species Acacia decurrens, which is commercially available under the same name.

Parts used : The medicinal parts are the bark, the gum and the fruit of the plant.

Habitat : The plant is indigenous to the Nile area, Ethiopia, East Africa, Angola, Mozambique, South Africa, Arabia, Iran, Afghanistan and India.

Active constituents : Tannins

Effects : The drug has an astringent effect.

Pharmacological activities : Acacia is used as a decoction in the treatment of diarrhea and vaginal secretions, and as an enema for hemorrhoids.

Dosage : 1 to 3 g. as directed by the herbal physician.

Precautions and Adverse Reactions: Large doses taken internally can lead to indigestion and constipation.

Side-effects: Intake of large doses internally can lead to indigestion and constipation.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Indian Acacia gum.

Metha Zahar

Taxonomical title of the Botanicals	: <u><i>Aconitum Napellus</i></u>
Natural order / Family	: Ranunculaceae
Tibbi Name	: Metha Zahar
English Name	: Aconite, Monkshood, Wolfsbane, Soldier 's cap
Hindi / Ayurvedic Name	: Kat bish
বাংলা নাম(Bengali name)	: মিঠা বিস(Mitha Bis)

Description : A perennial herb having perpendicular, tapering tuberous roots. Stem upright, round, smooth, slightly hairy above, upto 2 m. in height. Leaves alternate, long stalked, hairy on the under surface, palmately lobed, the lower more deeply than the upper into three or five segments, which are again divided. Flowers dark-violet in colour, stalked and racemose. Petaloid sepals five, the upper helmet shaped and beaked, nearly hemispherical, the two lateral are roundish and hairy internally, the lower two are oblong oval.



Parts used : Root, rhizome, Stem, leaf, flowers

Habitat : Aconite species can be found in Europe, North America, Asia and Africa.

Active constituents : Aconitine, Neopelline, Aconine, Ephedrine, Benzaconine, Hypoconitine, mesaconitine, Picraconatine, Aconitic, Chlorogenic, Succinic acids.

Effects : Complaints from sudden exposure to cold, marked with physical and mental restlessness, bursting headache. Face red hot, flushed, one cheek red, one pale. Thirst intense, drinks only to wet mouth or vomits. Tachycardia. Stitching Pain in chest. Better in open air. Worse in warm room, evening and by music.

Dosage :

Tincture : 5 to 15 minims ; Liniment for external use only. An extract is also made from the fresh leaves and flowering tops.

Temp : Hot 4° and Dry 4°.

Correction : Milk, Rain water

Alternatives : Aconitum Sp.

Piyaz

Taxonomical title of the Botanicals	: <u><i>Allium Cepa</i></u>
Natural order / Family	: Liliaceae
Tibbi Name	: Piyaz, Basal
English Name	: Onion
Hindi / Ayurvedic Name	: Piyaz
বাংলা নাম(Bengali name)	: পেঁয়াজ(Peyaz)

Description : The plant is perennial or biennial. There are many varieties and can be compressed – globose, ovate, or oblong. Most varieties have secondary bulbs. Leaves are shorter than the peduncle, tubular or swollen, and blue-green. There is a hollow scape, which is gray-blue, expanded, and bloated below the middle. The peduncles are up to 3 cm long. The flowers are greenish-white, in orbicular umbels, with 6 free flower bracts that are shorter than the 6 stamens. The pedicels are eight times as long as the flowers. The fruit is a thin-skinned capsule. The seeds are black and angular. The flowers are in globular umbels, before blooming in membranous sheaths. Onion consists of the fresh or dried, thick and fleshy leaf sheaths and stipules of *Allium cepa*.



Parts used : The medicinal part is the bulb.

Habitat : Central Asia is considered to be the region of origin. Onion was introduced to the Mediterranean and is cultivated worldwide.

Active constituents : Principal constituent of onion is an essential oil containing various mono-, di-, tri- and tetrasulphides ; thiols and thiophene derivatives. Onion also contains carbohydrates, proteins, polyphenols, quercetin, kaempferol, vitamins B and C, a saponin, β -amyryn and sterols. Dry brown outer scale contain catechol and protocatechuic acid.

Pharmacological activities : Onion is antimalarial, antirheumatic, diuretic, antihypertensive and antibacterial. It reduces insulin requirement of diabetic patients, decreases serum

cholesterol. It is a remedy for colic, scurvy and circular alopecia. Onion is also used in faintness, headache, epileptic fits, earache, rheumatism, flatulency, dysentery, cough, catarrh and bites of insects. It is regarded as stimulant, aphrodisiac, emmenagogue and emetic.

Dosage : Mode of Administration : Cut onions, pressed juice from fresh onions and other oral galenic preparations.

Preparation : Onion oil maceration : same as garlic maceration drug extract 1:1

Popular recipe : Pressed juice and onion syrup : made of 500 g onions, 500g water, 100g honey and 350g sugar.

Onion tincture : 100g mined onions in 300g ethanol 70% macerated for 10 days.

Daily Dosage : Raw drug is used therapeutically.

Externally the juice is spread or lead on as a poultice or in slices.

Internally : Onion tincture 4 to 5 teaspoonfuls daily ; onion syrup 4 to 5 tablespoons Daily.

Average daily dose : 50 g. of fresh onions or 20 g. of dried drug.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages. The intake of large quantities can lead to stomach complaints. Frequent contact with the drug leads on rare occasion to allergic reactions (hand eczema).

Temp : Warm in third order and dry in first order according to moistness.

Correction : Rain water

Alternatives : Allium sp.

Khulinjan

Taxonomical title of the Botanicals	: <u><i>Alpinia officinarum Hance.</i></u>
Natural order / Family	: Scitamineae
Tibbi Name	: Khulinjan
English Name	: Lesser Galangal
Hindi / Ayurvedic Name	: Suganda bacha
বাংলা নাম(Bengali name)	: মোটা বচ(Mota Boch)

Description : The plant has a dark, reddish-brown, cylindrical rhizome about 1 to 2 cm in diameter and 3 to 6 cm long. The stem is marked at short intervals with raised rings, which are the scars of the leaf bases. Stems are up to 1.5 m with long narrow lanceolate leaves bearing racemes of orchid-shaped flowers, white and veined red. A fracture of the rhizome is hard and tough, showing a pale inside with a darker central column. It is also a perennial plant and is similar in appearance to the sword lily. It has a pungent and spicy taste. The odor is aromatic, rather like ginger. Lesser Galangal consists of the dried rhizome of *Alpinia officinarum*.



Parts used : The medicinal part of the plant is the rhizome.

Habitat : The plant is indigenous to China and entered Europe via India and Arabia in the Middle Ages.

Active ingredients: Sesquiterpene hydrocarbons, Sesquiterpene alcohols, galangol, phenyl alkanones, pungent substances, galangin, galangin-3-methylether, kaempferide

Effects : The plant is said to have antispasmodic, antiphlogistic and antibacterial properties.

Pharmacological activities : Anorexia, dyspepsia, abdominal discomfort, stomach pain

Dosage :

Mode of Administration : Comminuted drug and powder, as well as other galenic preparations for oral administration.

Preparation : Infusion – Pour boiling water over 0.5 to 1 g drug and strain after 10 minutes.

Daily Dosage : 2 to 4 g. The infusion dosage is 1 cup 30 minutes before meals.

Side-effects: Health risks or side effects following the proper administration of designated therapeutic dosages are not reported.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Alpinia khulanjan.

Khatmi

Taxonomical title of the Botanicals	: <u><i>Althaea Officinalis</i></u>
Natural order / Family	: Malvaceae
Tibbi Name	: Khatmi, Gul-Khairo, Tukma khaeru
English Name	: Marshmallow
Hindi / Ayurvedic Name	: Khatmi dana
বাংলা নাম(Bengali name)	: খেতমী(Khetmi)

Description : A perennial herb with gray green, velvety leaves. Flowers single or clustered, pale blue to rosepink, many varieties. Seeds solitary in each carpel, ascending. Roots are long and narrow.

Parts Used : Flowers, carpels, leaves, root and seeds

Habitat : Cultivated in Kashmir and Punjab in Pakistan, in Belgium, France, Germany, USA, Australia, usually near salt marshes of the ocean.



Active Constituents: Mucilage, Flavonoids, tannins, scopoletin, asparagin lecithin, sterol, fatty acid esters, salicylic acid, oil.

Functions and Properties : Soothing demulcent, emollient, nutrient, alterative, resolvent, anti-tussive, vulnerary, diuretic, anti-inflammatory, mucilaginous, suppurative, effective against gastritis, gastric or peptic ulcer, enteritis, inflammation of the mouth, pharynx, respiratory catarrh, cystitis, immune stimulant. Internally flowers are expectorant ; internally the root is demulcent. Leaves are used for poultice and fomentation. Mixed with oil the leaves and flowers are applied to burns and parts bitten by venomous reptiles > It is utilised for inflammation of alimentary canal, kidneys, bladder. Used for ulceration of stomach and duodenum, hiatus hernia, catarrh of respiratory organs, dry cough, open wounds – to clean and heal, cystitis, diarrhoea, septic condition of moderate severity. A poultice or ointment is applied topically to boils, abscesses, ulcers and oil wounds to draw infective matter to the surface before expulsion from the body. It

is specific treatment for chronic coughs, urinary tract infections and prostate problems. It has been found to increase immunity by stimulating white blood cells. The pulverized roots make a soothing poultice and are blended in ointments and creams to soothe chapped hands.

Pharmacological Activity : Aqueous extract of the roots potentiated the anti-inflammatory activity of dexamethasone. A mixture of *Althaea Officinalis* and coconut oil is claimed to promote growth of hair. Roots with other ingredients are used for the treatment of hemorrhoids.

Dosage : 5 – 7 grams.

Side-effects : Excessive use harmful for stomach.

Temp : Warm towards moderate temperament.

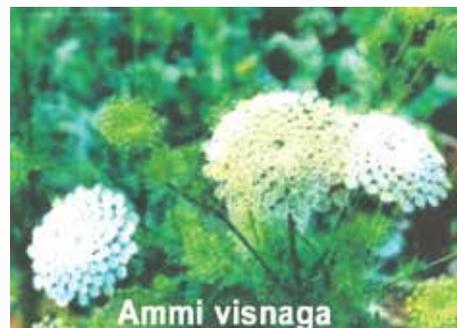
Correction : Rain water.

Alternatives : *Abutilon Indicum*.

Khaili

Taxonomical title of the Botanicals	: <u><i>Ammi visnaga</i></u>
Natural order / Family	: Apiaceae
Tibbi Name	: Khaili
English Name	: Bishop's Weed
Hindi / Ayurvedic Name	: Khaili
বাংলা নাম(Bengali name)	: খেঙ্গা(Khella)

Description : Bishop's Weed is a robust annual or biennial that grows up to 100 cm tall. The lower leaves are pinnate, the others are 2 to 3 pinnate. All of the leaves have narrow linear or filiform lobes. The rays are slender and patent in the flower, becoming erect, thickened and indurate in the fruit. The bracts are 1 to 2 –pinnatisect, equaling or exceeding the rays and the bracteoles are subulate. The pedicles are erect, stout and rigid in the fruit. The fruit is 2 to 2.5 mm long. It consists of the dried, ripe fruits of *Ammi visnaga*.



Parts used : The medicinal part is the fruit.

Habitat : The plant grows in the Mediterranean region and is cultivated in the U.S., Mexico, Chile and Argentina.

Active constituents : Khellin, visnagin, khellol and khellol glucoside, visnadin, samidin, flavonoids, volatile oil, fatty oil.

Effects : The drug intensifies coronary and myocardial circulation, acting as a mild positive inotrope. It has an antispasmodic effect on smooth muscles.

Pharmacological activities : Bishop's Weed has been used for angina pectoris, cardiac insufficiency, paroxysmal tachycardia, extra systoles, hypertonia, asthma, whooping cough and cramp-like complaints of the abdomen.

Dosage : Median dose corresponding to 20 mg g-pyrone derivatives, calculated as khellin.

Liquid extract : (1:1) 0.5 ml

Tincture : (1:10) 4 ml

Tea : 0.5 gm in one cup of water, taken several times a day.

Overdosage : Long-term use or overdose of the drug can lead to queasiness, dizziness, loss of appetite, headache or sleep disorders. Very high dosages, corresponding to over 100 mg khellin, may cause elevated levels (reversible) of liver enzymes in blood plasma.

Side-effects: Infrequently, a cholestatic jaundice (reversible) is observed following administration of the drug. The drug also possesses a phototoxic effect.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Atrilal, Centella asiatica

Abhaowa buti

Taxonomical title of the Botanicals	: <u>Anagallis Arvensis</u>
Natural order / Family	: Primulaceae
Tibbi Name	: Abhaowa buti
English Name	: Scarlet pimpernel / Poor man's weather forecast
Hindi / Ayurvedic Name	: Jonkhmari
বাংলা নাম(Bengali name)	: জেঁখমারি(Jonkhmari)

Description : A trailing annual herb with stem 15-50 cm. high, branched from the base, more or less procumbent, quadrangular, glabrous, branches slightly winged. Leaves opposite, entire, ovate, sessile, dotted on the lower surface. Flowers solitary, axillary, on long peduncles, erect during flowering but curves backwards when seeds ripens, pentamerous. petals scarlet, tubular below. Calyx 5, Stamens 5, opposite, petals, beset with a number of delicate violet hairs. Fruit a tiny capsule (urn-like) splitting into two halves, upper half lifts like a lid. Roots spindle shaped and contorted.



Parts used : The medicinal part is the whole plant.

Habitat : Throughout Europe, particularly U.K Also cultivated in India as protected plant.

Active constituents : Roots contain saponins, triterpenoids, cucurbitacin glycosides. Aerial parts also contain alkaloids, sterols, β -amyrin, rutin, n-hexacosane, laceric acid, anagalligenin, carbohydrates and enzymes. Roots contain saponins and on keeping yields cyclamin. Flowers contain sterols, kaempferol, quercetin and rutin.

Pharmacological activities: Complaints especially of skin, characterised by great itching and tingling everywhere. Favours expulsion of splinters. an old remedy for hydrophobia and dropsy. Possesses power of destroying warts. Headache over supra-orbital ridges. Cramps in thumbs and fingers. Urethral irritation. skin itches with dry bran like eruption, especially of hands, fingers and palm. Also diaphoretic and diuretic.

Dosage : Tincture : 10 – 40 drops as directed by the physician.

Side-effects: Not reported

Temp : Hot and dry.

Correction : Rain water

Alternatives : American life Plant.

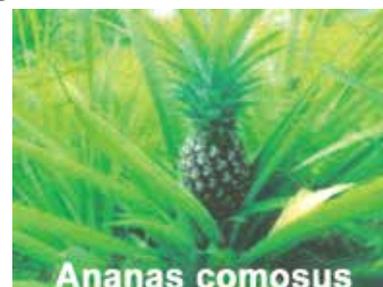
Anun nesa

Taxonomical title of the Botanicals	: <u><i>Ananas Comosus</i></u>
Natural order / Family	: Bromeliaceae
Tibbi Name	: Anun nesa
English Name	: Pineapple
Hindi / Ayurvedic Name	: Anannas
বাংলা নাম(Bengali name)	: আনারস(Anaras)

Description : The pineapple plant is a perennial, erect herb, with a short stem bearing a rosette of leaves 2 – 3 ft. long, with prickly margins and spiny tips. The fruit, which has a rough surface and a crown of small leaves, has succulent flesh of yellow to light orange colour.

Parts Used : Ripe and unripe fruits, leaves roots.

Habitat : Cultivated in India. Hawaii and Malaysia are the largest pineapple producing countries. Central America, Australia and South Africa also are important centres of production.



Active Constituents: Bromelin, ergasterol peroxide, ash, vitamin C (63 mg/100 g fruit).

Functions and Properties : Anti-inflammatory, diaphoretic, digestive, anti-scorbutic, emmenagogue, Abortifacient, diuretic, lithontriptic, nutritive, cardio-tonic, anti-bilious, refrigerant, anthelmintic, purgative, aperient. Gargle with fresh juice for sore throat. Topically a slice of the inner peel is placed over a corn, held in position by a skin adhesive and left on at night. In the morning the foot is soaked in hot water and debris scraped away ; 2 – 3 applications may be necessary. The unripe fruit is digestive, useful in cardiac disorders and fatigue. The fruits and roots are considered diuretic. They are given in blennorrhagia is used to produce abortion. Unripe fruit is also used as Abortifacient. The immature fruits cut up and boiled and taken internally for venereal diseases. As effective sedative and febrifuge against biliousness due to warmth in liver, thus also prescribed in Jaundice and palpitation.

Pharmacological Activity : Juice of unripe fruits showed anti-implantation and Abortifacient activities in rats. Bromelin possess anti-inflammatory activity.

Dosage : 25 – 60 ml.

Side-effects : Unripe fruit in large quantities, is Abortifacient.

Temp : Cold and moist in second order.

Correction : Rain water.

Alternatives : Garcinia Sp. / Carica papaya

Karafs

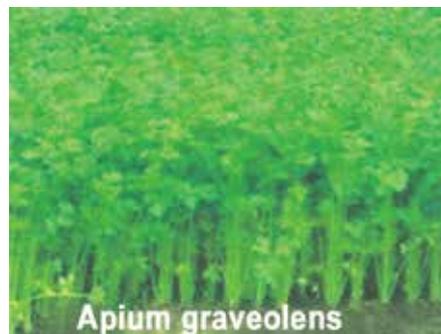
Taxonomical title of the Botanicals	: <u><i>Apium Graveolens</i></u>
Natural order / Family	: Apiaceae
Tibbi Name	: Karafs
English Name	: Celery
Hindi / Ayurvedic Name	: Ajmoda
বাংলা নাম(Bengali name)	: রান্ধুনী(Randhuni)

Description : An annual or biennial herb. Stem upto 2-4 m. high, erect, branching. Radical leaves pinnate with deeply lobed segments, cauline 3-partite ; segments once or twice trifid, coarsely toothed at the apex. Peduncle 6 mm. or less. Umbel rays 5-10, pedicels 6-16. Flowers white, very small ; Fruit a cremocarp, each with 2 mericarps, 1-1.5 mm. long with narrow ridges, board vittae.

Parts used : The medicinal part is the Fruit.

Habitat: Cultivated in Indian, particularly Punjab & U.P., Europe and U.S.A.

Active constituents : Choline, Myristic acid, Myristic acid, Myristoleic acid, Stearic acid ; Apiin, Isoquercitrin, Apigenin ; Apigravin, Apiumetin, Apiumoside, Bergapten, Celeroside, Rutaretin ; α -eudesmol, β -eudesmol, santalol ; 3-n-butyl phthalide, sedanenolide. Seeds : d-Limonene, Selinene, Oleoresin.



Effects : Used as Carminative, Stomachic, Anodyne, Nerve tonic, emmenagogue, Stomach trouble. For complaints of depression and sleeplessness. Obstinate retention of urine, throbbing headache, heartburn, Rheumatic pain in muscles of neck and sacrum. Dysmenorrhoea with short pains in both ovarian regions better by flexing legs, left ovarian Pain better by lying on left side. Sharp sticking pain in left iliac region going over to right side. Intense constriction over sternum. Skin urticaria with shuddering. Itching blotches with burning.

Temp : Hot and dry.

Correction : Pure Water.

Alternatives : Coriandrum Sativum Linn.

Jarwand Hindi

Taxonomical title of the Botanicals	: <u><i>Aristolochia clematitis</i></u>
Natural order / Family	: Aristolochaceae
Tibbi Name	: Jarwand Hindi
English Name	: Birth Wort
Hindi / Ayurvedic Name	: Iswarmul
বাংলা নাম(Bengali name)	: ইশ্বরমূল(Ishwarmul)

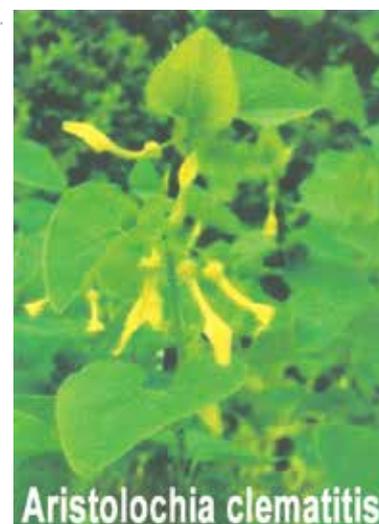
Description : The plant grows to a height of 30 to 100 cm. The stem is erect, simple, grooved and glabrous. The leaves are alternate, long-petioled, cordate-reniform, yellow-green with prominent ribs. The Plant has dirty yellow flowers, usually in axillary groups of 7. The perigone forms a straight tube, which is bulbous beneath and has a linguiform, oblong-ovate, obtuse border. There are 6 stamens, the style is upward growing, and the stigma is 6-lobed. The flower briefly traps the insects that pollinate it. The fruit is a globose, pear-shaped capsule

Parts used : The medicinal parts are the aerial portion (when in blossom) and the root.

Habitat : Indigenous to Mediterranean regions, Asia Minor and the Caucasus, but is also found in numerous other regions.

Active constituents: Aristolochic acids I and II, Isoquinoline alkaloids including magnoflorin, corytuberin and Volatile oil (0.03 to 0.2%) eg alpha-pinene, alpha-terpineol.

Functions: Birthwort is used to stimulate the immune system and in the treatment of allergically caused gastrointestinal and gallbladder colic. The plant is used in a wide variety of ways in the folk medicine of nearly all European countries. In Chinese Medicine, it is used to relieve joint



pain, stomach pain, malaria and abscesses. It is also used as a treatment after major surgery and in ear-nose-throat treatments.

Pharmacological activities : The aristolochic acid have a phagocytosis-and metabolism-activating effect. They are also thought to improve the production of lymphokinins. Activation of phagocytes has been demonstrated in animal tests in rabbits and guinea pigs, along with an increase in serum bactericides and stimulation of β -lysine. In addition, in animal tests, immune resistance to Herpes simplex viruses of the eye was proved.

In the ring test, stimulation and formation of granulation tissue was demon-strated in rats. In mice, there was a clear increase in the survival rate in cases of general infection. No significant results were recorded in cases where infections had no or only a low leucocytic immune reaction. The drugs's pure aristolochic acid acts similiary to colchicine; it is nephrotoxic, carcinogenic and mutagenic.

Side-effects : Birthwort is highly toxic. The intake of acutely toxic doses leads to vomiting, gastroenteritis, spasms, severe kidney damage and eventually to death by kidney failure. The chronic intake of low dosages among both humans and laboratory animals led to the development of tumors. Because of the genotoxic and carcinogenic effects of the aristolochic acids, the drug is not to be administered even in small dosages. Only to be used under the supervision of an expert qualified in its appropriate use. Birthwort is not to be used during pregnancy.

Dosage : Birthwort is used as a tincture in an ethanol solution. No further information is available.

Temp : Hot and dry.

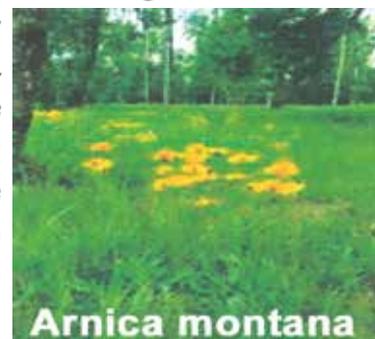
Correction : Piper longum

Alternatives : Aristolochia indica Linn.

Anika

Taxonomical title of the Botanicals	: <u><i>Arnica Montana</i></u>
Natural order / Family	: Asteraceae
Tibbi Name	: Anika
English Name	: Celtic nard, Leopard's bane
Hindi / Ayurvedic Name	: Anika
বাংলা নাম(Bengali name)	: আনিকা(Anika)

Description : Arnica is a herbaceous plant growing 20 to 50 cm high. The brownish rhizome that is 0.5 cm thick by 10 cm long, usually unbranched, in 3 sections and sympodial. The rhizome may also be 3-headed with many yellow-brown secondary roots. Leaves are in basal rosettes. They are in 2 to 3 crossed opposite pairs and are obovate and entire-margined with 5 protruding vertical ridges. The glandular-haired stem has 2 to 6 smaller leaves, which are ovate to lanceolate, entire-margined or somewhat dentate. The terminal composite flower is found in the leaf axils of the upper pair of leaves. They have a diameter of 6 to 8 cm. are usually egg yolk-yellow to orange-yellow, but occasionally light yellow. The receptacle and epicalyx are hairy. The 10 to 20 female ray flowers are linguiform. In addition, there are about 100 disc flowers, which are tubular. The 5-ribbed fruit is black-brown and has a bristly tuft of hair. The flower heads are aromatic ; the taste is bitter and irritating.



Parts used : The medicinal parts of Arnica are the ethereal oil of the flowers, the dried flowers, the leaves collected before flowering and dried, the roots and the dried rhizome and roots.

Habitat : Arnica is found in Europe from Scandinavia to southern Europe. It is also found in southern Russia and central Asia.

Active constituents : Choline, arnicin, arnidendiol, Helenalin, Alloarnidendiol, Insulin, Betaine, Scolimoside, Cynaroside, Isoquercetrin, Astragaline, Scopoletin, Beta-lactucerin, Beta-sitosterol.

Effects : Thrombosis, Trauma, cerebral congestion injuries, head injuries, Muscular debilities, haemorrhages, diplopia from trauma, angina pectoris, straining of tenesmus of diarrhoea, conditions becoming worse by touch, motion, low blood pressure. Tumors, intestinal cancer, expectorant, hemostat, reduces cholesterol, stimulates CNS.

Dosage :

Mode of Administration : Arnica is used in the form of the whole herb, cut herb or herb powder for infusions, extracts and tinctures ; gel, oil and poultice for external application.

Preparation : Arnica tincture (3x to 10x dilutions with water) is used to prepare a poultice. A tincture is prepared using 1 part Arnica flowers and 10 parts ethanol 70 % v/v (according to DAB 10). Arnica oil is an extract of 1 part herb and 5 parts slightly warmed fatty oil. Ointments are made up with up to 15 % Arnica oil or with 10 to 25 % tinctures in a neutral ointment base. Mouthwashes are prepared as a tincture in 10x dilution.

Daily Dose : Tincture for cataplasm : tincture in 3x to 10x dilution. For mouth rinses : tincture in 10x dilution. Ointments should contain a maximum of 15% Arnica oil.

Side-effects: Not reported

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Aconitum Napellus

Afsantin belayati

Taxonomical title of the Botanicals	: <u><i>Artemisia dracunculus</i></u>
Natural order / Family	: Asteraceae
Tibbi Name	: Afsantin belayati
English Name	: Warm seed
Hindi / Ayurvedic Name	: Nagadomoni
বাংলা নাম(Bengali name)	: নাগদনা(Nagдона)

Description : The plant is a glabrous, 60- to 120- cm high herbaceous perennial. There are numerous stems, which are bushily branched with flowering branches at the top. The are simple, lanceolate-linear, 2 to 10 cm by 2 to 10 mm, thorn-tipped, entire or slightly serrate and somewhat glossy. The flowers are drooping, almost globular, and 2 to 3 mm across. They are whitish, later reddish and clustered in loose panicles. The sepals of the epicalx are oblong-elliptic and mostly green ; the inner sepals are ovate with a broad membranous edge. The ray florets are female. The disc florets are androgynous and infertile. The corolla is yellow with a glabrous receptacle.



Parts used : The medicinal parts are the dried aerial parts of the plant.

Habitat : The plant is indigenous to Germany, Russia and Southern Europe.

Active constituents : Volatile oil of complex, variety-specific composition (0.25-3.1%): chavicol methyl ether dominates in German species, accompanied by ocimene, myrcene, alpha-pinene, beta-pinene, camphene, limonene, linalool. Flavonoids, including quercetin and patuletin glycosides, herniarin, scopoletin, aremidin, polyynes

Effects : The essential oil of the drug is an appetite stimulant.

Dosage :

Mode of Administration: Both the fresh and dried plant is used, mostly as a culinary herb.

Tincture : 10 to 40 drops as per physician directs.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Artemisia Maritima Linn.

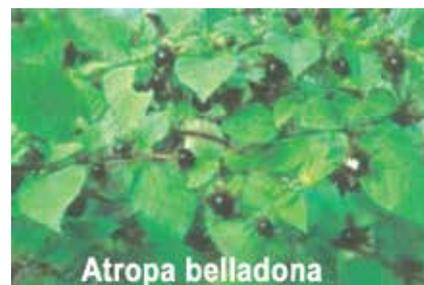
Angur sheaf

Taxonomical title of the Botanicals	: <u><i>Atropa belladonna</i> Linn.</u>
Natural order / Family	: Solanaceae
Tibbi Name	: Angur shefa
English Name	: Deadly night shade
Hindi / Ayurvedic Name	: Sag angur
বাংলা নাম(Bengali name)	: বেলাডোনা(Belladona)

Description : A large, bushy, perennial herb with a thick, fleshy, juicy, branched and spreading root. The plant is 1-1.6 m. high. Cylindrical, smooth. Leaves numerous, alternate below, opposite above, one larger than other, short stalked, 7-23 cm. long, ovate, entire, dark green. Flowers solitary (rarely 2 or 5 together), axillary, pedicillate, drooping, pedicel as long or longer than calyx ; calyx 5 cleft ; corolla bell-shaped, about 2.5 cm.. long, five-lobed, dull reddish purple, tinged with pale green. Fruit a berry.

Parts used : The medicinal parts are the leaves and roots.

Habitat :The plant is found throughout western, central and southern Europe, in the Balkans, southeast Asia, Iran, northern Africa, Denmark, Sweden and Ireland. It is cultivated in other countries, particularly England, France and the U.S.A.



Active constituents : Indian belladonna root contains a higher proportion of alkaloid atropine and hyoscyansine than the European varieties. A number of specimens of the roots contained 0.81% of total alkaloids, as compared with 0.45% laid down in the British Pharmacopoeia and the leaves contained 0.50% as compared with 0.3%.

Effects : Belladonna is a valuable antidote in poisoning by opium, muscarine, etc. Extract of belladonna is used as an external application to relieve pain and internally for checking excessive

perspiration in consumption, for the relief of coughs, and for many other purposes The extract prepared from the leaves causes the pupil of the eye to dilate, and is used in ophthalmic surgery.

Dosage : (Thrice a day) Dried herb as infusion. Dose : 30 – 100 mg.
Tincture. Dose : 0.5 – 2 ml.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Cold and dry.

Correction : Black pepper, Rain water.

Alternatives : Hyoscyamus aniger Linn.

Jai

Taxonomical title of the Botanicals : *Avena Sativa*

Natural order / Family : Gramineae

Tibbi Name : Jai

English Name : Oats

Hindi / Ayurvedic Name : Jai

বাংলা নাম(Bengali name) : যাই(Jai)

Description : The oat sometimes called the common oat, is a species of cereal grain grown for its seed, which is known by the same name. It is an annual with erect stems 40-180 cm long. Its leaves are cauline. The ligule is a hairless membrane 3-6 mm long. The leaf-blades are 14-40cm long and 5-15 mm wide. It is cultivated throughout the temperate world to produce food for humans.

Parts used : The medicinal parts are the fresh or dried above-ground plant, the ripe, dried fruits and the dried threshed leaf and stem.

Habitat : Oats originated in England, France, Poland, Germany, Russia and are now cultivated world wide.

Active constituents : Fat, starch, sugar, albumin soluble and insoluble, cellulose, mineral matter and moisture. Outer portion of the grain contains phosphates. Seeds contains a principle called "Avenin" the nitrogenous principle of *Avena sativa* and somewhat resembles legumin. Ritthausen considers Nortin's Avenin to have been a mixture of legumin or vegetable casein and a vegetable gluten containing sulphur which name "Gliadin", the legumin however predominating.



Effects : Oat is an antidepressive, thymoleptic, cardiac tonic. It is also used in melancholia, menopausal neurasthenia, general debility etc.

Pharmacological activities: Oats is most useful as a nutrient and is described as a perfect food. This is an unrivalled fodder crop for horses in India. British grown oats are best. Oatmeal porridge does not agree with every one. In cases where the bodily vigour is low and the body ill-nourished, creamed Oatmeal, or Oatmeal Blanc-mange is very valuable. In the form of tincture it is recommended for all liable to much nervous strain. The dose is from 10 to 20 drops in a little hot water taken twice a day ; in a dose of 40 drops as a saporific, as an antidote in morphinism, alcoholism, diphtheric paralysis (in rather smaller dosage), also in dysentery (for nocturnal restlessness).

Dosage:

Liquid Extract 1:1 in 25% alcohol. Dose 0.6 – 2.0 ml. Tincture 1:5 in 45% alcohol. Dose : 1 – 5 ml.

Temp : Hot and Cold.

Correction : Hot water.

Alternatives : Alfa alfa, Ceda sp.. Winter cherry.

Kamrak

Taxonomical title of the Botanicals	: <u><i>Averrhoa carambola</i> Linn.</u>
Natural order / Family	: Averrhoaceae / Oxalidaceae
Tibbi Name	: Kamrak
English Name	: Chines Gooseberry
Hindi / Ayurvedic Name	: Karmaranga
বাংলা নাম(Bengali name)	: কামরাজা(Kamranga)

Description : Averrhoa carambola is a tree that grows up to 5m high. The leaves are alternate, odd pinnate, and 10 to 12 cm long. Cymose inflorescences grow from the trunk..The flowers are redial, and their structures are arranged in fives. The petals are free; there are 10 stamens and a 5-chambered ovary. The fruit is a berry, approximately 10 cm long. The berry is acuminate, 5-sided and star-shaped in cross-section. It is translucently amber-yellow.



Parts used : The medicinal part is the fruit.

Habitat : Bangladesh, Pakistan, India, South east Asia. introduced from the new – world by the Portuguese.

Active constituents :Oxalic acid (0.3 % of fresh weight), vitamin C (0.5 % of fresh weight), monosaccharides / polysaccharides, carotinoids etc.

Effects : Carambola is used for diarrhea, vomiting, severe thirst, hemorrhoids, intermittent fever, scabies, and liver pain.

Dosage : No information is available.

Sifde-effects: There is no evidence of any health risks connected with limited consumption of the fruit or the preserves made from them. Nevertheless, due to the high oxalate content, which

corresponds approximately to that of rhubarb stalks, the ingestion of large amounts over extended periods should be avoided.

Temp : Cold and moist.

Correction : Piper nigra.

Alternatives : Averrhoa Bilimbi linn.

Darakte-bang

Taxonomical title of the Botanicals	: <u><i>Cannabis Sativa</i></u>
Natural order / Family	: Cannabaceae
Tibbi Name	: Darakte-bang.
English Name	: Marijuana, Cannabis, Hemp, Hashish
Hindi / Ayurvedic Name	: Ganja, Charas
বাংলা নাম(Bengali name)	: গাঁজা(Ganza)

Description : The medicinal parts are the twig tips of the female flowers, with either flowers or fruit attached, the flower-bearing twigs that have been dried ; the ripe hemp fruit and various homeopathic preparations of the fresh dried plant-parts. Hemp is dioecious. The female flowers are reduced to the perigone with one bract. The complete inflorescences form a leafy, flash spike. The male flowers form panicles rich in pollen. Pollination is by the wind.

The fruit is a gray-green, glossy achene, 3.5 to 5 mm long and 2.5 to 4 mm wide. The seeds have little endosperm, are white, oily-fleshy and hooked. Cannabis is an annual or biennial plant, which is usually branched and grows up to 5 m. The plant has erect, rough-haired and compressed bristles. The leaves are long-primordially and 3-7 pinnate. The leaflets are lanceolate and serrate.



Habitat : The plant probably came from Asia and the Middle East, but it now grows worldwide in temperate and tropical regions.

Active constituents : Principal constituent of the flowering tops of the pistillate plants, which are medicinally used, is a resin which contains more than 60 cannabinoids. Some of the active compounds are cannabinol, pseudocannabinol, tetrahydro-cannabinol, cannabidiol, cannabigerol, cannabofol, cannabiniol, cannin, piperidine and cannabichromene. The plant also contains volatile oil, alkaloids, choline, trigonelline, spermidine and cannabistatine and flavonoid glycosides of vitexin and orientin. Roots contain steroids, triterpenes and amide, β -sitosterol, friedelin and epifriedelinol, carvone and dihydrocarvone and a basic substance.

Pharmacological activities : Since the plant possesses strong narcotic properties, its use as a drug is generally discouraged. However, it possesses analgesic, antispasmodic, anodyne, sedative, aphrodisiac and stimulant properties. Leaf juice removes dandruff and vermin, allays earache, reduces the discharge in gonorrhoea and diarrhoea. Poultice of leaves is applied to inflammations, neuralgia and haemorrhoids. Resinous extract of the flowering top produces sleep. Prevents and cures headache, migraine, neuralgia and is useful in acute mania, asthma and whooping cough. It also relieves pain of Dysmenorrhoea, menorrhagia and phthisis. Seed oil is used in rheumatism. Cannabis is also used in cancer chemotherapy.

Dosage :

Mode of Administration : Marijuana is widely used as an illegal recreational drug. It is usually either smoked or eaten to produce mind-altering effects. The extracted or synthetically produced delta-9-tetrahydrocannabinol component is used legally in capsule form for oral administration.

Daily Dosage : The former average oral single dose of the drug was 0.1 g.

Appetite stimulation --- (Marinol) 2.5 mg to 10 mg twice daily

Antiemetic --- (Marinol) 5 mg/m² to 15 mg/m² 4 to 6 times daily.

Temp : Hot and Dry.

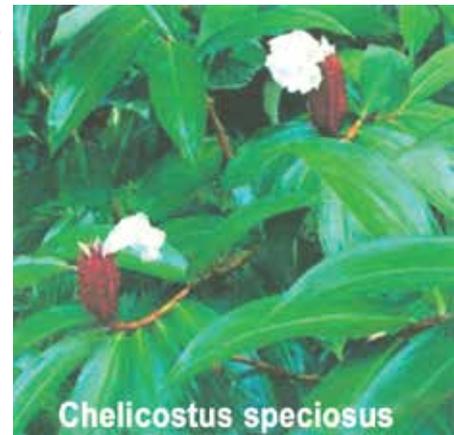
Correction : Milk.

Alternatives : Cannabis Indica.

Hanzal

Taxonomical title of the Botanicals	: <u><i>Citrullus colocynthis Linn.</i></u>
Natural order / Family	: Cucurbitaceae
Tibbi Name	: Hanzal
English Name	: Bitter Apple, Bitter Gourd
Hindi / Ayurvedic Name	: Makal phal
বাংলা নাম(Bengali name)	: রাখাল শসা(Rakhal Shosa)

Description: Bitter Apple is an annual similar to a watermelon plant. The stems are leafy and rough-haired. The leaves are alternate on long petioles. They are triangular, divided, variously indented, obtuse and pubescent. The upper surface is delicate green, the lower surface rough and pale. The flowers are yellow and appear singly in the leaf axils. The fruit is about the size of an apple. It is yellow, smooth, dry, and very bitter. When ripe, the fruit contains white spongy flesh within the coriaceous peel, with numerous ovate, white or brownish seeds. The seeds are 0.75cm long and 0.5 cm wide, ovate, compressed, without an edge, oily and somewhat shiny. Bitter Apples are the ripe fruits of *Citrullus colocynthis* that have been removed from the harder outer layer and it is highly poisonous.



Parts used: The medicinal part of the plant is the dried pulp.

Habitat: Bitter Apple is indigenous to Turkey and southern Mediterranean countries. It is also found in Sri Lanka, Egypt, Syria, and the Arabian Gulf.

Active constituents: Cucurbitacins: including Cucurbitacins E-, J-, L-glucosides, Caffeic acid derivatives: chlorogenic acid, fatty oil (in the seeds)

Pharmacological activities : Bitter Apple irritates the intestinal mucous membrane, increasing liquid production. Preparations of Bitter Apple are also used as a drastic (painful) purgative in fixed combinations in the treatment of acute and chronic constipation with various causes. Acitis and elephantiasis are among the conditions treated with Bitter Apple in Indian medicine.

Dosage : Tincture : 5 – 40 drops as per physician directed.

Side-effects: The drug is severely poisonous. It has a strongly irritating (and painful) effect on mucous membranes due to its cucurbitacin glycoside content, out of which cucurbitacins are released in watery environments. Vomiting, bloody diarrhea, colic, and kidney irritation follow the intake of toxic dosages (0.6 to 1 g), and then increased diuresis that progresses to anuria. Lethal dosages (starting at 2 g) lead to convulsions, paralysis and, if untreated, to death through circulatory collapse. The treatment for poisonings should proceed symptomatically following gastric lavage.

Temp : Hot and dry.

Correction : Rain water

Alternatives : Luffa Amara Roxb.

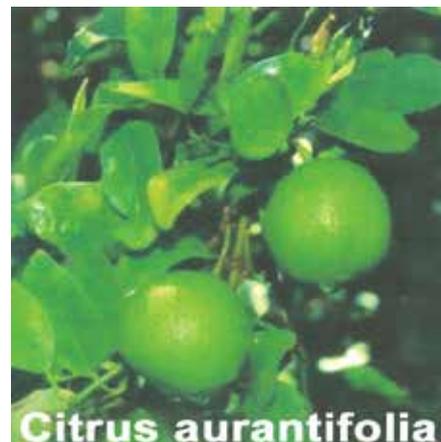
Santara

Taxonomical title of the Botanicals	: <u><i>Citrus aurantifolia</i> Linn.</u>
Natural order / Family	: Rutaceae
Tibbi Name	: Naranjg, Santara
English Name	: Lime
Hindi / Ayurvedic Name	: Kalma-nemboo
বাংলা নাম(Bengali name)	: কমলা লেবু(Kamala Lebu)

Description : The evergreen tree is small, bent, thorny and normally only grows to a height of 2.5 m. The leaves are ovate-lanceolate and acuminate. The fragrant flowers are small and pure white. The fruit is about half the size of a lemon, with a smoother, thinner peel, a greenish-yellow color and sweet taste.

Parts used : The medicinal component is the bergamot oil extracted from the plant.

Habitat : Lime is indigenous to South Asia and is cultivated in the West Indies, semi-tropic areas of the U.S. and Central America.



Active constituents : Citral, (+)-limonene, pinenes, alkanes, alkanols, alkanals, beta-bisabolene ; also, in pressed oils, furocoumarins.

Effects: Lime is used as a source of vitamin C to treat scurvy and in cases of general low resistance.

Dosage : Lime is used internally as a liquid extract of the fresh fruit.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages. There is a low potential for sensitization through skin contact with the juice of the fruit or with the vilatile oil.

Temp : Cold and moist.

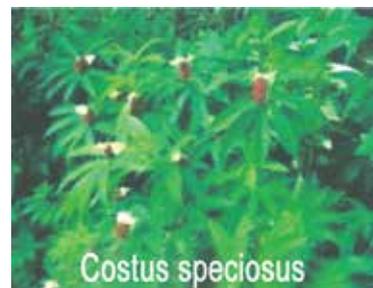
Correction : Honey.

Alternatives : Citrus Bargamia.

Kust

Taxonomical title of the Botanicals	: <u><i>Costus speciosus Sm.</i></u>
Natural order / Family	: Scitamineaceae
Tibbi Name	: Kust
English Name	: Cane-Reed
Hindi / Ayurvedic Name	: Keu
বাংলা নাম(Bengali name)	: কুট(Kut)

Description : *Costus speciosus* is a herbaceous perennial, upright, up to 3 m high. The leaves have tubular sheaths, which are 0.7 to 1.2 cm in diameter and a pubescent to glabrous. The ligula is 1 to 2 mm long ; the leaves are 12 to 25 cm long, 3 to 6 cm wide, narrow elliptical, thorny-tipped, glabrous above and downy-haired beneath. The stem is upright. The rhizome is up to 50-cm long, 3 cm thick and rich in starch. The inflorescence is ovoid, apical, and 4 to 7 cm long. The zygomorphic flowers are each supported by one narrow, ovate, acuminate, coriaceous, thickly haired, red to red-brown bract. There is a bracteole, which is approximately 2 cm long, violet to brown-red and sparsely pubescent. The calyx is approximately 2.5 cm long, green to red-brown and tubular. The 3 petals are approximately 6 cm long, white to pale pink and silky haired. The corolla tube is approximately 1.5 cm long. The lobes are elliptical to ovate and 6 to 7 cm long. The lobes are white to pale pink, with a yellow lip in the center made up of 5 stamens. When spread out, the lobe is broad obviate and crenate. There is 1 fertile stamen, which is white to yellowish and up to 5 cm long. The style is threadlike and the ovary 3-chambered and inferior. The fruit is a light red, loculicidal capsule. The seeds are black, 2 to 4 mm wide, with a narrow, fleshy aril.



Parts used : The medicinal part of the plant is the rhizome.

Habitat : *Costus speciosus* is found in India and its dried rhizome is used for medicine

Active ingredients :

Steroid saponins (1 to 4 %) :_Chief components dioscin and gracillin, aglycones diosgenin, tigogenin.

Steroids: Sterols, including beta-sitosterol, beta-sitosterol glucoside.

Curcuminoids (3 %) : including curcumin

Pharmacological activities : The saponin fraction of the drug exhibits estrogenic, antiexudative, spasmolytic, choleric, and anesthesia-prolonging effects.

In Indian Medicine Kusta is used for febrile conditions, coughs, skin conditions, retention of the placenta, postpartum bleeding, threatening abortion, insufficient uterine contractility and snake bites.

Side-effects: No health hazards are known in conjunction with the proper administration of designated therapeutic dosages. It is conceivable that gastric complaints and nausea might be experienced, as well as kidney irritation, due to the high level of saponin content.

Dosage : Whole herb preparations, cut and powdered drug for internal use.

Temp : Hot and dry.

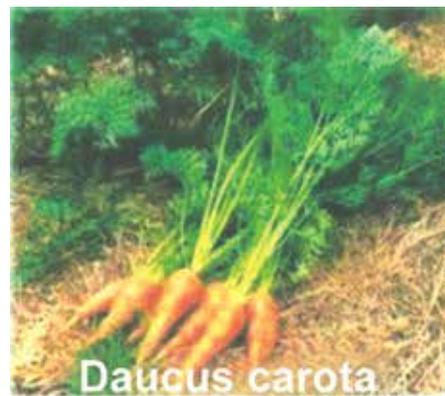
Correction : Honey, milk, water

Alternatives : Psoralea Corylifolia Linn.

Jazar

Taxonomical title of the Botanicals	: <u><i>Daucus carota Linn.</i></u>
Natural order / Family	: Apiaceae / Umbelliferae
Tibbi Name	: Jazar
English Name	: Wild Carrot
Hindi / Ayurvedic Name	: Gazor
বাংলা নাম(Bengali name)	: গাজর(Gazor)

Description : The wild Carrot is a biennial, 30-cm to 1-m high cultivated plant with a fusiform, usually red root and numerous pinnate, segmented, hairy leaves. In the second year, the plant produces a branched. Angular stem with alternate jointed leaves, which terminates in the flowering umbels. The flowers are in compact, terminal umbels or flattened, compound capitula. The peduncle divides in raylike fashion from one particular point. Each ray divides and forms further umbels with white flowers. The outer flowers are irregular and larger than the others. The florets are small. When in bloom, The flowers head is flattened or slightly convex. When they are ripe, The flowers draw together to form a cuplike structure. The double achenes are formed in the fruit umble. They are slightly flattened and have numerous bristles arranged in 5 rows



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Parts used: The medicinal part is the root.

Habitat : Now found in its cultivated form all over the world.

Active ingredients :

Carotinoids : including alpha-, beta-, gamma-, zeta-carotene, lycopene.

Volatile oil (very little) : including among others p-cymene, limonene, dipenten, geraniol, alpha- and beta-caryophyllene.

Polyynes : including falcarinol (carotatoxin)

Mono and oligosaccharides : Glucose, saccharose.

Effects : The wild Carrot is a useful drug in pediatrics for tonsillitis, nutritional disorders. It is also used in medicinal preparations for dermatological conditions such as photodermatitis and pigment anomalies. It is used in teas for intestinal parasites

Pharmacological activities: Wild Carrot has anthelmintic and antimicrobial activity. It is also a mild vermifuge. The essential oil has an initially stimulating, paralyzing effect on worms. In controlled animal tests, a temporary reduction of arterial blood pressure was observed. The pectin content is probably responsible for the severe constipating effect of the Carrot. The essential oil has a mild bactericidal effect, especially on gram-positive bacteria. The drug has a positive effect on visual acuity and scotopic (twilight) vision, as well as being a mild diuretic.

Side-effects: Health risks or side effects following the proper administration of designated therapeutic dosages are not recorded. The drug has a low potential for sensitization through skin contact.

Dosage : The drug is taken in a ground form or consumed as a juice or vegetable. It is found in ready-made medicinal preparations.

Temp : Hot and moist.

Correction : Milk.

Alternatives : Beta maritima.

Bhangra

Taxonomical title of the Botanicals	: <u>Eclipta Alba</u>
Natural order / Family	: Compositae
Tibbi Name	: Bhangra
English Name	: Eclipta, Common Perilla
Hindi / Ayurvedic Name	: Kala kasita
বাংলা নাম(Bengali name)	: জাংরা (Bhangra)

Description : An erect or prostrate, much branched, strigosely hirsute annual, often rooting at the nodes, leaves opposite, sessile, oblong-lanceolate, 1-4 inches long, flower-heads white, 0.25 – 0.35 inches in diameter.



Parts Used : Leaves, Seeds, Roots

Habitat : It grows in Bangladesh, Pakistan,, Myanmar, India, Sri Lanka, Malaysia, China, Hong Kong, Japan and Korea.

Active Constituents: Ecliptine, nicotine, ecliptal.

Functions and Properties : Paste of the root powder is active against spleen and liver hardness and enlargement. Much used in blood disorders which result in chronic skin ailments like leprosy, vitiligo, leucoderma and urticaria. Applied over the inflamed areas of the body. It relives pain when dropped as juice into the ears in earache. Juice and decoction of leaves are active against jaundice and fevers, as well as for uterine haemorrhages. Extract or infusion in water serve as useful gargles in teeth disorders particularly pain and gum complaints. Extract of the herb is boiled together with coconut and sesamum oil, when only the oil is left, it is preserved and applied on hairs, render the hairs black, shining and lengthy. Water of the herb is used effectively against ophthalmia as drops. The expressed leaf juice along with honey is a popular

remedy for catarrh in infants. The fresh plant is applied with sesamum oil in elephantiasis. The root is emetic and purgative.

Pharmacological Activities : Aphrodisiac, resolvent, cholagogue, deobstruent, carminative, purgative, alterative, anthelmintic, alexipharmic, expectorant, antipyretic, stomachic, anti-inflammatory. The shoots extract shows antibiotic activity against Staphylococcus aureus and Escherichia coll.

Dosage :

Leaves 5 – 7 gram, seeds 1 – 3 gram (approximately)

Side-effects : Prolonged use or in large doses may be harmful to individuals with warm temperament.

Temp : Warm and dry in second order.

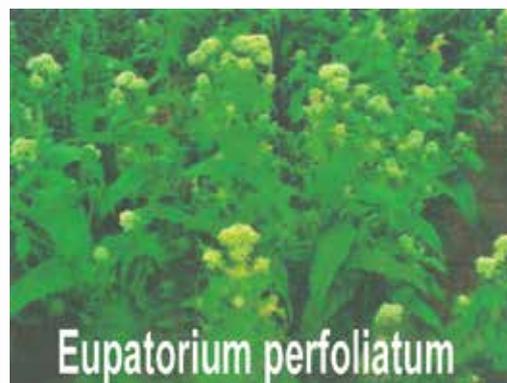
Correction : Rain water.

Alternatives : Phyllanthus amara.

Ayapana Balayati

Taxonomical title of the Botanicals	: <u><i>Eupatorium perfoliatum</i></u>
Natural order / Family	: Asteraceae
Tibbi Name	: Ayapana Balayati
English Name	: Boneset
Hindi / Ayurvedic Name	: Ayapan
বাংলা নাম(Bengali name)	: আয়াপানা(Ayapan)

Description: *Eupatorium perfoliatum* is a perennial herb with a horizontal hairy rootstock. The stems are rough-haired and grow to about 1.5 m. The leaves are opposite, 10 to 15 cm long, lanceolate, crenate, tapering to narrow point and fused at the base. They have shiny yellow points due to the resin glands, which are visible on the undersurface. There are numerous flower heads in terminal, large, and slightly convex cymose-paniculate inflorescences. They consist of 10 to 12 white, inconspicuous florets with bristly pappus whose hairs are arranged in a single row. The fruit is a tufted achene.



Parts used: The medicinal part is the herb after flowering.

Habitat: The herb is indigenous to the eastern U.S.

Active constituents:

Flavonoids: including eupatorin, astragalín, rutin, hyperoside

Sesquiterpene lactones: including eupafolin, euperfolitin, eufoliatin, eufoliatorin, euperfolide.

Functions: Boneset is used as a treatment for flu and febrile diseases

Pharmacological activities: The herb acts as an anti phlogistic, a diaphoretic, and a bitter, in addition to stimulating the body's immune system. In a comparative study of the homeopathic preparation Eupatorium D2 with aspirin in the treatment of feverish catarrh, a similar positive tendency was observed. In vitro, the phagocytic action of granulocytes was increased.

Side-effects: Health risks or side effects following the proper administration of designated therapeutic dosages are not recorded. Sensitization after skin contact with the plant is possible. Older scientific literature (Lewin) calls attention to the fact that the drug can lead to enhanced outbreaks of sweat and diarrhea in therapeutic use.

Dosage : Liquid extract is used.

Temp : Hot and cold.

Correction : Rain water

Alternatives :Eupatorium Ayapana Vent.

Hafiza buti

Taxonomical title of the Botanicals	: <u><i>Ginkgo biloba</i></u>
Natural order / Family	: Ginkgoaceae
Tibbi Name	: Hafiza buti
English Name	: Ginkgo, Ginkgo, kew tree, Maidenhair tree
Hindi / Ayurvedic Name	: Ginkgo, Medabeni
বাংলা নাম(Bengali name)	: জিঙ্কো(Ginkgo)

Description : The ginkgo is a deciduous tree that grows to a hundred feet or more, with a trunk eight feet in diameter. Its bark is gray and fissured. The distinctive fan-shaped light green leaves turn bright yellow in the autumn, have two lobes, and are about two to three inches across with a notch in the middle. The ginkgo bears flowers when it is 20 to 30 years old. The seeds smell like buryric, capric or valeric acid when ripe. The trees can live for hundreds of years.

Parts used: The medicinal parts are the fresh or dried leaves and the seeds separated from their fleshy outer layer.

Habitat : Ginkgo is indigenous to China, Japan, Korea and also found in Europe and the U.S.

Active constituents: A dry extract from the dried leaf of Ginkgo biloba is manufactured using acetone/water and subsequent purification steps without addition of concentrates or isolated ingredients. The active constituents are:

Flavonoids (0.5 – 1.8 %) : including monosides, biosides and triosides of quercetin, isorhamnetins, 3-O-methylmyristicins and kaempferol, to some extent esterified with p-coumaric acid

Biflavonoides (0.4 – 1.9%) : for example, amentoflavone, bilobetin, 5-methoxybilobetin, ginkgetin, isoginkgetin.

Proanthocyanidins (8-12%)



Trilactonic diterpenes (0.06 – 0.23%): ginkgolide A, B, C
Trilactonic sesquiterpene bilabolids (0.04 – 0.2%)

Pharmacological activities: Scientists have clinically established that a concentrated extract of ginkgo leaf increases memory performance and learning capacity, inactivates toxic radicals, and improves blood flow. Scientists have reported that Alzheimer patients receiving doses of ginkgo had delayed mental deterioration in the early stages of the disease. Clinical trials have also shown ginkgo to improve airway passages of asthma patients and to help relieve symptoms of vertigo and tinnitus. A concentrated, standardized extract from the leaf can treat circulatory problems such as arteriosclerosis and high blood pressure.

Dosage :

Mode of administration : Ginkgo is available in liquid or solid pharmaceutical forms for oral intake.

Capsules --- 30 mg, 40 mg, 50 mg, 60 mg, 100 mg, 120 mg, 260mg, 400 mg, 420 mg, 440 mg, 450 mg, 500 mg.

Extract --- 50:1

Liquid --- 40 mg / 5 mL

Tablets --- 30 mg, 40 mg, 60 mg, 80 mg, 120 mg, 260 mg

Daily Dosage : Ginkgo biloba extract should be standardized to contain 24 % flavone and 6% terpene lactones : 40 to 80 mg 3 times a day. Studies have demonstrated efficacy with 120 mg daily in 2 to 3 divided doses for dementia, peripheral arterial occlusive disease and equilibrium disorders like tinnitus or vertigo.

Side-effects: Health risks or side effects following the proper administration of designated therapeutic dosages are not recorded.

Temp : Hot and Dry.

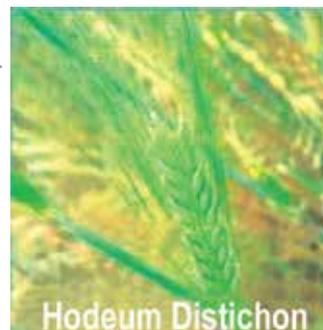
Correction : Milk.

Alternatives : Centilla Asiatica.

Shayeer

Taxonomical title of the Botanicals	: <i>Hordeum distichon</i>
Natural order / Family	: Poaceae
Tibbi Name	: Shayeer
English Name	: Barley
Hindi / Ayurvedic Name	: Jab
বাংলা নাম(Bengali name)	: যাব(Jaab)

Description : The plant is an annual that grows 60 to 130 cm high. It has a long hollow stalk and lanceolate leaves. The leaflets are very wide, long and glabrous. The spike is 7 to 15 cm long. The long form is nodding and the shorter one erect and compressed on the side that does not bear spikelets. The spike spindle is tough and loosens the spikelets when ripe. The lateral spikelets are unbarbed, male, or sexless. The middle spikelets are seed-bearing, with a beard up to 15 cm long.



Parts used : The medicinal part is the polished grain without the husk.

Habitat : Barley is cultivated worldwide.

Active constituents :

Polysaccharides : Starch (50 %), fructans.

Mono- and oligosaccharides : saccharose, raffinose, glucodifuctose, glucose, fructose

Proteins (10%) : Including, among others, prolamines : hordein-glutelins: hordenine (not to be confused with the amine of the same, see below)- albumins and globulins.

Prolamines : Hordein

Glutelins : horderine

Albumins and globulins

Fatty oil (2%) : chief fatty acids linoleic and oleic acid

Vitamins : Vitamin E, nicotinic acid, pantothenic acid, vitamins B6, B2, Folic acid
Hydroxycoumarine (only in the stalks): including, among others, umbelliferone, scopoletin, herniarin, aesculetin (in the sprouts)
Amines : tyramine, hordenine (dimethyltyramine), gramine also with certain strains (dimethylaminomethylindol)

Effects : Barley is soothing on the alimentary tract.

Pharmacological activities: Barley has been used for convalescents and in the treatment of diarrhea, gastritis and inflammatory bowel conditions.

Dosage :

Mode of Administration : Barley is used as a malt extract, in preparations and in combinations.
Capsules – 450 mg

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages. It should not be used during pregnancy.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Avena Sativum.

Pangae girri

Taxonomical title of the Botanicals	: <u><i>Lycopodium Clavatum linn.</i></u>
Natural order / Family	: Lycopodiaceae
Tibbi Name	: Pangae girri
English Name	: Club moss
Hindi / Ayurvedic Name	: Horini gas
বাংলা নাম(Bengali name)	: হরিনি গাছ(Horini gas)

Description : The plant has a 1 m. long procumbent stem with only a few roots. It is covered with yellowish-green leaves, densely arranged in spirals, which are entire-margined, linear, smooth and end in a long, white, upwardly bent hair tip. There are numerous erect, circular, 5 cm. high branches on the main stem. Sulfur yellow, minute spores, carried in large numbers in 2 to 3 cylindrical yellow-green cones, develop in August at the ends of leafy, 15 cm high stalks extending from aerial branches.



Medicinal Parts : The medicinal parts are the spores and the fresh plant.

Habitat : The plant is found world wide, but it originated in China and Eastern Europe.

Active constituents:

Alkaloids (0.2%) : including among others those of the lycopodine and lycodan-types (derived from piperidie alkaloids), chief alkaloids lycopodine and dihydrolycopodine, in traces also nicotine.

Triterpenes : including alpha-onocerin, lycoclavatul, lycoclavanol, serratendiol (demonstrated in plant of Japanese origin).

Steroids : including beta-sitosterol, campesterol and stigmasterol.

Flavonoids : including among others chrysoeriol, luteolin

Effects : Club Moss has a diuretic effect.

Pharmacological activities : Internally it is used for bladder and kidney complaints, also for pharyngeal catarrh and tonsillitis, menstruation complaints, rheumatism and impotence ; externally for wounds, itching and suppurating eczema of the skin.

Dosage :

Mode of Administration : In folk medicine, chopped drug is used in teas.

Daily Dosage : Single dose : 1.5 gm drug. Tea : 1 cup to be taken 2 to 3 times daily.

Temp : Hot and cold.

Correction : Rain water

Alternatives : Couch grass, Burduma grass

Talhon / Mus

Taxonomical title of the Botanicals	: <u><i>Musa paradisiaca</i></u>
Natural order / Family	: Musaceae
Tibbi Name	: Talhon / Mus
English Name	: Plantain Banana
Hindi / Ayurvedic Name	: Kola
বাংলা নাম(Bengali name)	: কলা(Kola)

Description : The herbaceous perennial grows up to 6 m high. The leaves are very large, entire and simple. They are often pinnatifid and grow from an underground rhizome. The leaf sheaths form a hollow false trunk. There are adventitious roots. The inflorescence, growing through the false trunk and curving downward, bears groups of male flowers in the axils of the bracts at the tip, groups of androgynous flowers beneath, and finally female flowers. The flowers are zygomorphic with 5 fused and 1 free tepal. There are 5 stamens and a superior ovary. The fruit is a berry. The 10 to 16 single fruits that develop from a hollow false trunk. There are called a hand.



Parts used : The medicinal part of the plant is the fruit.

Habitat : The plant grows in tropical areas.

Active constituents:

Polysaccharides : starch (20% of fresh weight)

Protein (1% of fresh weight)

Ascorbic acid (vitamin C) : 10 to 20 mg/100 g fresh weight

Amines : serotonin (28g/g fresh weight), tyramine (7 g/g fresh weight), dopamine (8 g/g fresh weight), noradrenaline (2 g/g fresh weight).

Fruit acids: including malic and citric acid.

Aromatic substances : 108 components, including isopentenyl acetate (chief aroma-bearer).

Effects : The drug is used for dyspepsia, gastrointestinal complaints, diabètes, scurvy, diarrhea, hypertension and gout.

Pharmacological activities: The starchy fruit has antiulcerogenic and cholesterol-reducing effects, and is a source of potassium. In East Africa and elsewhere, Plantain is used to prepare a narcotic drink.

In Indian Medicine the fruit is used in helminthiasis, scabies, severe thirst, bronchitis, itching, kidney disease, pharyngalgia and dysuria. But the efficacy for these indications has not yet been proved.

Dosage : Preparations of the whole, cut and powdered drug are administered orally.

Side-effects: No health hazards are known in conjunction with the proper administration of designated therapeutic dosages. It is conceivable that the amine content could trigger attacks of migraine headache. The frequency of myocardial fibrosis in tropical countries is said to be caused by chronic ingestion of the plant. (Plantain should never be eaten raw ; it must be cooked or fried).

Temp : Cold and moist.

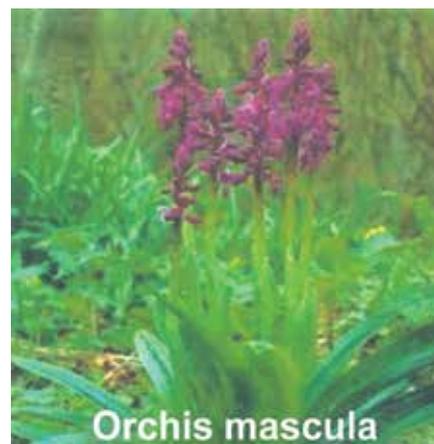
Correction : Honey or Ginger

Alternatives : Musa another sp.

Sa'lab misri

Taxonomical title of the Botanicals	: <i>Orchis Masculata</i> Linn.
Natural order Family	: <i>Orchidaceae</i>
Tibbi Name	: <i>Sa'lab misri; salap</i>
English Name	: <i>Salep orchid</i>
Hindi/Ayurvedic name	: <i>Sa'lab misri; salap</i>
বাংলা নাম(Bengali name)	: ছালের মিছরি(Saleb Misri))

Description: *Orchis masculata* is a bulb growing to .6 m(2ft). It is hardy. The flowers are hermaphrodite(have both male and female organs) and are pollinated by bees. Dioscorides writes that '*Khusa al-Kalb*' (mentioned in *Saydamah*) has roots that are equivalent in size to two olives. *Orchis* has been described by the ancients as having a twofold root formed of tuberosities. The tubers were used as remedy for ulcerations of the mouth and for internal organs as well as in wine as astringent.



Parts Used : The tubers (and the root).

Habitat: In Europe.

Active Constituents: Glucoside, a bitter principle, trace of volatile oil, albumen, starch, sugar, mucilage. Ash contains phosphates, calcium and chlorides of potassium and lime.

Effects : Demulcent, astringent, aphrodisiac, nervine tonic, anti-diarrhoeal, mucilaginous (viscous).

Pharmacological activities: Recommended in cases of nervous debility, weakness and loss of sexual ability. Much prescribed as nervine tonic in phthisis, hemiplegia and paralytic affections. Generally used in cases of diarrhoea and dysentery. It is helpful in alleviating chronic complaints and inflammatory conditions of the urino-genital system, and increases the quantity of seminal fluid. Tonic for muscles and (nutrition) for the body.

Dose : 3-5 grams (approx).

Side-effects: No known side-effects or health hazards reported following the use of prescribed doses for recommended duration. Described as harmful for persons with warm temperament (especially their cardiac orifice can be affected).

Temperament : Warm and moist in first order and Warm in second order.

Rakhi gulab

Taxonomical title of the Botanicals	: <u><i>Passiflora incarnata</i> Linn.</u>
Natural order / Family	: Passifloraceae
Tibbi Name	: Rakhi gulab
English Name	: Passion Flower
Hindi / Ayurvedic Name	: Jhumka lata
বাংলা নাম(Bengali name)	: জুমকা লতা(Jhumka)

Description : The Passion Flower is a perennial vine on a strong, woody stem reaching up to about 10 m in length. The vine is initially angular, later gray and rounded with longitudinally striated bark. The leaves are alternate, petiolate, serrate, and very finely pubescent. The under surface is hairier than the upper surface. There are bumpy extra-floral nectaries on the leaf blades. Stipules and tendrils grow from the leaf axils. The axillary pedicle grows up to 8 cm and bears 1 flower. The flowers are androgynous and rayed with a



diameter of 5 to 9 cm and have an involucre. The 5 sepals are green on the outside, white on the inside and tough. The 5 petals are white to pale red. There is a secondary corolla inside the petals made up of 4 thread wreaths arranged in rays around the axis of the flower, which are white on the inside and purple on the outside. The ovary has 3 carpels and 3 style branches, which end in a thickened stigma. The 5 stamens are joined at the base and fused to the androgynophor.

Parts used: The medicinal parts are the whole or cut dried herb and the fresh aerial parts. The yellow pulp from the berry is edible. Several other related species also have edible fruits or healing properties.

Habitat: The plant is indigenous to an area from the southeast U.S. to Argentina and Brazil. It is cultivated in Europe as a garden plant.

Active constituents:

Flavonoids (up to 2.5%) : in particular C- glycosyl-flavones, including among others isovitexin-2"-o-glucoside, schatfo- side, isoschaftoside, isoorientin, isoorientin-2"-o-glucoside, viccnin-2, luccnin-2

Cyangenic glycosides: gynocardine (less than 0.1%) Volatile *oil (trace)*The frequently postulated presence of harmaline alkaloids could not be confirmed.

Effects: Passion Flower is used internally for depressive states such as hysteria, general nervous agitation, insomnia and nervous gastrointestinal complaints. The herb is used externally for hemorrhoids and as a bath additive for nervous agitation.

Pharmacological activities: Passion Flower contains glycosides and in animal tests is hypotensive and stimulates respiration. Sedative or spasmolytic effects could not be definitively proven. The use of the herb for nervous agitation, difficulty falling asleep or nervous gastrointestinal symptoms needs further investigation. A motility-inhibiting effect has been observed in animal tests.

Daily Dosage:

Tea - Pour 150 mL of hot water over 1 teaspoon of the herb and strain after 10 minutes. Drink 2 to 3 times throughout the day and one-half hour before bedtime.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Cold and moist.

Correction : Rain water.

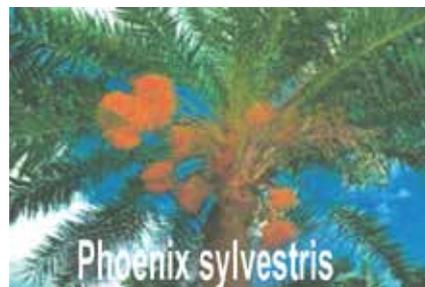
Alternatives : Lawsonia inermis Linn. Flos (Flower).

Khajur

Taxonomical title of the Botanicals	: <i>Phoenix Sylvestris Roxb.</i>
Natural order Family	: <i>Palmae</i>
Tibbi Name	: <i>Khajur; Khurma; tim.</i>
English Name	: <i>Wild date palm; sugar date palm, Wild date or today palm.</i>
Hindi/Ayurvedic name	: <i>Khajur; Khurma; timr.</i>
বাংলা নাম(Bengali name)	: খেজুর(Khezur)

Description: *Phoenix dactylifera*, the date palm with poor quality fruit is planted in Sindh, lower Baluchistan, N.W.F.P. and Punjab. However, according to Aitchison the wild root suckers. (*P. sylvestris*) is indigenous in the Indus basin and the species lacks root suckers. *P. humilis* another species, wild, not reported from Sindh or Baluchistan attains a height of about 10-12 ft. only and usually grows near streams.

Described under the heading of *Tamr* by al-Biruni, reference has been made to Galen who used the word (*Tamr*) as a generic name for date, dried date and *Ballut-iinakhl* (Oak of the Desert). It is said that the Egyptian variety of *Tamr* is dry, while that occurring in the region of Ariha is soft, moist and sweet. In the area between Egypt and Palestine it is called *Khuzi*. In Sistan, the dried fruit is designated as *Qasb*, the soft fruit as *Daql* and the medium variety, *Narm KhushKir*. According to al-Biruni, whatever the quantity of dates produced anywhere, dates produced in Iraq are unrivalled, particularly those produced in and around Basrah. Al-Biruni counted the varieties from Basrah, which were more than thirty only from there. Abu Hanifah says that *Daql* is the least favoured of the date varieties. It is also largely unknown. 'Ajuh is like *Shhriz* date of Iraq. Not only is the use of ripe fruit well described in literature but use of the unripe fruit (*Kharik*) has also been mentioned. This fruit pounded and mixed with almonds, quince seeds, pistachio nuts, spices and sugar forms *Paushtik*. A restorative remedy, much in vogue around the 1900s in the Sub continent. A paste made of its seeds and the root of *Achyranthes aspera* (Chirchira) is eaten with betel leaves as a remedy for ague.



Parts Used : Fruit (nutritive) and seeds; toddy (Sendhi).

Habitat: Basically it is the fruit of dessert land. Now it is found in Bangladesh, India, Pakistan, Saudi Arabia, Iraq, Iran, Afghanistan, Qatar etc countries.

Active Constituents: Salts and iron in an assimilable form, sugars, tannins, mucilage, extractive matter, insoluble matter and lime: vitamins A, B and D. Free amino acids and monosaccharides.

Effects: Nutritive, cardiogenic, aphrodisiac, semenagogue, calorific, diuretic, nervine tonic, nutritional supplement.

Pharmacological activities: The fruit is eaten fresh or dried. It is also used in culinary confections and desserts all over the world. The juice (*Sendhl*) is cooling and laxative. It is administered to patients suffering from tuberculosis. Fruit with boiled milk is useful as restorative tonic and aphrodisiac. Being a sedative and nervine tonic it is usefully employed for backache and pain in the buttocks. Clears the chest of phlegm and is useful for persons with cold temperament. Prescribed in cough, fevers, nervous debility and gonorrhoea. Seeds (powder) and ash of seeds is a traditional haemostatic for local external wounds and assists as antiseptic. Powder of seeds is good for cleaning teeth. Sweet sap is manufactured into *gur* (*soft brown sugar*) which is more nutritious than cane-sugar.

Dose : 5-7 numbers.

Side-effects : No known side-effects reported following the use of prescribed doses of dates for recommended duration. Long term or large quantity may harm persons with warm temperament.

Temperament : Warm and moist in first order.

Amla khurd

Taxonomical title of the Botanicals	: <u><i>Phyllanthus amarus</i></u>
Natural order / Family	: Euphorbiaceae
Tibbi Name	: Amla khurd
English Name	: Black Catnip
Hindi / Ayurvedic Name	: Bhui Amloki
বাংলা নাম(Bengali name)	: ভূই আমলা(Bhui Amla)

Description : Black catnip is a monoecious, occasionally dioecious, upright or ascending herb, which growing up to 60 cm high, or occasionally higher. The bracts and stipules are linear-lanceolate, 1 mm long, cream with a brownish middle rib. The stem is round, greenish or reddish, glabrous and woody at the base. The flowers are axillary. The male flower has 5, 0.5 mm long, acute, pale-green sepals with a white margin. There are 3 stamens with the filaments forming a 0.2 mm high column. The female flowers have an apically thickened pedicle and 5 ovate-elongate, up to 1 mm long, yellowish-green sepals. The ovary is 0.3 mm in diameter and 3-chambered. The fruit is ochre to olive with 3 pressed lobes, 2 mm in diameter and 1 mm long.

Parts used:: The whole, dried herb is the medicinal part.

Habitat : Africa, Asia and America.

Active constituents :

Tannins : Gallotannins, including amarine, phyllanthus D, geraniine, corilagin, elaeocarpusin

Flavonoids : including rutin, quercetin-3-O-glucoside

Lignans: phyllantin (0.8 %, extremely bitter), hypo-phyllanthin

Effects : The herb is used for fever (Cuba, Nigeria), for malaria (Cuba, Bahamas), diarrhea, tachycardia and female sterility (Congo), constipation with spasms and colic, as a diuretic (Nigeria) and for diabetes (Dominican Republic). In Indian Medicine, Black catnip is used for stomach conditions, ascites, jaundice, diarrhea, dysentery, intermittent fever, conditions of the urogenital tract, eye disease, scabies, ulcers, and wounds.

Pharmacological activities: The drug, which contains tannins and lignans, is antiviral and antimicrobial in effect.

Dosage :

Mode of Administration : Whole herb preparations for internal and external use.

Daily Dosage : No exact doses are known.

Side-effects : No health hazards are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Hot and dry.

Correction : Milk and Rain water.

Alternatives : Phyllanthus urinialis

Tambol Hindi

Taxonomical title of the Botanicals	: <u><i>Piper betle Linn.</i></u>
Natural order / Family	: Piperaceae
Tibbi Name	: Tambol Hindi (Barg-sabj)
English Name	: Betel-leaf Pepper
Hindi / Ayurvedic Name	: Pan Tamboli.
বাংলা নাম(Bengali name)	: পান(Pan)

Description : The plant is a dioecious or monoecious woody climber that can grow to 15 m. It has numerous small and short adventitious roots. The stem is thickened at the nodes, and the younger parts are glabrous. The leaves have a 2.5 to 5 cm. long petiole, are broadly cordate, 5 to 18 cm long and half as wide. The leaves are glabrous, light green and glossy on both surfaces with 5 to 7 radiating ribs. The inflorescences are compact, hanging, cylindrical and 3.5 to 5 c.m. long spikes of yellow-green flowers. There are 2 stamens in the male flowers. The female stamens have an ovary, which is pubescent at the top and has 3 to 5 stigmas. The fruit is globular, fleshy and about 6 mm in diameter. The fruit is yellow and becomes red when ripe. The seeds are also globular.



Parts used : The main medicinal parts are the dried leaves ; the roots and the fruit are also used.

Habitat : Piper betle is found in tropical Southern Asia and has been introduced to east Africa, Madagascar and the West Indies.

Active constituents:

Volatile oil (0.8-1.8 %) : Chief components-chavibetol (betel phenol), eugenol, additionally allylpyrocatechol (hydroxy-chavicol), allylpyrocatechol-mono and -diacetate, anethole, chavibetolacetate, chavicol, methyl eugenol, safrol.

Neolignans : Including crotepoxide, piperbetol, piperol, among others.

Functions: In folk medicine, betel Nut is used for coughs, as an expectorant for stomach ailments, diphtheria and inflammation of the middle ear. In Indian medicine Betel Nut is used to treat asthma, bronchitis, coughs, dyspepsia, rheumatism, leprosy, severe thirst, alcoholism, syncope, toothache and impotency.

Effects : The essential oils are antimicrobial and immune-modulating. The betel leaf is centrally sedating.

Dosage :

Mode of Administration : Now a days, the drug is obsolete.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Hot and dry.

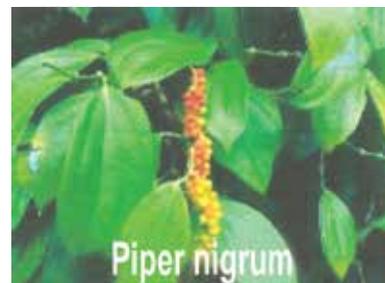
Correction : Orange peel.

Alternatives : Piper longum folium.

Filfil siyah

Taxonomical title of the Botanicals	: <i>Piper Nigrum Linn.</i>
Natural order Family	: <i>Piperaceae</i>
Tibbi Name	: <i>Kali mirch; filfil siyah</i>
English Name	: <i>Black pepper; common pepper</i>
Hindi/Ayurvedic name	: <i>Kali mirch; filfil siyah</i>
বাংলা নাম(Bengali name)	: গোল মরিচ(Gol Morich)

Description: It has been described under the general heading of *filfil* by al –Biruni (*Kitab al-Saydanah*). Known as *filfil-i-aswad* and *marich* (or *mirch*) in Hindi. According to Razi, the black grains, before gaining maturity, give the appearance of having been scorched and having undergone considerable desiccation. The white grains, once they have reached the maximum stage of their development, become pepper. This is why the white grains are more potent than the black ones. Dioscorides says that these are indigenous to India. He mentions both white pepper and black pepper. Theophrastus also mentions two kinds of pepper (in 4th century B.C.) Pliny says that in contrast to other (delicious or attractive) articles of diet, pepper has nothing in it that can plead to be either fruit or berry. Its only desirable quality being a certain pungency, and it is for this reason that it is imported all the way from India. Dymock *et al.*



write that places between Mangalore and Calicut on the Malabar coast have been indicated where it grows abundantly. Long pepper and black pepper are among the Indian spices on which the Romans levied duty at Alexandria about 176 A.D.

Europeans have described the pepper and pepper plant at many a place and it is an interesting historical fact that in 1793, an agreement was made between the Rajah of Travancore and the Europeans by which he was to supply a large quantity of pepper to the Bombay Government in return for arms, ammunition and European goods; this was known as the “Pepper Contract”. It is worthy of remark that all the foreign names for black pepper are derived from “*Pippali*, the Sanskrit name for the long pepper, which leads one to suppose that the bitter spice was first of its kind (of pepper) known to the ancient Persians and Arabs through whose hands it first reached Europe. Ancient Indian literature reveal black pepper to be useful in intermittent fever, haemorrhoids, dyspepsia, gonorrhoea, cough, flatulence and in promoting bile secretion,

Together with long *pepper* and ginger, it forms the much valued compound known as "*Trikatu*", the three acids, it forms the much valued compound known as Muslim physicians describe it as deobstruent, resolvent and alexipharmic, as nervine tonic given internally and applied externally in paralytic affections, in toothache as a mouthwash. As a tonic and digestive, it is given in dyspepsia. With vinegar it forms a good stimulating poultice. With honey it is useful in coughs and colds. Moreover it is diuretic and emmenagogue and has been referred to as good stimulant of hair growth on bald scalp.

Parts Used : Dried unripe fruits- black pepper.

Habitat: India, Pakistan, Arab, Afganistan, Malayesia

Active Constituents: Alkaloids piperine, piperdine, piperitine, chavicine balsamic volatile oil, proteids, fats, starch, lignin and gum, piperlyline, piperole A and B, piperanine monoterpenes, sesquiterpense.

Functions: Degestive tonic, carminative, effective against phlegmatic disorders, alterative.

Pharmacological activities: Stimulant (particularly of the taste buds), sialagogue, carminative and digestive, stomachic, alterative (antiperiodic and rubefacient), febrifuge, appetizing, Piperine is referred to as antipyretic (antiperiodic), emmenagogue, deterrent and rubefacient.

Dose : 300 mgs-1.5 grams (approx.)

0.3-06 grams (any further increase in dose intensifies its rubefacient action).

Confection dose: 7.5 grams (approx.)

Piperine as antiperiodic: 0.4 gram (b.d.)

Side-effects: Toxic reports are attributed to active principle piperine, since this and other related alkaloids (of black pepper) have chemical structure similar to that of mutagenic urinary safrole metabolite[3-piperidyl-1(3'4'-methylenedioxyphenyl) -1 propanone] They pungent components of black pepper are sometimes suspected to be mutagenic and or carcinogenic. Consumption of tea flavoured with balck pepper may have contributed to the unusually high incidence of esophagal cancer (in the Aktibinsk region in Russia, as suggested by some workers of this region)

Temperament : Warm and dry in the third order.

Rumi mastagi

Taxonomical title of the Botanicals	: <i>Pistacia Lentiscus Linn.</i>
Natural order Family	: <i>Anacardiaceae</i>
Tibbi Name	: <i>Rumi mastagi; kundari</i>
English Name	: <i>Mastiche uee or mastic</i>
Hindi/Ayurvedic name	: <i>Rumi mastagi; kundari</i>
বাংলা নাম(Bengali name)	: মস্তগী(Mostogi)

Description: *Pistacia lentiscus* is a shrub or dioecious tree, with separate male or female plants, evergreen from 1 to 5 meter high with a strong smell of resin. Dioscorides has discussed it under two headings (in Book meter highI), as *Schino-Mastich*, and In Book II, as *Pistaliia-Lentiscus*. Dioscorides states that *Lentisch* is a known tree. Being of a binding nature, it is good for sanguinous reactions, dysenteries and sanguinous eruptions. And generally it may be used instead of acacia and hypocist (cistus-inspissated juice from the fruit of *Cytinus hypocistis*). Although the origin of the use of mastic is lost in antiquity, it is mentioned by both Theophrastus and Pliny. Its employment in medicine dates back to about 13th century. Mastic has long been chewed by article in the Orient. Mastiche, the concrete resinous exudate from *Pistacia lentiscus*, Linn. is from Greek: *Mastic* = to chew, *Pistachio* = is the fruit and *lentiscus*, refers to the lenticular cavities into which the resin is secreted (i.e.in the inner bark). Al-Biruni says that the resinous exudate (or oil) made from *Mastaki* is potent and astringent. Dymock *et al.* have mistakenly mentioned the name as *Khinijak* under *Pistacia terebinthus* because *Khinjak* is actually *P. Lentiscus*. However, they have supported their views referring to Fluckiger and Hanbury:



“The several forms of this tree are regarded mostly as so many distinct species; but after due consideration and examination of a large number of specimens both dried and living, we have arrived at the conclusion that they may fairly be united under a single specific name” (*Pharmacographia Indica*).

Parts Used : The resinous exudation (mastich) obtained from the stem by incision (B.P.U.S.P.), the oil of Mastich.

Habitat: Pistacia lentiscus is found in dry and rocky areas in Mediterranean Europe.

Active Constituents: Resin (90%), masticin, mastichic acid and a bitter principle, masticodienoic acid, isomasticodienoic acid, oleanolic acid and tirucallol. Volatile oil contains 9% resin (soluble in alcohol and 10% resin insoluble in alcohol. Young leaves and twigs contain myricetin (C₁₅H₁₀O₈), quercetin, kaempferol, skimmic acid, lupeol, cycloartenol, B-sitosterol, d-pinene, camphene and terpene. Seeds contain aucubin, choline, organic acids, plantase (a crystalline trisaccharide), starch and edible oil (upto 22.08%).

Function: Diuretic, restorative, absorbent (of catarrh).

Pharmacological Activities: Stimulant and diuretic, tonic for stomach and liver, carminative, demulcent, resolvent of inflammations, absorbent (of catarrh from internal organs), astringent, styptic, antflatulent, appetitive, aphrodisiac, tonic for urinary system and reproductive organs.

Dose : 1 gram-2 grams (approx.). 0.6 gram-2.0 grams (approx.)

Side-effects: No known toxicity reported following the use of prescribed drug for recommended duration. However, described as harmful in case of use by patients suffering from anal ailment; may produce bloody urine and dermatitis.

Temperament : Warm and dry in second order.

Khurfa

Taxonomical title of the Botanicals : *Portulaca Oleracea Linn.*

Natural order Family : *Portulacaceae*

Tibbi Name : *Khurfa; kulfa*

English Name : *Indian purslane*

Hindi/Ayurvedic name : *Khurfa; kulfa*

বাংলা নাম(Bengali name) : বড় লুনিয়া(Boro Lunia)

Description: The creeping annual, purslane, has (probably) been long used as a domestic remedy by the people of India. The Sanskrit names are *Lonika* and *Lonamla*. In Arabic and Persian works, the herb is given several names like *Baqalat al Humaqa*, *Baqalat al-Mubarika*, *Tukhm-e0Khurfa*, *Kurfah*, *Farfakh* etc. Two kinds are described, the large and small. Large is identified as the item not only used as vegetable but in medicine as well. Both kinds are said to be cold and moist and to have detergent and astringent properties. Dioscorides and Celsus have well described the herb. The plant and seeds are recommended in many diseases of the kidneys, bladder and lungs, which are supposed to be caused by hot or bilious humours. They are also praised as external application in burns, scalds and various forms of skin diseases. While discussing the item under *Falar Kalrand* (S.V. 42, p. 254, alphabet *Fa* in *Kitab al-Saydanah*), al-Biruni has identified it as *Bazr al-Farfakh* i.e., the seeds of *Portulaca oleracea*. Ibn Sina has included it in his list of drugs on cardiovascular diseases and has made it an ingredient of several compound prescriptions administered in cardiac ailments.

Parts Used : Seeds, leaves and whole plant.

Habitat: Bangladesh, India, Myanmar.

Active Constituents : Purslane is rich in sodium and potassium. Among other constituents vitamin C, oxalic acid, thiamine, riboflavin, nicotinic acid, carotene (as vitamin A), crude protein-free extract has been found to contain biologically active /noradrenaline dopamine and dihydroxyphenyl alanine (dopa).

Effects: Herb is valued as refrigerant and alternative and popularly used as a pot-herb or salad. Medicinally useful in haemoptysis, liver diseases, reducing small tumours and inflammations, ulcers, asthma, urinary discharges, diarrhoea, dysentery and piles. Regarded as effective against tapeworm. Paste or juice of vegetable is useful in burns, scalds, hot inflammations, and headache

of warm origin. The paste is directly applied over the affected parts. Lessens body heat particularly hands and feet, in aphthae of mouth and tapeworm complaint, when given in recommended doses. Recommended in bilious conditions and low fever, thirst and headache, stops vomiting and good in diseases of the kidney and spleen. Roasted seeds when taken in recommended doses are considered diuretic and antidysenteric. Seeds are also used in applications for burns and scalds.

Pharmacological Activities: Seeds are described as demulcent, slightly astringent, refrigerant, diuretic, emollient and alterative. The herb is said to possess refrigerant, vulnerary, antiscorbutic, aperient and diuretic properties.

Dose :

Herb frequently used as vegetable in the Orient.

Seeds or seed husk approx. 3-5 grams.

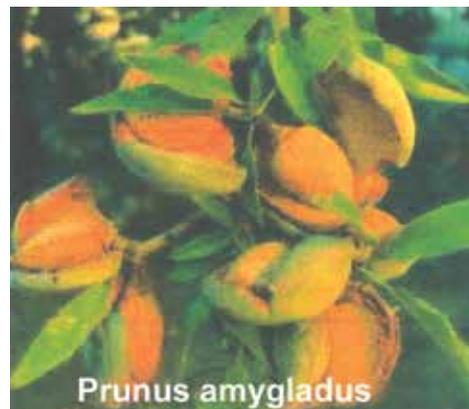
Side-effects : Vegetable- non-toxic; however saltish and difficult to digest, may cause biliousness. Seeds given in prescribed doses have no known toxic effects when used for recommended duration. Heavy ingestion of this plant in experimental trials on animals proved toxic.

Temperament : Cold and moist in second order.

Louza adam

Taxonomical title of the Botanicals	: <u><i>Prunus amygladus</i> Baill.</u>
Natural order / Family	: Rosaceae
Tibbi Name	: Louza adam
English Name	: Almond
Hindi / Ayurvedic Name	: Kakgi badam
বাংলা নাম(Bengali name)	: কাগজী বাদাম(Kagzi Badam)

Description: The plant is of medium height, seldom reaching 12 m. It is a tree or shrub with mildly red--tinged branches, thorny in its wild form but not in the cultivated form. The leaves have a 1.2 to 1.5 cm long, glandular petiole, and glabrous, oblong-lanceolate-acuminate or serrate, tough, glossy, dark green blades. The short-petioled flowers appear in pairs before the leaves. The petals are 19 to 20 mm long, pale pink to whitish with dark veins. The fruit is oblong-ovoid, compressed, 3.5 to 4.6 cm long by 2.5 to 3 cm wide, gray green, velvet-downy, and pubescent. The nutshell is yellow, hard, compressed, broad- and sharp-edged, punctated externally with irregular grooves; inside it's smooth and glossy, either thick- or thin-skinned. The seed is cinnamon brown, flattened, and 2 cm long by 1.2 to 1.5 cm wide.



Parts used: The medicinal part is the ripe fruit.

Habitat: The tree is indigenous to Western Asia and is extensively cultivated in many regions.

Active constituents :

Cyanogenic glycosides, amygdalin, 0.2 to 8.5% (corresponding to 12 to 500 mg prussic acid per 100 gm)

Fatty oil (non -dehydrating, 38 to 60%): chief fatty acids oleic acid (77%) and linoleic acid (17 to 20%)

Mucilages (3%): arabinogalactans

Proteic substances (25 to 35%)

Effects: Sweet Almonds have a demulcent effect. Bitter Almonds were used in the past as a remedy for coughs, vomiting and nausea in the form of bitter almond water.

Dosage: Sweet Almonds fatty oil is used as an ointment base and in the production of natural cosmetics.

Side-effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic topical dosages.

Temp : Hot and moist.

Correction : Piper nigrum.

Alternatives : Kidney Nut.

Sandal surkh

Taxonomical title of the Botanicals	: <i>Pterocarpus Santalinus Linn.</i>
Natural order Family	: <i>Papilionaceae</i>
Tibbi Name	: <i>Sandal surkh; lalchandana</i>
English Name	: <i>Red sandalwood</i>
Hindi/Ayurvedic name	: <i>Sandal surkh; lalchandana</i>
বাংলা নাম(Bengali name)	: লাল চন্দন(Lal Chandan)

Description: Ibn Sina writes that sandal is called “*Chandan*” in Hindi. Galen and Masawaih are of the view that it (*Sandal surkh*) more potent than the white (or other varieties) whereas other authors say that white is more effective. Its temperament is cold from the end of the second to third order and dry in the second. Red sandalwood resolves the warm inflammations especially in erysipelas and headache. In debilitating conditions of stomach, its infusion or decoction is taken and it is applied over the affected abdominal part for relief. Al-Biruni says that its seeds are like those of the lentil. The next is *Khuzi* (variety) which is often employed by the apothecaries. This is followed by *Bihiri* variety, wood of which is easily broken and is inclined to be yellowish and streaked. The most inferior variety is *Waq Waqi*, White and reddish with slender wood. The red odourless variety *Itri* used only in external soothing applications. Khushki and Yahya say that the most excellent variety is hard, yellow and heavy, as if saffron has been rubbed over it.

Parts Used : Red sandalwood shavings or wood infusion made into suitable vehicle.

Habitat: It is found in Bangladesh, Myanmar, India, Pakistan.

Active constituents : Fresh shoots yield glycoside and colouring matter contains the principle santalin or santalic acid; santal pterocarpine, a white crystalline insoluble substance and homopterocarpine.

Effects: Red sandalwood is used as a cooling external application for inflammations and headache, internally in bilious affections, skin diseases, fever and boils, to strengthen the sight, and to reduce swelling of the eye-lids. The wood is generally employed as colouring agent in

compound tincture of lavender and as an ingredient of several medicated oils. Powdered and mixed with milk it is taken for bleeding piles. Decoction of the legume is useful in chronic dysentery. Commercially useful in extraction of dye.

Pharmacological Activities: Astringent, tonic and diaphoretic, mostly applied as (or in) external application, acts as soothing anti-inflammatory agent, repercussive, refrigerant and sedative.

Dose : 5 grams-7 grams (approx.)

Side-effects : No known toxicity reported following the use of prescribed doses (of simple or in compound formulation) for recommended duration. However, described as depressing sexual activity.

Temperament : Cold and dry in second order.

Sarpagandha

Taxonomical title of the Botanicals	: <i>Rauwolfia Serpentina Benth.</i>
Natural order Family	: <i>Apocynaceae</i>
Tibbi Name	: <i>Sarpagandha: chandrika; chota chand.</i>
English Name	: <i>Rauwolfia root; serpentina root</i>
Hindi/Ayurvedic name	: <i>Sarpagandha: chandrika; chota chand.</i>
বাংলা নাম(Bengali name)	: স্বর্পগন্ধা(Swarpagandha)

Description: While working on the task of development of new compounds from indigenous sources for the therapy of cardiac arrhythmias, Arora *et al.* have mentioned the use of *Rauwolfia serpentina* as in vogue in the indigenous system of medicine for the last many years. Later writers on materia medica (Kabiruddin and Muzaffar Awan) have either not mentioned the herb or if mentioned, then with the citation that it is a comparatively newly identified plant in the field of medicinal botanics. Ancient Ayurvedic literature does not contain sufficient information about the plant. However, Dymock *et al.* say that the shrub has been mentioned in Sanskrit works under the names of *Sarpagandha* and *Chandrika*. In India the root is used as febrifuge and as an antidote to the bites of poisonous reptiles, also in dysentery and other painful affections of the intestinal canal. It is supposed to cause uterine contractions and promote foetus expulsion. Although it was widely used in south-east Asia, yet its pharmacological efficacy was not (clinically) established. This is supported by the fact that no ancient Hindu or Sanskrit work classifies it among the panaceas nor is it affiliated with any specific superstition. Thus the view of being introduced into the 19th century materia medica or pharmacopoeias by the Muslim physicians of the Subcontinent is substantiated. Even the name *Sarpagandha* is considered to be of recent origin. The plant drug has been a topic of extensive research in India and Pakistan and the (late) Professor Salimuzzaman Siddiqui is credited to have worked upon its alkaloids and to have isolated several compounds introduced to the world of plant-derived patent medicines. Around twenty species of *Rauwolfia* found in Asia, Africa, Central and South America have been investigated for their alkaloid contents and more than fifty different types of alkaloids have been reported in literature on medicinal plants.



Parts Used : Air dried roots.

Habitat: Asia, Africa, Central and South America.

Active Constituents: Alkaloids reserpine group: reserpidine (Canascine) group: Rescinnamine, Ajmaline group and Ajmalicine group. Serpentine, serpentinine, isoajmaline, neo-ajmaline etc. Besides the alkaloids, root contains oleoresin, sterol, (serpasterol), and the resin fraction (which is physiologically active). Reserpine is pharmacologically the most potent alkaloid found in all the *Rauwolfia* species, and Ajmaline is the most abundant alkaloid.

Effects: The root being a bitter tonic possesses well-marked sedative properties. Also acts as febrifuge. The hypnotic and sedative actions of the drug were known to the poorer classes in Bihar and the practice of putting children to sleep by this drug is still continued in certain areas of the Orient. The powdered root is administered for the relief of insanity, hysteria, high blood pressure, epilepsy and insomnia particularly effective when the individual is not temperamentally bilious. It is excessively bitter and if used in large doses may cause irritation of the alimentary canal and thus vomiting. Long term use in small doses is a safe therapy for blood heat and high blood pressure. It is an established remedy for those maniacs who are loud and violent but is absolutely ineffective in hypochondriac patients who remain silent or are melancholic Bruised and applied on the site of poisonous insect bites, it instantly gives relief. With aqua *Rosa damascena* a single dose is enough to bring sleep to mentally retarded persons. It thus may help patients suffering from other illnesses to function as an effective hypnotic. Insomnia and high blood pressure, it is widely used the world over. Decoction of the root has been employed to increase uterine contractions and promote expulsion of the fetus. Root also serves as a remedy for painful affections of the bowels, dysentery and above all, in insomnia, hypochondria and irritative conditions of the central nervous system. With others suitable drugs (like *Aristolochia bracteata*) it is given in cholera, with *Holarrhena antidysenterica* given in colic, with *Andrographis paniculata*, ginger and black salt, given in fevers. In India (particularly U.P. and Bihar) the drug is believed as an effective '*Insanity Specific*.'

Pharmacological Activities: Antihypertensive, sedative, hypnotic increases uterine contractions, stimulator of the central nervous system.

Dose : 0.25 grams-1.0-gram (approx.) (TDS).

Side-effects : In large doses it may produce deep sleep, the reflexes and sensation of pain are diminished death may result from asphyxia due to the paralysis of respiratory centres.

Temperament : Warm and dry in second order.

Revand-chini

Taxonomical title of the Botanicals	: <i>Rheum Emodi Wall.</i>
Natural order Family	: <i>Polygonaceae</i>
Tibbi Name	: <i>Revand-chini; tursak</i>
English Name	: <i>Himalayan rhubarb; Indian rhubarb</i>
Hindi/Ayurvedic name	: <i>Revand-chini; tursak</i>
বাংলা নাম(Bengali name)	: রেউচিনি(Reuchini)

Description: The drug has been mentioned in the Chinese herbal *Pen-T'sao*, attributed to the Emperor Shen-nung, Father of Chinese agriculture and medicine (reigned c. 2700 B.C.) The drug has been named *Huang-hang* (Yellow excellent) and *Ta-huang* (The Great Yellow). This (latter) name has been mentioned in the great Geography of China, where it is stated that rhubarb was a native of the province Shi-ning-fu, eastward of Lake Kuko-Nor, from about the 7th –10th centuries of the modern era. Dioscordies mentions a root brought from beyond the Bosphorus, and pliny mentions a root (*Rhaeoma*), which when pounded yielded a colour like that of wine. It is described usually as the rhubarb or at least the root of some species of *Rheum*. Ethnobotanical data show that it is one of the natural products that reached European lands through the Central Asian trade routes for, there are evidences that trading caravans from Shensi, North China, arrived at Bokhara as early as the year 114 B.C.Ibn Sina notices two types, *Ribas* (Persian, *Riwas*) and *Reward* (Persian, *Reward*)- the first an acid plant and the second, evidently Chinese rhubarb. Some authorities (like Zein-el-Attar: 1368 A.D.) consider both as same. The author of the *Makhzan al-Adviya* considers that *Reward* is the root of *Ribas*. He says that plant grows in the cold snowy mountains, (best is found in Persia), white, delicate, succulent, subacid, with a stout, tall stalk. The root is called “*Ribas-i-Mu'ummiri*” because, one Mu'umir of Nishapur was the first to discover it.The author of *Pharmacographia* has discussed rhubarb (under *Rheum officinale* Baillion) with the Latin name *Rheum palmatum* Linn., and declares that it is not an article of the old Indian materia medica but we have now become acquainted with its properties through Muslim and European physicians. In the use of rhubarb the Muslim physicians and authors of the Subcontinents on *materia medica*, quote and follow Galen, Oribasius, Paulos, Razi and Ibn Sina. Chiefly it is credited to exert stomachic, tonic and mild aperient action.

Parts Used : The dried decorticated root (*Rhie radix* / Rhubarb root).

Habitat: India, China.

Active Constituents: Anthraquinone derivatives based on emodin, 6-methoxy chrysophanol (physcion), chrysophanol, aloe-emodin, rhein. These occur free as glycosides: Chrysophanein, gluco-emodin, glucorhein, Palmidin-A, Palmidin-B, Palmidin-C. The chief purgative constituent is said to be an amorphous resin which on hydrolysis, furnishes rhein, chrysophanol and other substances. In addition rhubarb also contains cinnamic acid, gallic acid and astringent compounds, glucogallin, epicatechin, gallate and catechin. Recently rhaponticide has been isolated from *Rheum rhaponticum*.

Effects: The root has been described useful in removing the freckles, naevus or moles, spots, ringworm etc. when bruised and mixed with acetic acid and applied externally over the affected parts, particularly the face. Sometimes applied to relieve local inflammations externally as well as systemically. In certain types of coughs, asthma and haemoptysis as well as to relieve flatulence, stomach and intestinal debility and to stop frequent motions, it is given in small doses. In diarrhoea due to indigestion, jaundice, dropsy, liver and spleen inflammation and quartan fever, it is administered through various modes.

Rhubarb is a mild anthraquinone purgative. It exerts an astringent action following purgation. With small doses the astringent action predominates and rhubarb is therefore also used as an astringent bitter and used occasionally in the treatment of diarrhoea. In case of children's constipation, anaemic females, gouty subjects and in puerperal states it is especially recommended by the mildness of its action. In diarrhoea depending upon the presence of crude or irritating ingesta, it proves highly effective. In some forms of dyspepsia, it is a remedy of great value either alone or combined with other suitable agents.

Pharmacological Activities: Stimulant and liver tonic, primarily mild (anthraquinone) purgative, secondarily stomachic and astringent in relatively small doses, diuretic and emmenagogue, deobstruent (especially for liver and intestines).

Dose :

Generally 200 mg. –10 grams (approx).

As purgative : 1.5 grams –2.0 grams (approx).

As astringent : 125 mg. –375 mg (approx).

Rhubarb liquid extract (B.P.C. 1949) : 0.6 ml.-2 ml.

Rhubarb dry extract (B.P.C. 1954) : 120 mg.-500 mg.

Concentrated rhubarb infusion

Side-effects : As like other purgatives, constant use can cause decreased sensitivity of the intestinal mucosa, abdominal colic, flatulence, watery diarrhoea, weight loss etc. Precautions must be taken as for other purgatives should not be given to patients with symptoms of appendicitis, intestinal obstruction or abdominal pain of unknown etiology.

Rhubarb, like sorrel and tomato, should never be eaten by those who have a tendency to gout, rheumatism, epilepsy, or any uric acid disease, owing to the oxalic acid it contains.

Temperament : Compound (purgative as well as astringent : *Murakkab al-Quwa*).

Arand

Taxonomical title of the Botanicals	: <i>Ricinus Communis Linn.</i>
Natural order Family	: <i>Euphorbiaceae</i>
Tibbi Name	: <i>Arand; arandi; bedanji</i>
English Name	: <i>Castor-oil plant; castor; castor seed</i>
Hindi/Ayurvedic name	: <i>Arand; arandi; bedanji</i>
বাংলা নাম(Bengali name)	: ভেড়েন্দা(Bherenda)

Description: *Ricinus communis* is believed to be a native of tropical Africa and India and cultivated in both areas from ancient times. Chakradatta extols its virtues as a purgative and galactagogue. According to the authors of *Pharmacographia Indica*, the Arabs appear to have been first acquainted with the tree in India as they call the seeds *Simsim-el-Hindi* (Indian sesamum) and the plant *khirva*, a wood which signifies any weak or frail plant. The properties they attribute to it are also mentioned by Sanskrit writers. *Ricinus communis*, the *Bedanji* of the Persians, bears various local names (such as *Gerchak*, *Buzanji*, *Kinnatu* etc.). According to Galen it is a soft, loose structured plant and Abu Hanifah mentions that cattle do not graze on it.

Parts Used : Oil, leaves, roots and seeds.

Habitat: Bangladesh, India, Tropical Africa.

Active Constituents: Castor oil principally consists of ricinoleic acid, isoricinoleic, stearic and dihydroxy stearic acid and their glycerides present in the fixed oil (seeds yield from 46-53%). Seeds contain enzyme lipase employed for commercial hydrolysis of fats. A crystalline alkaloid, ricinine, is found in seeds which also occurs in leaves and stems. Sprouting seeds contain catalase, peroxidase and rductase. The cake left after expression of oil, has a poisonous lectin known as ricin.

Effects :

Oil: expectorant, purgative, resolvent of hard inflammations and sedative.

Leaves : galactagogue, emmenagogue, vulnerary in boils

Seeds ;resolvent, deterrent, counter-irritant, purgative, emmenagogue, anthelmintic.

The oil in every age and in most conditions is an effective and safe purgative, useful against muscular rheumatism, paralysis, tremors, asthma, cough, colicky pains and dropsy. It is

administered in constipation as single does, as well as in phlegmatic complaints, also administered as enema. Its safety is increased when given with a minimum quantity of *Papaver somniferum* dried latex (*Afiyun*) with *Acacia* gum extract. The safe purge gets rid of intestinal worms too. When massaged over rheumatic and other painful hard swellings, it brings relief. Frequently used for the relief of diarrhoea, constipation and colic.

Seeds are more effective as purgative than oil; internally these are also effective in diseases due to the cold malhumours (particularly phlegmatic), in warts, freckles and scabies. Paste of leaves is applied over the affected parts in gout and rheumatism. Women after parturition use fried leaves (in some suitable vehicle) to bind over breasts which render galactagogic results. Warm leaves can also be applied to obtain same results. Leaves applied to the abdomen promote menstrual discharge. Fomentation with leaves is useful against wounds. Leaves are made into ointment for sores and applied over boils with benefit.

Pharmacological Activities: The oil (castor oil) is a non-irritant purgative, stimulates intestines and muscles to cause purgation. Seeds are counter-irritant, leaves are galactagogue. Frequently referred to as the expectorant effective against malhumours of cold origin and resolvent of inflammations.

Dose :

Seeds 3-5 nos. Oil 25-50 ml. (single dose).

Side-effects: In the conventional doses, side effects are not common. Laxative effects may be more prominent in sensitive individuals (i.e. with warm temperament). Seeds contain a toxic principle 'ricin' (the albumin which may produce antigenic or immunizing activity).

Temperament : Warm and dry in second order.

Gule Surkh

Taxonomical title of the Botanicals	: <u><i>Rosa canina Linn.</i></u>
Natural order / Family	: Rosaceae
Tibbi Name	: Gule Surkh (Ward-e-kalbi)
English Name	: Dog Rose
Hindi / Ayurvedic Name	: kukur gulab
বাংলা নাম(Bengali name)	: কুকুর গোলাপ(Kukur golap)

Description : The plant is an approximately 1 to 3m high shrub with hanging branches and erect root shoots that are covered in tough, sickle-shaped prickles that are appressed below. The leaves are pinnatifid with 5 to 7 leaflets. They are markedly petiolate, obovate, smooth-margined, glabrous, glossy and dark green above, lighter and simple-serrate beneath. The pink flowers are usually solitary or in clusters of 2 or 3. The receptacle deepens to form a cup, the upper edge of which house the 5 pinnatifid sepals, 5 petals, and numerous stamens. There are long white silky hairs in the receptacles and numerous ovaries. The ovaries grow into stiff haired nuts surrounded by the receptacle and become the scarlet “rose hip”.



Parts Used : The medicinal parts are the petals, the Rose hips with and without seeds, and the seeds.

Habitat : Rosa canina grows in Europe and North Africa and is extensively cultivated.

Active constituents:

Fatty oil (8 to 10 %), Tocopherol (vitamin E), Volatile oil (0.3%), Proteic substances
Carotinoids, Flavonoids

Fruit acids: malic acid, citric acid

Monosaccharides/oligosaccharides (12 to 15 %) : invert sugar, saccharose

Pectins, tannins, Vitamins :

Effects: Dog Rose fruits are used in folk medicine for disorders of the efferent urinary tract and the kidneys, kidney stones, rheumatic conditions such as rheumatism, and gout, colds, scurvy, and febrile conditions. Dog Rose fruits are used in folk medicine for colds and “flu,” intestinal conditions, digestive complaints, vitamin-C deficiency, gallstones, subacidic stomach, infectious diseases, conditions of the efferent urinary tract, edema, rheumatism and gout, bleeding and leukorrhea.

Dosage :

Daily Dosage : The single dose is 2 g drugh.

Daily Dosage : Tea: 2 to 5 g drug added to 1 cup and steeped for 10 to 15 minutes

Side-effects: Dog Rose Fruits and Shells no health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Hot and dry.

Correction : Rain water.

Alternatives : Rosa centifolia Linn.

Gulab-ke-phul

Taxonomical title of the Botanicals	: <i>Rosa Damascena Mill.</i>
Natural order Family	: <i>Rosaceae</i>
Tibbi Name	: <i>Gulab-ke-phul; gul-surkh; bussorah; fasli gulab</i>
English Name	: <i>Rose; damask rose; Persian rose</i>
Hindi/Ayurvedic name	: <i>Arand; arandi; bedanji</i>
বাংলা নাম(Bengali name)	: গোলাপ(Golap)

Description: Under the name of *Ward*, the flower has been mentioned in Arabic and Persian works: white wild rose, red wild rose, red garden rose, yellow wild rose, yellow garden rose, dalik rose or dog rose, white cluster rose and wild rose called *Ward-el-Hamak*, the petals of which are described as yellow outside and red within. Of these the red garden rose appears to be the *Rosa damascena* which is cultivated both in Persia and India for official purposes. Dog rose according to Damishqi is known as *Ward-i-Chini* in China and the flower is so big that it cannot be cupped within the human fist. Roses are mentioned by the old Greek writers and among the ancients, roses were considered sacred to Dionysius and Aphrodite. Under the Romans one of the principal Bacchic festivals was called '*Rosalia*' and roses were used on all festive occasions. The famous rose gardens of Midas were situated in Macedonia. Modern Bulgaria is still famous for the production of Otto of Roses. Roses have given rise to innumerable solar myths both in the east and in the west, one of the prettiest being the well known story of *Gul-Bakawli*. It is said to be the story of a miraculous flower (presumed to be the rose) in the garden of a fairy princess, Bakaawli, reputed to restore sight to the blind. The story tells of a young prince whose looks adversely affected his father who lost his eyesight. The prince and his brothers went in search of the celebrated flower. The young prince succeeded with the help of some friendly giants and rats. He not only brought the flower but also won the heart and hand of the fairy princess. Dioscorides mentions the astringent properties of rose petals, use of them as collyrium and medicinal use of the stamens. Roses were said to be introduced into Europe by the Crusaders. Several varieties have been discussed by Al-Biruni in his *Kitab al-Saydanah* where the *jawri* variety is used in perfumes. Its odour is the most powerful and aqua is expressed from it, incorporated in all fragrant perfumes as well as in the decoction of myrobalans. They are moderately desiccatory, refrigerant and astringent and are good for liver and stomach.

Parts Used : Flowers, flower buds, petals, stamens, oil and aqua of rose.

Habitat: Bangladesh, India, China, Pakistan, Thailand

Active Constituents: Volatile oil containing geraniol, citronellol (rhodinol, nerol, linalool, enogenol, and colourless stearoptene): the petals contain vitamin C, quercitrin, quercitannic acid, gallic acid, carotene and red colouring matter.

Effects: Refrigerant, mild laxative and mild astringent.

Pharmacological Activities: Flowers are bitter, acrid with a good odour, cooling, mild laxative, aphrodisiac, antipyretic, cardiotoxic. The flower has astringent qualities when dry. Rosebuds are more astringent than the full blown flowers and considered cold and dry, cephalic, cardiacal, tonic and aperient, removing biliousness. Buds are considered as astringent, aperient, cardiacal, cephalic tonic, removing bile and cold humours.

Dose :

Flowers: 5 grams-7 grams (approx.)- Stamens: 1gram-2grams (approx.)

Fresh acid infusion of rose (B.P.C. 1949): 15 ml.-30 ml.

Confection of roses (B.P.C. 1939) : Formerly used as pills excipient.

Temperament : Cold and dry in second order. Stamens: Cold and dry in second order.

Side-effects: No known Health hazards reported following the use of prescribed preparations for recommended duration. Though its smell is regarded as refrigerant and tonic for heart and brain, yet in weak individuals or in those allergic to its aroma, some respiratory, catarrhal affection may occur.

Mundi

Taxonomical title of the Botanicals	: <i>Sphaeranthus Indicus Linn.</i>
Natural order Family	: <i>Compositae</i>
Tibbi Name	: <i>Mundi; gul-i-mundi; gorakh-mundi</i>
English Name	: <i>Globe thistle</i>
Hindi/Ayurvedic name	: <i>Mundi; gul-i-mundi; gorakh-mundi</i>
বাংলা নাম(Bengali name)	: মুন্ডিরী(Mundiri)

Description: Almost every known author on materia medica or medicinal plants of the Subcontinent (e.g. Kirtikar and Basu, Nadkarni, Kibairuddin and others including Dymock *et al.*) identify this plant with at least two common names: *Gorakh-mundi* (Hindi) and *Kamazariyus* (Arabic-most probably derived from the Greek). However, the author or *Makhzan al-Adviya* differs and deals with *Kamazariyus* and *Mundi* under separate headings. Al-Biruni says that *Kamazariyus* is a Roman name. Description of the plant given by him does not correlate with *Sphaeranthus*, as well the absence of Arabic/Hindi names has caused a bit of confusion in identification of the specific plant. *Mundi* (the plant) was known to the ancient Hindus and more than thirty Sanskrit names have been given to this plant. It has been described in the *Nighantas* as pungent, bitter, stomachic and the bark ground, and mixed with whey, is a valuable remedy for piles. The inhabitants of Java consider it as a useful diuretic.

The author of *Makhzan al-Adviya* mentions its medicinal attributes as a powerful tonic, deobstruent and alternative and observes that the odour of the plant may be perceived in urine and perspiration of those who are taking it. Administration of drug is recommended in bilious affections, for the dispersion of various kinds of fumours, and as a blood purifier. Its preparation like rosewater is regarded as a useful tonic, for preventing hair from falling and greying, and, to increase sexual ability. Sometimes it is prescribed for more than 40 days to exert aphrodisiacal effects. However its use in improving general body health and blood purification, surpasses all its other pharmacological attributes.

Parts Used : Whole herb, mostly the flowers, (roots and seeds).

Habitat: Bangladesh, India, Myanmar, Thailand

Active Constituents: Essential oil from the leaves, stems and flowers contains contains alkaloids: sphaeranthine, sphaeranthol, methyl chavicol, a-cadinene, p-methoxycinnamaldehyde,

ocimene, α -terpinene, citral, geraniol, geranylacetate, β -ionone, sphaerene, idicene. Fatty acids: linoleic, oleic, palmitic, stearic and arachidic acids; phytosterol. Glycoside composed of an alkaloid (sphaeranthine) and a polysaccharide, β -sitosterol, n-pentacosane, n-triacontanol, stigmasterol; hentriacontane, β -sitosterol, β -D-glucoside of β -sitosterol.

Effects: Alterative, blood purifier (immuno-stimulant).

Pharmacological Activities: Alterative, blood purifier, resolvent of tumours, immuno-stimulant, bitter, stomachic, stimulant, anti-tubercular (pectoral), demulcent, nervine tonic, externally emollient; root and seeds are regarded to possess anthelmintic activity.

Dose : 5 grams-12 grams (approx.)

Side-effects : No known toxicity reported following the use of prescribed preparations for recommended duration.

Temperament : Warm in first order and moist in the second order.

Halela

Taxonomical title of the Botanicals	: <i>Terminalia Chebula Retz.</i>
Natural order Family	: <i>Combretaceae</i>
Tibbi Name	: <i>Halela: halila-hezarda; harr; balhar</i>
English Name	: <i>Chebolic myrobalan; ink-nut; Indian gallnut</i>
Hindi/Ayurvedic name	: <i>Halela: halila-hezarda; harr; balhar</i>
বাংলা নাম(Bengali name)	: হরিতকি(Horitoki)

Description: Al-Biruni has given a historical account regarding this valuable plant. He says: “When Mamun al-Rashid was in Khurasan after the conquest of Kabul, the king of that country embraced Islam and submitted himself (to the suzerainty of the Caliph). When the government appointed by the Caliph, accompanied by an officer of the postal department went there, the king gave (the representative) scabrous chebolic myrobalans o be presented to the Caliph.”

Al-Biruni has drawn the elaborate picture of the then available varieties and quoted Al-Jurayh, Razi and Ibn Masawaih while referring to these varieties. Muslim physicians and authors, seem to have been aware of the qualities of myrobalans (particularly chebolic) since centuries, and through them this knowledge passed on the Greeks, but probably the ancient Hindus also knew it (*Haritaki*) as a powerful alterative and tonic. Sanskrit writers gave the names of *Pranada* (or life-giver), *Sudha* (or nectar), *Bhishakpriya* (or physicians’ favourite) and so forth. A mythological origin has been attributed to the tree. When *Indra* was drinking *amrita* in heaven, a drop fell on the earth and produced the plant. On this account it is called *Shakra-srishta* (i.e. created by *Indra*). Indian writers describe seven varieties of *Haritaki* which however are nothing more than the same fruit in different stages of maturity. The author of *Makhzan* has given proper names to different stages of young fruit to mature. The Arabs however attribute same properties to it like the Hindus and ascribe it with purgative qualities and as remover of bile, phlegm and adust bile combined with aromatics such as fennel seeds, caraway etc. Arabs say, according to Dymock *et al.*, that, “*lhilaj* is in the stomach like an intelligent housewife, who is a good manager of the house.” On account of its astringent and aperient properties it is a useful medicine in dysentery and diarrhoea.



Parts Used : Dried fruit-myrobalans and galls.

Habitat: Bangladesh, India, Myanmar, Pakistan.

Active Constituents: Kernels yield 30% oil; fatty acids, palmitic, stearic, oleic, linoleic, arachidic and behenic acids. Fruit contains betulinic acid (3%), tannic acid (25%), B-sitosterol, reducing sugars (3.04), non-reducing (0.21%) starch, crude fibre, tannins (7.23%), Vitamin C (92 mg/100gm). Chebulinexert antispasmodic activity (on smooth muscles). In pulp, gallotannic acid (approximately 20%).

Effects: Alterative, antidiarrhoeal, absorbent, astringent, aperient, carminative, stomachic; ripe-fruits have purgative effect on humours.

Pharmacological activities: Dried fruit is effective astringent and acts as antidiarrhoeal. It is also useful in bloody piles. Though astringent, yet it rids the body of melancholic, phlegmatic and bilious waste matters (humours) through purgation. Therefore it is used as purgative of humours and corrective of liver functions. Its preserve (*murabba*) is useful in eye complaints and constipation due to piles. The fruit pulp is used as a dentifrice to cure bleeding and ulceration of gums.

Being absorbent of extra-humoural matter or catarrh it is a major ingredient of *Itrifals*. As restorative of sexual potency, in rainy season it is used with table salt, in autumn with sugar, in spring with honey and in summer season with jaggery (cane juice solidified). The pericarp bruised in fennel water and applied to the eyes, strengthens the eyesight. Generally cough, asthma, urinary complaints, flatulence, colic, enlarged spleen and liver are treated by *Itrifals* (containing chebulic myrobalan).

Dose : 5-7 grams (approx.)

Infusion/Decoction: 15-30 grams (approx.).

Side-effects : No known Health hazards reported following the use of prescribed preparations for recommended duration. Prolonged continuous use is considered inappropriate.

Temperament : Cold in first order, dry in second.

Amrita

Taxonomical title of the Botanicals : *Tinospora Cordifolia Miers.*

Natural order Family : *Menispermaceae*

Tibbi Name : *Amrita; gilo; golancha*

English Name : *Gulantha tinospora*

Hindi/Ayurvedic name : *Amrita; gilo; golancha*

বাংলা নাম(Bengali name) : গুলঞ্চ(Gulantha)

Description: Gilo is a well-known plant, long used in Hindu medicine. Ayurvedic physicians consider it to be cold and dry whereas Arabic and Persian writers ascribe it with hot and dry attributes in first order. In native practice, it is much valued as an antiperiodic in fevers and as tonic and alterative and also credited with aphrodisiac properties. The fresh plant is said to be more effective than the dry, taken with milk in rheumatism, acidity of the urine and dyspepsia. The plant is very common in many parts of India and may always be obtained in the green state. Elephants are very fond of the stems and the hill tribes in Sikkim give it to their cattle to cure stomachache. The herb became official around the 1880s in the *Pharmacopoeia of India*.



Parts Used : Stems and roots-the whole plant and essence (sat gilo).

Habitat: Bangladesh, India, Thailand, Myanmar, Pakistan, Nepal.

Active Constituents: Leaves contain octacosanol B-sitosterol, tinosporin (alkaloid), tinosporic acid, tinosporol B-sitosterol, tinosporide, cordifolide, gilonin and gilo-sterol, berberine. Bitter principles (columbin, chasmanthin, and palmarin) in the stem have been reported.

Effects : Stomachic, bitter tonic, antispasmodic, antipyretic (antiperiodic), anti-inflammatory, blood purifier and alterative. Root is considered emetic and dried powdered fruit (with ghee or

honey) as tonic. The drug is reported to possess one fifth of the analgesic effect of sodium salicylate. Its aqueous extract has a high phagocytic index..

Pharmacological Activities: Watery extract of the plant is used as febrifuge (called Indian quinine). An infusion and aqueous extract prepared from the dry stem and root is useful tonic in debilitating conditions, intermittent fevers and dyspepsia. Decoction of leaves is used for the treatment of gout. Dried powdered fruit with ghee or honey used as a tonic and also in the treatment of jaundice and rheumatism. Root is reported to be a powerful emetic and used for visceral obstructions; its water extract is used in leprosy. An active constituent (unidentified) in the drug has been found to possess inhibiting property (*in vitro*) on the growth of *Mycobacterium tuberculosis* and the extract of the same is reported to possess activity against *Escherichia coli*. The aqueous and alcoholic extract of plant is reported to cause a reduction in fasting blood sugar in rabbits and rats (al though the hypoglycemic effect in the does range of 100-200 mg/kg was not proportional to the dosage). Stem pieces are kept in warm water overnight; the water extract to which is added the syrup of violet (banafshah) is taken in the morning, as an effective antiperiodic. The fresh plant is said to be more efficacious than the dry plant. It is given with milk in rheumatism, and hyperacidity of the urine.

Dose :

Stems :12-24 grams (approx.);

water of Tinospora: 24-36 Mls. (approx.).

Essence Tinospora: 2 grams (approx.).

Juice: 7.5-22.5 mls

Side-effects: No known toxicity reported following the use of prescribed preparations for recommended duration.

Temperament :

Different view (mentioned in literature):

- 1) Warm and dry in first order.
- 2) Compound temperament (*Murakkab al-Quwa*).
- 3) Cold and dry in first order.

Gokhru

Taxonomical title of the Botanicals	: <i>Tribulus Terrestris Linn.</i>
Natural order Family	: <i>Zygophyllaceae</i>
Tibbi Name	: <i>Gokhru; chota-gokhru; trikantah.</i>
English Name	: <i>Small caltrops; puncture vine; devil's thorn</i>
Hindi/Ayurvedic name	: <i>Gokhru; chota-gokhru; trikantah.</i>
বাংলা নাম(Bengali name)	: গুখরু(Gokhru)

Description: Dioscorides and Pliny have correctly mentioned the plant and have described two kinds: *terrestris* and *aquaticus*; this latter kind is from genus *Trapa* (water chestnut). Indian physicians regard the fruit and root as cooling, diuretic and aphrodisiac and use them in gonorrhoea and dysuria. Physicians of Greco-Arab system of medicine also hold the plant to be diuretic, emmenagogue, used frequently in dysuria and gonorrhoea. It is considered as a substitute for the juniper.



Parts Used : Fruit and root.

Habitat: Bangladesh, India, Thailand, Myanmar, Pakistan, Nepal.

Active Constituents: Fruit contains an alkaloid harman, harmine (in traces) in seeds, fixed oil (approx. 3.5%) consisting of unsaturated acids, an essential oil in very small quantity, saponins, resins and fair amount of nitrates.

Effects : Diuretic, antiseptic, useful (anti-inflammatory) for the mucous membrane of urinary tract, demulcent, tonic emmenagogue.

Pharmacological Activities: Recommended in cases of spermatorrhoea, phosphaturia, dysuria and impotence. Administered in urinary diseases such as chronic cystitis, calculus affections, gonorrhoea and painful micturition. It is useful in inflammatory conditions of genito-urinary system and helps relieve calculus affections and uterine disorders. Its chronic kidney inflammation when albumen is passed in urine and there occurs dropsy as a result of which (oedematous) swelling is observed over face and body, then small caltrops with suitable drugs (like seeds of cucumis) is used to relieve this situation. They are also prescribed in Bright's disease. In burning micturition it is used along with potassium carbonate. The leaves are considered to possess stomachic properties. A paste prepared from them is given for the treatment of stones in the bladder.

Dose :

5-7 grams (approx.).

Infusion/decoction (1 in 10): 30-60 ml. (approx.).

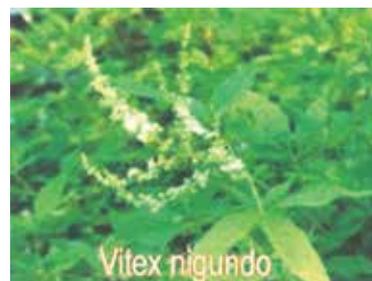
Side-effects : Declared as non-toxic; however, it is appropriate to use this natural diuretic under physician's prescription and advice.

Temperament : 1) Cold and dry in first order.

Panjangusht

Taxonomical title of the Botanicals	: <u><i>Vitex Nigundo</i></u>
Natural order / Family	: Verbenaceae
Tibbi Name	: Panjangusht, Habbutowaheer
English Name	: Chaste tree, Five - leaved Chaste tree
Hindi / Ayurvedic Name	: Shambalu, Nishinda
বাংলা নাম(Bengali name)	: নিশিন্দা(Nishinda)

Description : A deciduous shrub or a tree of about 3 – 4 m. height. Leaves opposite, petiolate and digitate, 3-5 palmately partite, dark green on upper surface, gray on under surface with margins entire or undulated, the smallest leaflets are usually sessile. Flowers white, in panicles, terminal or axillary or supra-axillary, forming a pyramidal inflorescence, composed of numerous paired, many-flowered, sessile or subsessile cymes (few flowered cymes). Calyx densely white-puberulent, each 5-toothed. Corolla also densely white puberulent. Fruit a drupe, greyish, hard.



Medicinal Part : The medicinal part is the Berries .

Habitat : Southern Europe, shores of Mediterranean, France and Greece. Also cultivated in Indian gardens.

Active constituents : Leaves contain a pale greenish yellow essential oil, an alkaloid, nishindine, a glucoside, p-hydroxy-benzoic acid, ascorbic acid, carotene, hentriacontane, sterols, β -sitosterol, β -sitosterol acetate and stigmasterol, and amino acids. Stem bark contains flavonoid glycosides of wogonin, aurosin, vitexin, myrecetin, also leucodelphinidin, leucocyanidin rhammoside, β -sitosterol, luteolin, vanilic acid and p-hydroxybenzoic acid.

Effects: Impotence, relaxation, leucorrhoea.

Pharmacological activities : Eye diseases, stomach-ache, Complaints of excessive sexual desire in both sexes and there fore acts as antiaphrodisiac. Premature old age due to abuse of sexual power. Complete impotence, relaxation, flaccidity, coldness of genitalia. No sexual power. Gleet with adsence of sexual desire or erections. In females for abhorrence of sexual intercourse, relaxation of genitals with transparent yellow leucorrhoea. Traditionally for menstrual problems resulting from corpus luteum deficiency including spasmodic dymenorrhoea, menstrual neurosis.

Dosage : Tincture : 10 – 40 drops as directed by the physician.

Side-effects : No definitive side-effects has been reported.

Temp : Hot 2° and dry 2°.

Correction : Milk, Rain water.

Alternatives : Vitex trifolia.

Makkai

Taxonomical title of the Botanicals	: <u><i>Zea mays</i></u>
Natural order / Family	: Gramineae
Tibbi Name	: Makkai
English Name	: Corn Silk, Stigmata Maydis ; Maidis Stigmata
Hindi / Ayurvedic Name	: Bhutta
বাংলা নাম(Bengali name)	: ভূটা(Bhutta)

Description : The plant is 1 to 3 m high and sturdy with a solid stem covered in alternate, over 4 cm wide, linear leaves. The plant is monoecious. The male flowers form terminal racemes of spikes with two-flowered husks. The female flowers are axillary. The spikes are at varying distances from the ground and are enclosed in a number of thin leaves and the sheathlike maize husk. The spikes consist of a cylindrical substance, the cob, on which the seeds are arranged in 8 rows of 40 or more. Single whitish-green threads of a silky appearance grow from the eyes of the seeds and hang outside the husk, where they catch the pollen. The Maize seeds are usually yellow but can be darker to almost black.



Parts used : The medicinal part is the seed.

Habitat : The plant is indigenous to America and is cultivated all over the world as green fodder or as a cereal crop.

Active constituents :

Compounds: Volatile oil (0.2%) : including among others carvacrol, alpha-terpineol, menthol, thymol

Flavonoids : including among others maysin, maysin 3-ethyl ether

Bitter substances. Saponins (2-3%)
Tannins : the main one is probably proanthocyanidins
Sterols : including among others beta-sitosterol, ergosterol
Alkaloids (0.05%)
6-methoxybenzoxazolinone
Fatty oil (2%)

Effects : Maize is used for disorders of the urinary tract. In Chinese Medicine it is used in the treatment of liver disorders.

Pharmacological activities: The active agents are saponin, essential oil and tannin. Maize stimulates the cardiac muscles, increases blood pressure, acts as a diuretic and sedates the digestive tract.

Dosage :

Mode of administration : Liquid extract, in medicinal preparations and combinations.

Preparation : Prepare an infusion using 2 teaspoons of drug per cup of water. A tincture is prepared by adding 20 gm of drug to 100 ml of 20% alcohol (leave to stand for 5 days).

How Supplied : Capsules : 450 mg

Liquid Extract

Daily Dosage : Drink cup of infusion every other day. Take 2 to 3 teaspoons of tincture per day.

Side effects: No health hazards or side effects are known in conjunction with the proper administration of designated therapeutic dosages.

Temp : Hot and dry :

Correction : Rain water, Fountain water

Alternatives : Maiden hair, Venus hair.

APPENDIX 1

GENERAL INFORMATION

1. 1.1 Definition and Method of preparing of Joshanda or Decoction

Joshanda is the decoction obtained by boiling coarse powder of drugs in proportion of 4,8,16 times of water reduced to one fourth and strained in cloth.

1.1.2 Tasfia (Decontamination)

Tasfia is a process of decontamination with specified drugs for removal of impurities and potentiation of drugs. The process of Tasfia may be divided under the following processes:

- A. Daq-wa- Sahaq;
- B. Ghasl-e- Adviyah and
- C. Tasweel-e- Adviyah.

A. Daq –Wa- Sahaq (pounding and Grinding)

In the preparation of many compound formulations, single drugs are used in the form of coarse or fine powder. The process of powdering, by pounding or grinding, is called Daq- was – sahaq (kootna –aur – peesna).

Drugs are generally powdered in a mortar and pestle, made of stone, iron, wood, porcelain or glass. Sometimes, they are rubbed on a sil- batta (flat grinding stone). Some drugs are pounded only in an iron or stone mortar. In large scale manufacture of drugs, pulverizing machines are now used.

i. Powdering of hard drugs

Tough, hard or fibrous are first dried in shade, sun or over low fire to evaporate their moisture contents and pounded in iron mortar. Initially, gentle pounding is employed to avoid drug pieces being scattered outside the mortar, when the drugs are initially broken into small pieces by gentle pounding, vigorous pounding is then employed till they are finely powder. The powder is sieved through sieves of the prescribed meshes. The coarse particles left in the sieve are again pounded and resieved . the remaining pieces of drugs which can no longer be pounded are ground on a sil –batta with little water to form a fine paste which is then dried and ground to powder form in a porcelain or glass mortar. Kernels of Nuts and Dry fruits are ground only on a sil- batta or in a kharal. The powder of these drugs is not sieved.

ii. Powdering of precious stones and minerals

Precious stones and minerals are first ground in an iron mortar or kharal of hard stone and then sieved through sieves of 100 Mesh. The sieved powder is put in the same mortar or kharal and ground with Arq-e – Gulab for three hours till the Arq is completely absorbed. The powder is then tested between the fingers for its fineness. If coarseness is still felt, more Arq-e-Gulab is added and ground till the coarseness disappears. The fine powder is then sieve through a piece of fine muslin cloth.

iii. Powder of Mushk, Ambar, etc.

Drugs like Mushk, Ambar, Jund-e- Badastar, etc, are ground either dried or with a suitable Arq or Raughan and then used as required in the respective formula.

iv. Powdering of Nuts and Dry Fruits.

Kernels of Nuts and Dry Fruits are ground only on a sil-batta or in a kharal. The powder of these drugs is not sieved.

v. Powdering of Zafran, kafoor, etc.

Drugs like Zafran, kafoor are ground only in a dry mortar (Kharal), with slow and light movements of the pestle to avoid sticking of the drug with the mortar. It is also ground with a few drops of alcohol. Lastly, these drugs are added to the powder of other drugs and mixed well in a mortar.

vi. Powdering of Toxic Drugs

Poisonous or Toxic drugs are first purified or detoxicated (mudabbar) and then ground to fine powder. Kuchla (Nux- Vomica), besides being toxic (poisonous), is also very hard and difficult to powder. It is, therefore, ground immediately when it is soft. In case it gets hard on drying, it is powdered by frying in Raughan Zard or any other suitable oil by which the drug is crisped.

vii. Powdering of Abresham

Silk cocoons (Abresham) are cut into small pieces and roasted in an iron pan over low fire, care being taken to ensure that they are not burnt. It is then ground in mortar and pestle to fine powder form.

viii. Powdering of moist and resinous drugs

Drugs like Afyun. Ushaq, Muqil, Anardana, Narjeel, Daryae, etc. are first dried over a low fire to evaporate the moisture content, care being taken to ensure that they are not burnt. They are then powdered.

ix. Powdering of khurma khushk

In case khurma khushk (Dry Date) the seed are first removed and then dried over a low fire in a frying pan before powdering. In some formulation, dates (Khurma khushk) are soaked in the prescribed liquids. In such cases they are ground on sil-batta, with a little water to form a fine paste and then mixed with other drugs coming in the respective formula.

x. Powdering of Mastagi

Mastagi is powdered in a porcelain mortar by slow and light motion. It is also dissolved in any oil over a low fire and added to the other drugs in the formula.

xi. Powdering of Abrak

The layers of Abrak are first separated by pounding in an iron mortar. The small pieces of Abrak are kept in bag if thick cloth along with small pebbles, cowrie shell, Data seeds or Dhan (paddy) and tied. The bag is then dipped in hot water and rubbed vigorously with both hands. Small particles of Abrak are then squeezed till all the particles of Abrak are squeezed out of the bag. The particles of Abrak are allowed to settle down at the bottom of the vessel and with water is

decanted. The Abrak particles are removed and then allowed to dry. The dry particles are called Abrak Mahloob.

xii. Powdering of Tukhm-e-Imli

Tukhm-e-Imli is soaked in water for four to five days. The brownish outer covering (testa) of the seeds is removed and the seeds are ground to powder. The outer covering can also be removed by roasting the seeds.

xiii. Powdering of sang-e-surma

Sang-e-surma is ground in a mortar and pestle (kharal). The process of powdering is continued till the shine of the particles disappears and the powder is tested between the fingers for its fineness. If it is still coarse than the process is repeated till the highest degree of fineness is obtained. Similarly, all other drugs which are applied in the eye. Are ground to the highest degree of fineness for which it is sieved through a piece of silk cloth to obtain the finest quality of surma.

B. Ghasl-e-Adviyah (cleaning of Drugs)

In order to prepare the drugs of moderate properties and action the drugs of plant, animal and mineral origins are washed with special method. This special method of washing is called Ghasl-e-Adviyah. The drugs which undergo this process are suffixed with the term Maghsool (washed) in respective formulae. A few of the drugs which are processed by this method are described below.

i. Aahak (choona)

Aahak (edible lime) is soaked in a large quantity of water, stirred well and allowed to settle down at the bottom. After settling down to the particles of Choona the water is decanted. Fresh water is again added to the sediment and stirred well. The process of addition of water to fine particles of choona and decantation is repeated 7 to 8 times and the fine particles of the choona are collected in the end. The product thus obtained is called choona Maghsool or Aahak Maghsool.

ii. Hajriyat

Precious stones, like shadjanj Adsi, Lajward, etc., are used after they are purified. The stone is ground to fine powder. Sufficient quantity of water is then added to the powder, stirred and allowed to settle down. The finer particles of the stone still suspended in the water will come out when decanted. The coarse particles will settle down at the bottom. These coarse particles are removed and ground till all the particles pass through the process of decantation. The decanted water is left undisturbed so that the finest particles are settled down at the bottom. Water is then removed and the particles when dried are finely powdered.

The drugs treated by the above method are called "Maghsool" viz .Shadnaj Adsi Maghsool, Sang-e-Surma Maghsool and Lajward Maghsool.

iii. Raughan Zard or Ghee

Ghee is taken in a tin-coated metallic plate or kansa (a metallic alloy) plate and water is poured over it. The Ghee is then rubbed with the hands for five minutes and the watery part is decanted. This process is repeated many times as indicated in the particular formula to obtain the Raughan Zard Maghsool.

iv. Luk

First of all the visible impurities are removed from Luk. 30 gms of Luk is finely powdered and ground in the decoction prepared by 15 gms. Each of Rewand chini and Izkhar Mskki. The mixture is sieved through a piece of clean fine cloth, and when the fine particles of Luk settle down in the decoction, it is then decanted and the fine particles of Luk are washed with water and dried to obtain the Luk Maghsool.

C. Tasweel –e- Adviyah (sieving)

Sieves of different meshes are used in the process of powdering the drugs. Each sieve has a particular mesh number. The mesh number depends on the number of holes in the mesh in an area of 2.5 sq.cm. (1 square inch). If there are 20 holes. The mesh number is 40, if there are 30 holes, the mesh number is 60, for 50 holes the mesh number is 100. If coarse powder is required then sieve number 40 is used. For fine powders, sieves of highest number are used. Sieve of 100 mesh gives the finest powder. Powders are also sieved through a piece of muslin or thin silk cloth when the highest degree of fineness is required as in the case of preparation of Surma.

Joshandas (Decoctions) and sharbats (syrups) are filtered through a piece of clean thick cloth. Joshanda prepared for sharbats are filtered through cotton pads to ensure a greater degree of homogeneity and purity of the end product. Uniformly thick layers of cotton wool or double-layered flannel cloth is spread over the sieve and the decoction is passed slowly through it. When a small quantity of fluid drug is required to be filtered, then a filter paper or a flannel cloth is used. The pulpy drugs like Maweez Munaqqa, Anjeer etc, are first cleaned by washing and then soaked in water and boiled till they become a soft mass. They are then removed from the water, allowed to cool, squeezed and the pulp is sieved through a metallic sieve or a piece of cloth.

Turanjabeen is first soaked or boiled in water. When dissolved completely the solution is filtered through a piece of clean fine cloth and kept in a vessel to allow the impurities to settle down. The solution is then decanted into another container without disturbing the sediments.

1.1.3 Tadbir –e- Adviyah (Detoxification of Drugs)

Some of the plant, animal and mineral and mineral origin drugs are naturally toxic in their properties and actions. Therefore, these drugs before making the medicines are detoxified or purified in order to enhance their therapeutic action and reduce their toxicity. The process of detoxification of the drug is called Tadbir – e-Adviah and the drugs which undergo this process are suffixed with term “Musffa” Different processes of detoxification are employed for different drugs. Details of these processes for a few important drugs are described below. These should be referred along with the process prescribed in the original texts.

i. Afyun

Dissolve Afyun in Arq –e- Gulab and filter it. The filtrate is heated till it became thick for making the Habb(pills).

ii. Sibr (Aloe)

Keep sibr in Apple or Bahi or shalgham, cover it by the process of kapoorti, heat it, till it turn brown. Now take out the elva, dry it and use.

iii. Bhang

Soak the bhang in Arq-e-Ajwain and dry it. Now keep it in an earthen pot, heat it to roast.

iv. Zeera Siyah

Dip Zeera siyah is sirka (the level of sirka should be 2 inch above the level of Zeera siyah for three days. After three days, Zeera siyah is taken out and dry it use.

v. Rasaut

Rasaut is cut into small pieces and soaked in Araq –e-Gulab for 2 hours. It is then stirred well and sieved through a clean piece of fine cloth into a big cylindrical glass jar and the sediments are allowed to settle down. The liquid is then decanted into another vessel without disturbing the sediment and boiled till it becomes a thick mass. The purified Rsaut is called Rasaut Musaffa.

vi. Anzaroot

Anzaroot powder is mixed with Mother’s Milk or Donkey’s milk to form a paste. The paste is smeared over a piece of jhao wood (Tamariz wood) and dried directly over a charcoal fire.

vii. Bhilawan

After removing the cap (thalamus) of the Bhilawan fruits, the juicy contents (Asal-e Bhilawan) are squeezed out completely with the help of red hot tongs. Thereafter, Bhilawan fruits are boiled in fresh water at least for three times. Lastly, the fruits are boiled in milk, washed with water and dried. Precaution must be taken not to touch the juice with hands as the juice is toxic.

viii. Habb-us- salateen (Jamalgota)

25 grams of the kernels of Jamalgota is tied in a cloth bag and boiled in one liter of Cow’s milk giving sufficient time till the milk becomes dense. When cooled, the kernels are taken out from the bag and the embryo part (pitta) of the seeds is removed to obtain jamalgota Mudabbar.

ix. Chaksu

Chaksu is kept in a cloth bag and tied from the mouth. It is then soaked in a vessel of water containing Badiyan (Fennel) equal to half the weight of Chaksu or Barg-e –Neem Taza (fresh Neem leaves) equal in weight of chaksu. The water is boiled for half and a hour and then the cloth bag is removed and allowed to cool. Chaksu is then removed from the bag and rubbed between the palms to remove the outer coverings to get chaksu Mudabbar.

x. Kibreer (Gandhak)

One part of Gandhak Amlasar and two parts of Raughan (Ghee) are taken in a kadeha (ladle) and kept on a low fire. When Gandhak is melted, four parts of the milk is added. This process is

repeated at least three times changing the fresh Ghee and Milk each time to obtain Gandhak Mudabbar.

xi. Samm-ul-Far (sankhiya)

Fine powder of sankhiya is immersed in sufficient quantity of fresh Aab – e- Leemu (lemon juice) and ground in mortar of china clay or glass till the juice is completely absorbed. This process is repeated seven times to obtain samm-ul-Far or Sankhiya Mudabbar.

xii. Shingraf

Shingraf is ground with fresh Aab-e-Leeum(lemon juice) till it is absorbed and a fine powder is obtained, This process is repeated three times to obtain Shingraf Mudabbar.

xiii. Seemab

There are three following methods of purifying seemab.

- a. Seemab is ground with half burnt brick pieces for 12 hours. It is then washed with water and seemab is separated. The whole process is repeated three times.
- b. Seemab is kept in a four layered thick cloth bag (50 count) and squeezed out by pressing with hand, this process is repeated till the blackish tinge of seemab is completely disappeared.
- c. Seemab is ground with Turmeric powder as long as the powder does not change its original colour. The resultant product is called seemab Mudabbar.

xiv. Khabs –ul – Hadeed

- a. Small pieces of khabs-ul Hadeeb are heated redhot in charcoal fire and then immersed in Aab –e-Tirphal or sirka Naishakar (sugarcane vinegar) by holding each piece with a tongs. The whole process is repeated seven times.
- b. In this process khabs-e-Haddeb is ground to powder form and kept immersed in sirka Nsishakar (sugarcane vinegar) or sharab –e- Angoori (Brandy). The level of either of the two should be 5 cms. Above the level of the powder. After 14 days the sirka Naishakar or sharab –e –Angoori is decanted, the powder is dried and fried in Raughan-e-BAdam.

xv. (Beesh (Bachnak or Meetha Telia)

30gms.of Beesh is cut into small pieces, tied in a bag of clean fine cloth and dipped in a vessel containing milk so that the bag is completely immersed without touching the bottom. When the milk is completely evaporated, the pieces of beesh are removed and washed well with water to obtain Mudabbar.

xvi. Hartal

Juice of 5 kg.of petha (with Gourd Melon) is taken and kept in a vessel. Sixty grams of Hartal (small pieces) is put in clean, soft cloth bag and immersed in petha juice without touching the

bottom of the vessel and boiled. When the petha juice is completely evaporated the Hartal pieces are removed and washed with water thoroughly to obtain purified Hartal or Hartal Mudabbar.

xvii. Sang –e- surma

There are four following methods of purifying sang-e- Surma:

- a) A piece of sang- e- surm is covered with goat's fat and kept on low fire till all the fat is completely burnt into fumes. The pieces of sang-e-surma is then removed from the fire with a tongs and immersed in Araq-e- Gulab or ice water. The whole process is repeated three times.
- b) A piece of sang –e- Surma is immersed in Araq-e- Gulab or Araq-e Badiyan and heated till the Araq evaporates. This process is repeated seven times.
- c) Sang- e- Surma is immersed in Aab-e- Triphal and boiled for 12 hours.
- d) Sang-e- surma is kept immersed in rain water(Aab –e-Baran) for 21 days.

xviii. Ajwayin and Zeera

Either of the above drugs are soaked in sirka Naishakar (Sugarcane Vinegar) for 72 hours. The level of sugarcane vinegar in the container should be 5 cms. Above the level of the drug. The drug is then removed and allowed to dry and then roasted over a low fire before use. Besides purifying, Sirka naishakar (Sugarcane vinegar) also enhances the efficacy of the drug.

xix. Neem – Kob (Bruising)

Neem-Kob is the process by which hard and fibrous drugs (roots, stems, seeds etc.) are crushed to small pieces in an iron mortar and softened in order to obtain the maximum efficacy, when used in the preparation made by the process of decoction or infusions. The word "Neem Kofra" is suffixed to the name of the drug in the recipe/ formula which has to undergo this process.

1.1.4 Tahmiz –o-Biryani-Biryani-e –Adviyah (Roasting or parching)

a. Tahmiz (Roasting or parching with medium)

Tahmiz is process in which the drugs like chana (Gram), jau (Barley), etc. are roasted with some medium e.g., chana or jau is roasted with sand till they get swelled.

b. Biryani (Roasting or parching with medium)

In the process of Biryani, drugs are roasted or roasted without medium e.g., drugs like shibb-e-Yamani, Tankar, Tootiya-e-Sabz, etc., are directly put over fire in any vessel or frying pan and roasted.

1.1.5 Tarviq-e-Adviyah

In this process the juice of the fresh herb is poured in a tin – coated vessel and heated over low fire till a green froth appears on the surface. The juice is then slowly sieved through a piece of fine cloth leaving behind froth on the surface of the cloth. The watery juice thus obtained is called Aab –e- Murawwaq.

In case of dry herbs a decoction is first made to which a small quantity of fresh lemon or Alum powder is added. This will separate the green contents of the decoction. The aqueous portion is decanted and stored.

APPENDIX -2

TESTING OF DRUGS

2.1.1 Systematic study of crude Drugs

In Bangladesh alternative system of medicine systems of Medicine comprising of Unani, Ayurveda and Homoeopathic, drugs of plant, animal and mineral origin, are used in their natural or so called "Crude" forms singly or in their mixture or in combination, to make a compound preparation or formulation. Nearly 90 per cent of the crude Drugs are obtained from animal and mineral sources. The while about 10 percent of the drugs are derived from animal and mineral sources. The drugs of plant origin especially of herbaceous nature are frequently used as whole plant; other wise their parts such as root, stem, leaf, flower, seed, fruit modifications of stem and root, bark of a stem or root wood, and their exudates of gums etc. constitute single drugs in Alternative Systems of Medicine. These vegetable drugs are either used in dried forms of some times as whole fresh or their juice. The study of these crude drugs made with view to recognize them is called pharmacognosy (pharmaka = Drug; gignosco = to acquire knowledge of), meaning the knowledge of science of Drug. In pharmacognosy a complete and systematic study of a drug is done, which comprises of (I) origin, common names, scientific nomenclature and family, (II) geographical source (and history), (III) cultivation, collection, preservation and storage, (IV) Macroscopical, Microscopical and sensory (organoleptic) characters, (v) chemical composition wherever possible, (vi) Identity, purity, Strength and assay, (iv) substitute and adulterant etc. Such systematic study of drug as complete as possible, is called to be the scientific or pharmacognostical evaluation.

As mentioned above each crude derived from the vegetable kingdom consists of a definite part of plant e.g. leaf, stem, fruit, seed, wood, bark, root etc. Morphological details of the respective part are given by observing it with a naked eye or with the aid of a magnifying lens. In this description general conditions of the drug, size, shape outer surface, inner surface etc. are referred to. Drugs can be identified with the aid of the above, only if they are available in entire condition. Sensory or organoleptic characters describe colour, odour, taste, consistency etc. the microscopic examination of different parts of the drug provides section, preferably through midrib, are made and nature of epidermis, trichomes, stomata, arrangement of tissue like palisade cells, vascular bundles and nature of cell content are studied. Similarly in case of bark, root, rhizome and vascular bundles and nature of cell content are studied. Similarly in case of bark, root, rhizome and wood, transverse and longitudinal sections are made and from characteristic arrangements of tissues of each drug and from diagnostic elements like stone cells, fibers, vessels etc. as also from the study of the cell deposits like crystals, starch etc. the drugs are identified. The studies of diagnostic elements are helpful especially when the drugs are in powdered condition and give clue in the identification of drugs. Linear measurements and other methods of quantitative microscopy give further aid in the identification of the drugs. The sections or the powdered drug samples are cleared by clearing agents mostly by chloral-hydrate solution, before mounting on the slide.

The basic chemical nature of cell-wall of almost all the plants is cellulosic, however, lignin, suberin, cutin or mucilage are deposited on the cellulose. Cellulose gives blue colour with chlorzinc-iodine solution or with cuoxam. (Copper-Oxide-ammonia) reagent. Lignin present in the middle lamella and secondary cell-wall- of many vessels. Fibers and sclerids give red

colour with phloroglucinol and concentrated hydrochloric acid. Suberin is present in cork and endodermis cells while cutin in the cuticle of leaf. Both are fatty in nature and when heated with sudan Red-III give red colour.

Mucilage gives red colour with ruthenium red. The chemical constituents present in the drugs can be identified by chemical or microchemical tests e.g., Rhubarb rhizomes given with 5% potassium hydroxide red colour because of anthraquinone derivatives, strychnine present in *NUX-vocica* gives purplish-red colour with ammonium vanadate and concentrated sulphuric acid.

Paper and Thin Layer chromatography are now utilized in identification of drugs, their adulterant and their chemical constituents from paper and thin Layer chromatography (TLC).

2.1.2 Microscopical Methods of Examining crude Vegetable drugs for Microscopical studies vary, depending on the morphological groups of drugs to be examined and also on the natures of the material i.e., entire cut or powdered.

I. Leaves, Herbs and Flowers

For examining leaves, herbs and flowers (entire or cut under microscope, following methods are employed for clarification:

A. Entire and cut materials

1. Entire materials –when examining entire leaves, herbs and flowers, take pieces of leaf (margin and vein of leaves only), herbs (only leaf) and flowers (only calyx and corolla) in a test tube. Add a solution of caustic alkali or nitric acid to the test tube and boil for 1-2 minutes, pour the contents into a porcelain dish, drain off the liquid, wash the material with water and leave for sometimes. Remove the pieces of the material from the water with a spatula and put on the slide, Add a few drops of the solution of glycerol and chloral hydrate. Crush the material with scalpel and cover with cover slip before examining.
2. Cut materials – For examining cut leaves, herb and flowers, take several pieces in a test tube and employ the same methods as described for entire materials. Other methods employed for clarification of the material (leaf and stem) are described below:-
 - a. Leaf – Boil pieces of leaves in a test tube with chloralhydrate for Several minutes until completely clarified and examine them in chloral hydrate solution. After clarification, leaf, pieces are divided into two parts with the help of scalpel or needle, and carefully turn one part. The leaf can be examined from both the dorsal and ventral surfaces.
 - b. Stem – To examine stem material (without leaf) boil pieces in a solution of caustic alkali or on nitric acid. Remove the epidermis with a scalpel or a needle for examining the surface. For examining pressed specimen of stem, take separate tissue and press them with a scalpel on the slide.

B. Powder

For examining characters of the powder take sufficient amount of powder in Chloralhydrate solution on a slide and cover it with a cover slip, warm over a low flame for a short time.

II. Fruits and Seeds

A. Entire materials

General Microscopical examination of fruit and seed is not done. If required then take the specimens of outer coat of seed or fruit and examine as described below;

1. **Outer Coat:** For examining the outer coat boil 3 or 4 seeds or fruits in caustic alkali solution on a test tube for 1-2 minutes (outer coat specimens with intensive pigmentation are boiled for longer period). After boiling, place the pieces on slide, remove the layers of the coat and examine them after mounting on glycerol solution.

2. **Section:** If fruits or seeds are too hard to cut then boil them for 15-30 minutes or more depending on their hardness or keep them on moistening chamber or absorb in water and chloroform solution, For cutting small, flat seeds (which are difficult to hod) place them in a pith or potato slit for section cutting. Small, round or smooth seeds can not be cut into section in the pith, and then in such cases, they may be embedded in paraffin wax blocks for section cutting. For this, a block of paraffin (0.x0.5x1.5cms.in size) is made and the seed is embedded in the block by making a cavity or a pit in the block with a hot teasing needle. Cut the section with a sharp razor (through the object) together with the paraffin, place them on to the slide, remove paraffin with a needle or wash it with xylene and examine the section in chloral-hydrate solution.

B. Powder

For examining the structure of the cells of the seed coat and the cells of the embryo take a small amount of powder of the material on a slide in glycerol and cover it with a cover slip and examine.

i. **Starch:** For examining the presence of starch in the seed, tale two specimens, one in iodine solution and the other in water. With iodine solution starch turns blue. Shapes and the structure of starch grains can be seen in water and their size is measured.

When examining objects containing starch, prepare by slightly warming in chloral- hydrate solution.

ii. **Fixed oil-** For examining the of fixed oil, prepare a specimen in a solution of sudan III droplets of fixed oil are coloured orange pink. When examining objects containing small amount of fixed oil, prepare a specimen by slightly warming in shloral- hydrate solution, and when examining containing lare amount o f fixed oil, then the powder is defatted and clarified as follows:

(i) Plaxe 0.5 –1g. of the powd in a porcelain dish, add 5-10 ml. of dilute nitric acid and boil for 1 mintue, then strain off the liquid thourgh a cloth, wash the residue with hot water and return it to the porcelain dish with a spatula boil it with 5-10 ml. of caustic alkali solution for 1 minute and again strain it though the cloth and wash with water. Examine the residue in a glycerol solution, after the treatment the structure of the layers of the coat and their cells can be seen very distinctly.

- iii. Mucilage- Prepare a specimen in Indian Ink and examine it under a low power microscope or under dissecting microscope. Mucilage appears as colour less masses against the black back ground which spreads when slightly pressed with needle.

III. Barks

A. Entire material:

Prepare transverse or longitudinal section of bark. To soften bark break it into pieces of about 1-2 cm long and 0.5-1 cm wide and boil with water in a test tube for 1-3 minutes. Soft pieces are then straightened with a scalpel so as to have an exact transverse or longitudinal direction. Cut the section with razor, moisten the surface of the bark with glycerol solution. Remove the sections with brush and place them on the slide. Thin pieces of the bark are cut by placing them in the pith (potato or carrot). The sections are treated with various reagents before examining.

1. Lignified elements- For testing lignin add several drops of phloroglucinol and a drop of concentrated hydrochloric acid to the section on a slide then draw off the liquid, immerse the section in chloral hydrate solution and cover with a cover slip (the specimen should not be heated); the lignified elements are coloured crimson phloroglucinol can be substituted by saffranine, and the lignified elements are coloured pink. The excessive stain can be washed out with acidified alcohol.
2. Starch - starch is detected by treating with iodine solution.
3. Tannin - tannin is detected by treating with ferric ammonium sulphate solution [blue-black or green black color shows the presence of tannin] or with potassium-bi-chromate solution [brown colour indicates the presence of tannin].
4. Anthraquinone derivatives - anthraquinone derivatives are detected by treating with alkali solution [blood-red colour shows the presence of anthraquinone derivatives].

B. Cut materials:

Prepare small pieces or scraping of bark and boil them for 3-5 minutes in a solution of caustic alkali or potassium hydroxide or in nitric acid solution and then prepare pressed specimen and immerse in glycerol for examination on a slide covered with a cover slip.

C. Powder:

[I] prepare specimen for examination by placing a little amount of powder on a slide, add 1-2 drops of phloroglucinol and a drop of concentrated hydrochloric acid, cover it with a cover slip. Draw off the liquid from one side of the slide with filter paper, and then apply 1-2 drops of chloral-hydrate solution from the other side of the slide, lignified elements are stained crimson-red. Specimen may also be prepared with caustic alkali or ferric ammonium sulphate for this purpose.

IV. Roots and Rhizomes

A. Entire materials

Generally anatomical examination of entire roots and rhizomes is not done but if required then cut transverse and longitudinal sections. For this. Soften small pieces of roots without heating in glycerol solution for 1-3 days, depending on their hardness. The soften roots are straightened with help of a scalpel in the right direction and then cut a section with the razor. First cut thicker entire slices and then make then, smaller sections. Stain the entire slices with phloroglucinol and concentrated hydrochloric acid or with saffranine, examine the specimen under a dissecting microscope. For micro-chemical test the small and then sections are examined under microscope, as follows;

1. **Starch** - starch is detected with iodine solution. if starch is present; prepare specimen with water to measure the granule of starch with an ocular micrometer.
2. **Inulin** - inulin is detected with molish's reagent. for this place a little powder on a slide and apply 1-2 drops of naphthol and a drop of concentrated sulphuric acid, if inulin is present, the powder will appear reddish-violet coloured. Starch also gives this test, so the test for inulin can be done in the absence of starch.
3. **Lignified elements** - Lignified elements (fibrovascular bundles, mechanical tissue etc.) are detected with phloroglucinol and concentrated hydrochloric acid or saffranine solution as mentioned above for barks.
4. **Fixed Oil** - For fixed oil detection use Sudan III, as mentioned above for fruits and seeds.

If required for tannin, anthraquinone derivatives test as mentioned above.

B. Cut material:

Make small pieces or scrapings of roots of rhizomes and boil them for 3-5 minutes in caustic alkali, or in nitric acid and then make pressed specimen and immerse them in glycerol.

Microchemical tests can be performed with scrapings for various chemicals mentioned above.

C. Powder:

Prepare several specimens of the powder on slides in chloral hydrate solution and perform the above mentioned standard tests for detection of starch, fixed oil, inulin, lignified elements, anthraquinone derivatives, tannins, mucilage, etc.

2.1.3. Types of stomata

There are several types of stomata, distinguished by the form and arrangement of the surrounding cells. The following descriptions apply to mature stomata.

1. **Anomocytic (irregular-celled)**- previously known as ranunculaceous. The stoma is surrounded by a varying number of cells in no way differing from those of the epidermis generally.

2. Anisocytic (unequal-celled) – previously known as cruciferous or solanaceous. The stoma is usually surrounded by three subsidiary cells, of which one is markedly smaller than the others.
3. Diacytic (/cross-celled) – previously known as caryophyllaceous. The stoma is accompanied by two subsidiary cells whose common wall is at right angles to the guard cells.
4. Paracytic (parallel-celled) – previously known as rubiaceous. The stoma has one each side one or more subsidiary cells parallel to the long axis of the pore and guard cells.

2.1.4. Determination of stomatal Index

The stomatal index is the percentage of the number of stomata formed by the total number of epidermal cells, including the stomata, each stoma being counted as one cell.

Place leaf fragments of about 5x5 mm in a test tube containing about 5 ml of chloral hydrate solution and heat in boiling water water- bath for about 15 minutes or until the fragments become transparent. Transfer a fragment to a microscopic slide and prepare the mount, the lower epidermis uppermost, in chloral hydrate solution and put a small drop of glycerol- ethanol solution on one side of the cover-glass to prevent the preparation from drying. Examine with a 40x objective and a 6x eye piece, to which a microscopical drawing apparatus is attached. Mark on the drawing paper a cross (x) for each epidermal cell and a circle (o) for each stoma. Calculate the result as follows:

$$\text{Stomatal index} = \frac{X \times 100}{E + S}$$

Where,

S = the number of stomata in a given area of leaf

E= the number of epidermal cells (including trichomes) in the same area of leaf.

For each sample of leaf make not fewer than ten determinations and calculate the average index.

2.1.5 Determination of palisade Ratio

Palisade ratio is the average number of palisade cells under one epidermal cell.

Place leaf fragments of about 5x5 mm in size in a test-tube containing about 5 ml of chloral hydrate solution and heat in a boiling water-bath for about 15minute or until the fragment become transparent, transfer a fragment to a microscopical slide and prepare the amount, the upper epidermis uppermost, in chloral hydrate solution and put a small drop of glycerol solution on one side of the cover-glass to prevent the preparation from drying. Examine with a 40x objective and a 6x eye piece, to which a microscopical drawing apparatus is attached. Trace four adjacent epidermal cells on paper; focus gently downward to bring the palisade into view and trace sufficient palisade cells under the four epidermal cells. Where a cell is intersected, include it the court only when more than half of it is within the area of the epidermal cells, calculate the average number of palisade cells beneath one epidermal cells, dividing the count by 4; this is the “palisade ratio”.

For each sample of leaf make not fewer than ten determinations and calculate the average number.

2.1.6 Determination of vein –Islet Number

The mesophyll of a leaf is divided into small portions of photosynthetic tissue by anastomosis of the veins and veinlets; such small portions or areas are termed “veinislets”. The number of vein-islets per square millimeter is termed the “vein-islet number”. This value has been shown to be constant for any given species and, for full-grown leaves, to be unaffected by the age of the plant or the size of the leaves. The vein-islet number has proved useful for the critical distinction of certain nearly related species. The determination is carried out as follows.

For whole or cut leaves- Take pieces of leaf lamina with an area of not less than 4 square millimeters from the central portion of the lamina and excluding the midrib and margin of the leaf. Clear the pieces of lamina by heating in a test tube containing chloral hydrate solution on a boiling water-bath for 30 to 60 min or until clear and prepare a mount in glycerol-solution or, if desired stain with safranin solution and prepare the mount in Canada Balsam. Place the stage micrometer on the microscope stage and examine with 4x objective and 6x eyepieces. Draw a line representing 2 mm on a sheet of paper by means of a microscopic drawing apparatus and construct a square on the line representing an area of 4 square millimeters. Move the paper so that the square is seen in the centre of the field of the eyepiece. Place the slide with the cleared leaf piece on the microscope stage and draw in the veins and veinlets included within the square, completing the outline of those vein-islets which overlap two adjacent sides of the square, count the number of vein-islets within the square including those overlapping on two adjacent sides and excluding those intersected by the other two sides. The result obtained is the number of vein-islets in 4 square millimeters. For each sample of leaf make not fewer than three determinations and calculate the average number of vein-islets per square millimeter.

For Leaf fragments having an area less than 4 square millimeters – take fragments of leaf lamina each with an area of not less than 1 square millimeter, excluding the midrib and the margin of the leaf. Clear and prepare a mount as stated above. Use a 10x objective and a 6x eyepiece and draw a line representing 1 mm on a sheet of paper by means of a microscopical drawing apparatus and construct a square on this line representing an area of 1 square millimeter. Carry out the rest of the procedures as stated above. The result obtained is the number of vein-islets in 1 square millimeter. For each sample of leaf make not less than 12 determinations and calculate the average number.

2.2 Determination of Quantitative Data of Vegetable Drugs

2.2.1 Sampling of Vegetable Drugs

Original Samples;

- a. Samples of crude vegetable drugs in which the component parts are 1 cm or less in any dimension; and of powdered or ground drugs may be taken by means of sampling device that removes a core from the top to the bottom of the container. Not less than two cores are taken in opposite directions.

When the total weight of the drug to be sampled is less than 100 kg, several samples are taken in the manner described, mixed and quartered, two of the diagonal quarters being rejected, and the remaining two quarters being combined and carefully mixed, and again subjected to quartering

process in the same manner until each of the quarters weigh at Least 125g; two such quarters then constitute an original sample.

- b. **Samples of crude vegetable drugs in which the component part are over 1 cm in any dimension taken by hand.**

When the total weight of the drug to be sampled is more than 100kg. samples are taken from different parts of the container or containers. Not less than 500g of samples so taken constitute an original sample.

When the total weight of the drug to be sampled is more than 100kg, several samples are taken in the manner described, mixed and quartered, two of the diagonal quarters being rejected, and the remaining two quarters being combined and carefully mixed, and again subjected to a quartering process in the same manner until each of the quarters weigh not less than 250g; two such quarters then constitute an original sample.

Note:-Where the total weight of crude drug to be sampled is less than 10kg, the proceeding methods may be followed but somewhat smaller quantities are to be withdrawn but in no case shall the original samples weight less than 125g.

Test Sample:

Withdraw as much as may be necessary of the original sample by quartering, taking care to see that the portion is representative of the gross sample, In the case of ungrounded or unpowdered drugs, it should be reduced to as fine a state as possible. Mix by rolling it in paper or cloth, spread it out in a thin layer, and withdraw the portion for analysis.

2.2.2 Foreign Matter and Determination of Foreign Matter

A. Foreign Matter

Drugs should be free moulds, insects, animal faecal matter and other contamination such as earth, stones and extraneous material. Any matter not covered by the description of the drug in the monograph shall be regarded as an non-extraneous foreign matter

Foreign matter is material consisting of any or all of the following:

- (1) In particular, parts of a organ or organs from which the drug is derived other than the parts named in the definition or for which a limit is prescribed in the individual monograph.
- (2) Any organ or part of organ, other than those named in the definition and description.

The amount of foreign matter shall not be more than the percentage prescribed in the monograph.

The amount of foreign matter shall not be more than the percentage prescribe in the monograph.

B. Determination of Foreign Matter

Weigh 100-500g of the drug sample to be examined, or the minimum quantity prescribed in the monograph, and spread it out in a thin layer. The foreign matter should be detected by inspection with the unaided eye or by the use of a lens (6x). Separate and weigh it and calculate the percentage present.

2.2.3 Determination of Total ash

Incinerate about 2 to 3g accurately weight, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 450 until free from carbon, cool and weigh. If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 450.

Calculate the percentage of ash with reference to the air-dried drug.

2.2.4. Determination of Acid-insoluble Ash

Boil the ash obtained in (2.2.3) for 5 minutes with 25ml, of dilute hydrochloric acid; collect the insoluble matter in a Gooch crucible, or on an ashless filter paper, wash with hot water and ignite at constant weight. Calculate the percentage of acid- insoluble ash with reference to the air dried drug.

2.2.5. Determination of water – soluble Ash

Boil the ash for 5 minutes with 25 ml of water; collect insoluble matter in a Gooch crucible, or on an ashless filter paper, wash with hot water, and ignite for 15 minutes at a temperature not exceeding 450. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water- soluble ash. Calculate the percentage of water-soluble ash with reference to the air – dried drug.

2.2.6. Determination of Alcohol – soluble extractive

Macerate 5g of the air dried coarsely powdered, with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter taking precautions against loss of solvent, evaporate 25ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105, to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air- dried drug.

2.2.7. Determination of water- soluble extractive

Proceed as directed for the determination of Alcohol-soluble extractive, using chloroform water instead of ethanol.

2.2.8. Determination of Ether-soluble extractive (Fixed oil content)

Transfer a suitable weighed quantity (depending on the fixed oil content) of the air dried, crushed drug to an extraction thimble, extract with solvent ether (or petroleum ether, b.p. 40 to 60) in a continuous extraction apparatus (soxhlet extractor) for 6 hours. Filter the extract quantitatively into a tared evaporation dish and evaporate off the solvent on a water bath. Dry the residue at 105 to constant weight. Calculate the percentage of ether-soluble extractive with reference to the air-dried drug.

2.2.9. Determination of Moisture content (Loss on drying)

Procedure set forth here determines the amount of volatile matter (i.e., water drying off from the drug). For substances appearing to contain water as the only volatile constituent, the procedure given below, is appropriately used.

Place about 10g. of drug (without preliminary drying) after accurately weighing (accurately weighed to within 0.01g) it in a tared evaporating dish. For example, for underground or unpowdered drug, prepare about 10g, of the sample by cutting shredding, so that the parts are about 3 mm in thickness.

Seeds and fruits smaller than 3mm should be cracked. Avoid the use of high speed mills in preparing the samples, and exercise care that no appreciable amount of moisture is lost during preparation and that the portion taken is representative of the official sample. After placing the above said amount of the drug in the tared evaporating dish dry at 105 c for 5 hours, and weigh. Continue the drying and weighing at one hour interval until difference between two successive weighings corresponds to not more than 0.23 per cent. Constant weight is reached when two consecutive weighting after drying for 30 minutes and cooling for 30 minutes in an desccator, show not more than 0.01g difference.

2.2.10. Thin Layer chromatography

Preparation of chromatoplates

Unless otherwise specified in the monograph, the chromatoplates are prepared in the following manner. Prepare a suspension of silica gel- G, using a spreading device designed for the purpose, spread a uniform layer of the suspension 0.20 to 0.25 mm thick on flat glass plate 20 cum long. Allow the coated plates to dry in air, heat at 100 to 105 for at least one hour (except in the case of chromatoplates prepared with cellulose when ten minutes' heating is normally sufficient) and allow to cool protected from moisture. Store the chromatoplates protected form moisture and use within three days of preparation. At the time of use, re-dry the chromatoplates, if necessary.

Method

Unless unsaturated conditions are prescribed, prepare the tank by lining the walls with sheets of filter paper; pour into the tank, saturating the filter paper in the process, sufficient of the mobile

phase to form a layer of solvent 5 to 10 mm deep, close the tank and allow to stand for one hour at room temperature.

Remove a narrow strip of the coating substance, about 5 mm wide, from the vertical sides of the chromatoplate. Apply the solutions being in the form of circular spots about 2 to 4 mm in diameter, on a line parallel with, and 20 mm from, one end of the plate, and not nearer than 20 mm to the sides; the spots should be 15 mm apart, if necessary, the solutions may be applied in portions, drying between applications. Mark the sides of the chromatoplate 15 cm, or the distance specified in the monograph, from the starting line. Allow the solvent to evaporate and place the chromatoplate in the tank, ensuring that it is as nearly vertical as possible and that spots are above the level of the mobile phase. Close the tank and allow to stand at room temperature, unless otherwise stated in the monograph, until the mobile phase has ascended to the marked line. Remove the chromatoplate and dry and visualize as directed in the monograph; where spraying technique is prescribed it is essential that the reagent be evenly applied as a fine spray.

2.2.11. Determination of Sulphated Ash

Heat a silica or platinum crucible to redness for 10 minutes, allow to cool in a desiccators and weigh. Put 1 to 2 g of the substance, accurately weighed, into crucible, ignite gently at first, until the substance is thoroughly charred. Cool, moisten the residue with 1 ml of sulphuric acid, heat gently until white fumes are no longer evolved and ignite at 800 ± 25 until all black particles have disappeared. Conduct the ignition in a place protected from air currents. Allow the crucible to cool, add a few drops of sulphuric acid and heat. Ignite as before, allow to cool and weigh. Repeat the operation until two successive weighings do not differ by more than 0.5 mg.

2.2.12 Determination of phenolics

Dissolve 5mg of drug in water and filter. The filtrate is shaken with petroleum ether to remove greasy matter. It is precipitated with a saturated solution of lead acetate, digest for few minutes on water bath let the ppt settle and filter. Dry the residue, than suspend it in alcohol and slightly warm on water bath and decompose by passing H_2S . the clear alcohol solution is concentrated under reduced pressure. It is subjected to vacuum distillation 3 times, after adding fresh quantity of alcohol each time, to get rid of all the H_2S gas. The residue is transferred to a weighed petri-

dish with alcohol and excess of alcohol evaporated on water-bath. The residue is dried at 105 c till constant weight.

2.3. Limit Tests

2.3.1. Limit Test for Arsenic

In the limit test for arsenic, the amount of arsenic present is expressed as arsenic, As.

Apparatus-

A wide-mouthed bottle capable of holding about 120 ml is fitted with a rubber bung through which passes a glass tube. The latter, from ordinary glass tubing has a total length of 200 mm and an internal diameter of exactly 6.5 mm (external diameter about 8mm). It is drawn out at one end to a diameter of about 1 mm and a hole not less than 2mm in diameter is blown in the side of the tube, near the constricted part. When the bung is inserted in the bottle containing 70ml of liquid, the constricted end of the tube is above the surface of the liquid, and the hole in the side is below the bottom of the bung. The upper end of the tube is cut off square, and is either slightly rounded or ground smooth.

Two tuber bungs (about 25mm x 25mm), each with a hole bored centrally and true, exactly 6.5 mm in diameter, fitted with a rubber band or sparing clip for holding them tightly together. Alternatively the two bungs may be replaced by any suitable contrivance satisfying the conditions described under the General Test.

Reagent-

Ammonium oxalate AsT-Ammonium oxalate which complies with the following additional test: Heat 5g with 15 ml of water, 5ml of nitric acid Ast, and 10ml of sulphuric acid AsT in a narrow necked, round-bottomed flask until frothing ceases, cool, and apply the General test; no visible stain is produced.

Arsenic solution, dilute, AsT:

Strong arsenic AsT	1ml
Water	sufficient to produce 100 ml

Dilute arsenic solution AsT must be freshly prepared

1ml contains 0.01 mg of arsenic, As

Arsenic solution, AsT

Arsenic trioxide	0.132g
Hydrochloric acid	50 ml
Water sufficient to produce	100 ml

Brominated hydrochloric acid AsT:

Bromine solution AsT	1ml
Hydrochloric acid Ast	100 ml

Bromine solution AsT:

Bromine	30g
Potassium bromide	30g
Water sufficient to produce	100ml

It complies with the following test:

Evaporate 10 ml on a water- bath neatly of dryness, add 50 ml of water, 10 ml of hydrochloric acid AsT and sufficient stannous chloride solution AsT te reduce the remaining bromine and apply the General tes; the stain produced is not deeper than 1 ml standard stain, showing that the proportion of arsenic present does not exceed 1 part per million.

Citric acid Ast: citric acid which complies with the following additional tests: Dissolve 10 g in 50 of water add 10 ml of stannated hydrochloric acid AsT and apply the General test; no visible stain is produced.

Hydrochloric acid AsT: hydrochloric acid diluted with water to contain about 32 percent w/w of HC 1 and complying with the following additional tests:

- i. Dilute 10 ml white sufficient water to produce 50 ml, add 5 ml ammonium thiocyanate solution and stir immediately; no colour is produced.
- ii. To 50 ml add 0.2 ml of bromine solution AsT, evaporate on a water-bath until reduced to 16 ml adding more bromine solution Ast, if necessary, in order that an excess, as indicated by the colour, may be present throughout the evaporation; add 50 ml of water and 5 drops of stannous chloride solution AsT, and apply the General test; the stain produced is not deeper than a 02 ml standard stain prepares with same acid, showing that the proportion of arsenic present does not exceed 0.05 part per million.

Hydrochloric acid (constant-boiling composition) AsT –Boil hydrochloric acid AsT to constant boiling composition in the presence of hydrazine hydrate, using 1 ml of a 10 percent w/v in solution in water per liter of the acid.

Mercuric chloride paper – smooth white paper, not less than 25 mm in width soaked in a saturated solution of mercuric chloride, pressed to remove superfluous solution, and dried at about 60, in the dark. The grade of the filter paper is such that the weight is between 65 and 120g per sq. mm; the thickness in mm 400 papers is approximately equal numerically, to the weight in g per sq. mm.

Nitric acid AsT – nitric acid which complies the following additional test:

Heat 20ml in a porcelain dish with 2 ml of sulphuric acid AsT until white fumes are given off. Cool, add 2 ml of water, and again heat until fumes are given off; cool, add 50 ml of water, and 10 ml of stannated hydrochloric acid AsT, and apply the General test; no visible stain is produced.

Potassium chlorate AsT- potassium chlorate which complies with following additional test:

Mix 5 g in the cold with 20 ml of water and 22 ml of hydrochloric acid AsT; when the first reaction has subsided, heat gently to expel chlorine, remove the last traces with a few drops of stannous chloride solution AsT add 20 ml of water, and apply the General test; no visible stain is produced.

Potassium iodide AsT –potassium iodide which complies with the following additional test:

Dissolve 10 g in 25ml of hydrochloric acid AsT and 35 ml of water, 2 drops of stannous chloride solution AsT apply the General test; no visible stain is produced.

Sodium carbonate, anhydrous AsT- anhydrous sodium carbonate which complies with the following additional test:

Dissolve 5 g in 50 ml water, add 20 ml of brominated hydrochloric acid AsT, remove the excess of bromine with a few drops of stannous chloride solution AsT, and apply the General test; no visible stain is produced.

Stannated hydrochloric acid AsT:

Stannous chloride solution AsT	1 ml
Hydrochloric Acid AsT	100 ml

Stannous chloride solution AsT- prepared from stannous chloride solution by adding an equal volume of hydrochloric acid, boiling down to the original volume, and filtering through a fine-grains filter paper.

It complies with the following test:

To 10 ml add 6 ml of water and 10 ml of hydrochloric acid AsT, distil collect 16 ml. to the distillate add 50 ml of water and 2 drops of stannous chloride solution AsT and apply the General. Test; the stain produced is not deeper than a 1 ml standard stain, showing that the proportion of arsenic present does not exceed 1 part per million.

Sulphuric acid AsT – sulphuric acid which complies with the following additional test:

Dilute 10 g with 50 ml of water, add 0.2 ml of stannous chloride solution AsT, and apply the General test; no visible stain is produced.

Zinc AsT – Granulated zinc which complies with the following additional tests:

Add 10 ml of stannated hydrochloric acid AsT to 50 ml of water, and apply the General test, using 10 of the zinc and allowing the action to continue for one hour; no visible stain is produced (limit of arsenic). Repeat the test with the addition of 0.1 ml of dilute arsenic solution AsT; a faint but distinct yellow stain is produced (test for sensitivity).

General Method of Testing – By a variable method of procedure, suitable to the particular needs of each substance, a solution is prepared from the substance being examined which may or may not contain that substance, but contains the whole of the arsenic (if any) originally present in that substance. This solution, referred to as the ‘test solution; is used in the actual test.

General test – The glass tube is lightly packed with cotton wool, previously moistened with lead acetate solution and dried, so that the upper surface of the cotton wool is not less than 25 mm below the top of the tube. The upper end of the tube is then inserted into the narrow end of one of the pair of rubber bungs, either to a depth of about 10 mm when tube has a rounded-off end, or so that the ground end of the tube is flush with the larger end of the bung. A piece of mercuric chloride paper is placed flat on the top of the bung and the other bung placed over it and secured by means of the rubber band or spring clip in such a manner that the borings of the two bungs (or the upper bung and the glass tube) meet to form a true 6.5 mm in diameter interrupted by a diaphragm of mercuric chloride paper.

Instead of this method of attaching the mercuric chloride paper, any other method may be used provided (1) that the whole of evolved gas passes through the paper; (2) that the portion of the

paper in contact with the gas is a circle 6.5 mm in diameter; and (3) that the paper is protected from sunlight during the test. The test solution prepared as specified is placed in the wide-mouthed bottle, 1 g of potassium iodide AsT and 10 g of zinc AsT are added, and the prepared glass tube is placed quickly in position. The action is allowed to proceed for forty minutes. The yellow stain which is produced on the mercuric chloride paper if arsenic is present is compared by day light with the standard stains produced by operation in a similar manner with known quantities of dilute arsenic solution AsT. The comparison of the stains is made immediately at the completion of the test. The standard stains used for comparison are freshly prepared; they fade on keeping.

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NOTE: mercuric chloride paper should be stored in a stoppered bottle in the dark. Paper which has been exposed to sunlight or to the vapour of ammonia affords a lighter stain or no stain at all when employed in the limit test for arsenic.

By matching the depth of colour with standard stains, the proportion of arsenic in the substance may be determined. A stain equivalent the 1-ml standard stain produced of arsenic is 1 part per million.

NOTES:

- (1) The action may be accelerated by placing the apparatus on a warm surface, care being taken that mercuric chloride paper remains dry throughout the test.
- (2) The most suitable temperature for carrying out the test is generally about 40° bit because the rate of the evolution of the gas varies somewhat with different zinc AsT, the temperature may be adjusted to obtain a regular, not violent, evolution of gas.
- (3) The tube must be washed with hydrochloric acid AsT, rinsed with water and dried between successive tests.

Standard stains-Solutions are prepared by adding to 50 ml of water, 10 ml of stannated hydrochloric acid AsT and quantities of dilute arsenic solutions AsT varying from 0.2 ml to 1 ml. the resulting solutions, when treated as described in the General test; yield stains on the mercuric chloride paper referred to as the standard stains.

Preparation of the Test solution-In the various methods of preparing the test solution given below, the quantities are so arranged unless otherwise stated, that when the stain produced from

the solution to be examined is not deeper than the 1 ml standard stain, the proportion of arsenic present does not exceed the permitted limit.

Ammonium chloride - Dissolve 2.5 g in 50 ml of water, and 10 ml of stannated hydrochloric acid AsT.

Boric acid – Dissolve 10 g with 2 g of citric acid AsT in 50 ml of water, and 12 ml of stannated hydrochloric acid AsT.

Ferrous sulphate – Dissolve 5 g in 10 ml of water and 15 ml of stannated hydrochloric acid AsT and distil 29 ml; to distillate add a few drops of bromine solution AsT. Add 2 ml of stannated hydrochloric acid AsT, heat under a reflux condenser for one hour, cool and add 10 ml of water and 10 ml of hydrochloric acid AsT.

Glycerin – Dissolve 5 g in 50 ml of water, and add 10 ml stannated hydrochloric acid AsT.

Hydrochloric acid – mix 10 g with 40 ml of water and 1 ml of stannous chloride solution AsT.

Magnesium sulphate – Dissolve 5 g in 50 ml of water, and add 10 ml of stannated hydrochloric acid AsT.

Phosphoric acid: Dissolve 5 g in 50 ml of water; add 10 ml of stannated hydrochloric acid AsT.

Potassium iodide – Dissolve 5 g in 50 ml of water, and add 2 ml of stannated hydrochloric acid AsT.

Sodium bicarbonate – Dissolve 5 g in 50 ml of water, add 15 ml of brominated hydrochloric acid AsT and remove the excess of bromine with a few drops of stannous chloride solution AsT.

Sodium hydroxide – Dissolve 2.5 g in 50 ml of water, add 16 ml of brominated hydrochloric acid AsT and remove the excess of bromine with a few drops of stannous chloride solution AsT.

2.3.2. Limit Test for chlorides

Dissolve the specified quantity of the substance in water or prepare a solution as directed in the text and transfer to a Nessler cylinder. Add 10 ml of dilute nitric acid, when nitric acid is used in the preparation of the solution, dilute to 50 ml with water, and add 1 ml of silver nitrate solution. Stir immediately with a glass rod and allow to stand for 5 minutes. The opalescence produced is not greater than the standard opalescence, when viewed transversely.

Standard Opalescence - place 1.0 ml of a 0.05845 percent w/v solution of sodium chloride and 10 ml of dilute nitric acid in a Nessler cylinder. Dilute to 50 ml with water and add 1 ml of silver nitrate solution, stir immediately with a glass rod and allow to stand for five minutes.

2.3.3 Limit Test for Heavy Metals

The test for heavy metals is designed to determine the content of metallic impurities that are coloured by sulphide ion, under specified conditions. The limit for heavy metals is indicated in the individual monographs in terms of the parts of lead per million parts of the substance (by weight), as determined by visual comparison of the colour produced by the substance with that of a control prepared from a standard lead solution.

Determine the amount of heavy metals by one of the following methods and as directed in the individual monographs: method A is used for substances that yield clear colourless solutions under the specified test conditions. Method B is used for substances that do not yield clear, colourless solutions under the test conditions specified for method A. or for substances which, by virtue of their complex nature, interfere with the precipitation of metals by sulphide ion. Method C is used for substances that yield clear, colourless solutions with sodium hydroxide solutions.

Special Reagents -

Acetic acid sp. : Acetic acid which complies with the following additional test:

Make 25 ml alkaline ammonia solution sp. Add 1 ml of potassium cyanide solution sp., dilute to 50 ml with water and add two drops of sodium sulphide solution; no darkening is produced.

Dilute acetic acid sp.: Dilute acetic which complies with the following additional test: Evaporate 20 ml in a porcelain dish, near to dryness on a water-bath. Add the residue 2 ml of the acid and dilute with water to 25 ml, add 10 ml hydrogen sulphide solution. Any dark colour produced is not more than that of a control solution consisting of 2 ml of the acid and 4 ml of standard lead solution diluted to 25 ml with water.

Ammonia solution sp.: strong ammonia solution which complies with the following additional test: Evaporate 10 ml to dryness on water – bath; to the residue add 1 ml of dilute hydrochloric acid sp. And evaporate to dryness. Dissolve the residue in ml of dilute acetic acid sp. And sufficient water to produce 25 ml.

Add 10 ml of hydrogen sulphide solution. Any darkening produced is not greater than in a blank solution containing 2 ml of dilute acetic acid sp. 1 ml of standard lead solution and sufficient water to produce 25 ml.

Dilute ammonia solution sp.: dilute ammonia solution which complies with the following additional test: To 20 ml add 1 ml of potassium cyanide solution Sp., dilute to 50 ml with water, and add two drops of sodium sulphide solution; no darkening is produced.

Hydrochloric acid: hydrochloric acid which complies with the following additional test: Evaporate of the acid in a beaker to dryness on a water-bath. Dissolve the residue in 2 ml of dilute acid sp., dilute 17 ml with water and add 10 ml of hydrogen sulphide solution; any darkening produced is not greater than in a blank solution containing 2 ml of standard lead solution, 2 ml of dilute acetic acid sp., and dilute to 40 ml with water.

Dilute hydrochloric acid sp., Dilute hydrochloric acid, which complies with the following additional test: Treat 10 ml of the acid in the manner described under Hydrochloric acid sp.

Lead nitrate stock solution: Dissolve 0.1598 g of lead nitrate in 100 ml of water to which has been added 1 ml of nitric acid, then dilute with water to 1000ml.

This solution must be prepared and stored in polyethylene or glass containers free from soluble lead salts.

Standard lead solution: one the day of use, dilute 10 ml of lead nitrate stock solution with water to 100 ml. Each ml of standard lead solution the equivalent of 10 mg of lead. A control comparison solution prepared with 2 ml of standard lead solution contains, when compared to a solution representing 1 g of the substance being tested, equivalent of 20parts per million of lead.

Nitric acid sp.: Nitric acid which complies with the following additional test: Dilute 10 ml with 10 ml of water, make alkaline with ammonium solution sp. Add 1ml of potassium cyanide solution sp. Dilute to 50 ml with water, and add two drops of sodium sulphide solution; no darkening is produced.

Potassium cyanide solution sp.: see appendix 2.3.5 sulphuric acid sp. Sulphuric acid which complies with following additional test: add 5 g to 20 ml of water make alkaline with ammonia solution sp., add 1 ml of potassium cyanide solution sp., dilute to 50 ml with water and two drops of sodium sulphide solution, no darkening is produced.

Method A

Standard solution: Into a 50 ml Nessler cylinder, pipette 2 ml of standard lead solution and dilute with water to 25 ml. adjust with dilute acetic acid sp. Or dilute ammonia solution sp. To a pH between 3 and 4, dilute with water to about 25 ml. mix.

Test solution: Into a 50 ml Nessler cylinder, place 25 ml of the solution prepared for the test as directed in the individual monograph; or using the stated volume of acid when specified in the individual monograph, dissolve and dilute with water to 25 ml the specified quantity of the substance being tested. Adjust with dilute acetic acid sp. Or dilute ammonia solution sp. To a pH between 3 and 4 dilute with water to about 35 ml and mix.

Procedure: To each of the cylinders containing the standard solution and test solution respectively add 10 ml of freshly prepared hydrogen sulphide solution, mix dilute with water to 50 ml, allow to stand for five minutes, and view downwards over a white surface, the colour produced in the test solution. Not darker than that produced in the standard solution.

Method B

Standard solution: proceed as directed under Method A.

Test solution: weigh in a suitable crucible the quantity of the substance specified in the individual monograph, add sufficient sulphuric acid sp. To wet the sample, and ignite carefully at a low temperature until thoroughly charred. Add to the charred mass 2 ml of nitric acid sp. And five drops of sulphuric acid sp. And heat cautiously until white fumes are no longer evolved. Ignite, preferably in a muffle furnace, at 500° to 600° until the carbon is completely burnt off. Cool, add 4 ml of hydrochloric acid sp. Cover, digest on a water bath for 15 minutes, uncover and slowly evaporate to dryness on a water-bath. Moisten the residue with one drop of hydrochloric acid sp., add 10 ml of hot water and digest for two minutes. Add ammonia solution sp., dropwise, until the solution is just alkaline to litmus paper, dilute with water to 25 ml and adjust with dilute acetic acid sp. To a pH between 3 and 4. Filter if necessary, rinse the crucible and filter with 10 ml of water, combine the filtrate and washings in a 50 ml Nessler cylinder., dilute with water, to about 35 ml, and mix procedure: proceed as directed under Method A.

Method C

Standard solution: Into a 50 ml Nessler Cylinder, pipette 2 ml of standard lead solution, add 5 ml of dilute sodium hydroxide solution., dilute with water to 50 ml and mix.

Test solution: Into a 50 ml Nessler cylinder, place 25 ml of the solution prepared for the test as directed in the individual monograph; or, if not specified otherwise in the individual monograph, dissolve the specified quantity in a mixture of 29 ml of water and 5 ml of dilute sodium hydroxide solution. Dilute 50 ml with water and mix.

Procedure: To each of the cylinders containing the standard solution and the test solution, respectively add 5 drops of sodium sulphide solution, mix allow to stand for five minutes and view downwards over a white surface; the colour produced in the test solution is not darker than that produced in the standard solution

2.3.4. Limit Test for Iron

Standard iron solution: Weigh accurately 0.2726 g of ferric ammonium sulphate and dissolve in 10 ml of 0.1 N sulphuric acid and sufficient water to produce 1000.0 ml. Each ml of this solution contains 0.02 mg of Fe.

Method

Dissolve the specified quantity of the substance being examined in 40 ml of water, or use 10 ml of the solution prescribed in the monograph, and transfer to a Nessler cylinder Add 2ml of a 20 per cent w/v solution of iron-free citric acid and 0.1 ml of thioglycollic acid, mix make alkaline with iron-free ammonia solution, dilute to 50 ml with water and allow to stand for five minutes. Any colour produced is not more intense than the standard colour.

Standard colour: Dilute 2 ml of standard iron solution with 40 ml of water in a Nessler cylinder. Add 2ml of a 20 per cent w/v solution of iron free citric acid 0.1ml of thioglycollic acid, mix make alkaline with iron-free ammonia solution, dilute to 50 ml with water and allow to stand for five minutes.

2.3.5 Limit Test for Lead

The following method is based on the extraction of lead by solutions of dithizone. All reagents used for the test should have as low a content of lead as practicable. All reagents solutions should be stored in containers of borosilicate glass. Glassware should be rinsed thoroughly with warm dilute nitric acid, followed by water.

Special Reagents-

- (1) **Ammonia-cyanide solution sp:** Dissolved 2g of potassium cyanide in 15 ml of strong ammonia solution and dilute with water to 100 ml.
- (2) **Ammonia citrate solutions sp:** Dissolve 40 g of citric acid in 90 ml of water. Add two drops of phenol red solution then add slowly strong ammonia solution until the solution acquires a reddish colour. Remove any lead present by extracting the solution with 20ml quantities of dithizone extraction solution until the dithizone solution retains its orange-green colour.
- (3) **Dilute standard lead solution:** Dilute 10 ml of standard lead solution with sufficient 1 per cent v/v solution of nitric acid to produce 100 ml. Each ml of this solution contains 1 μ g of lead per ml.
- (4) **Dithizone extraction solution:** Dissolve 30 mg of diphenylthiocarbazon in 100 ml of chloroform and add 5 ml of alcohol. Store the solution in a refrigerator. Before use, shake a suitable volume of the solution with about half its volume of 1 per cent v/v solution of nitric acid and discard the acid.
- (5) **Hydroxylamine hydrochloride solution Sp.;** Dissolve 20g of hydroxylamine hydrochloride in sufficient water to produce about 65 ml. Transfer to separator, add five drops of thymol blue solution, add strong ammonia solution until the solution becomes yellow. Add 10 ml of a 4 per cent w/v solution of sodium diethyldithiocarbamate and allow to stand for five minutes. Extracts with successive quantities, each of 10 ml chloroform until a 5 ml portion of the extract does not assume a yellow colour when shaken with dilute copper sulphate solution. Add dilute hydrochloric acid until the solution is pink and then dilute sufficient water to produce 100 ml.

- (6) **Potassium cyanide solution sp.:** Dissolve 50 g of potassium cyanide in sufficient water to produce 100 ml. Remove the lead from this solution by extraction with successive quantities, each of dithizone extraction solution until the dithizone solution retains its orange-green colour. Extract any dithizone remaining in the cyanide solution by shaking with chloroform. Dilute this cyanide solution with sufficient water to produce a solution containing 10 g of potassium cyanide in each 100ml.
- (7) **Standard dithizone solution:** Dissolve 10 mg of diphenylthiocarbazone in 1000 ml of chloroform. Store the solution in a glass-stoppered, lead-free, bottle, protected from light and in a refrigerator.
- (8) **Citrate-cyanide wash solution:** To 50 ml of water add 50 ml of ammonium citrate solution Sp. And 4 ml of potassium cyanide solution Sp. Mix and adjust the pH, if necessary, with strong ammonia solution to 9.0.
- (9) **Buffer solution pH 2.5:** To 25 ml of 0.2M potassium hydrogen phthalate add 37.0 ml of 0.1 N hydrochloric acid, and dilute with sufficient water to produce 100.0 ml.
- (10) **Dithizone-carbon tetrachloride solution:** Dissolve 10 mg of diphenylthiocarbazone in 1000 ml of carbon tetrachloride. Prepare this solution fresh for each determination.
- (11) **pH 2.5 wash solution:** To 500 ml of a 1 per cent v/v nitric acid add strong ammonia solution until the pH of the mixture is 2.5, then add 10 ml of buffer solution pH 2.5 and mix.
- (12) **Ammonium-cyanide wash solution:** To 35 ml of pH 2.5 wash solution add 4ml of ammonia-cyanide solutions sp., and mix.

Method

Transfer the volume of the prepared sample directed in the monograph to a separator, and unless otherwise directed in monograph, add 5 ml of ammonium citrate solution sp., and 2 ml of hydroxylamine hydrochloride solution sp., (For the determination of lead in iron salts use 100 ml of ammonium citrate solution sp.) add two drops of phenol red solution and make the solution just alkaline (red in colour) by the addition of strong ammonia solution. Cool the solution if necessary, and add 2 ml of potassium cyanide solution sp. immediately extract the solution with several quantities each of 5 ml of dithizone extraction solution, draining off each extract into another separating funnel, until the dithizone extraction solution retains its green colour. Shake the combine and discard the chloroform layer. Add to the acid solution exactly 5 ml of standard

dithizone solution and 4 ml of ammonia-cyanide solution sp. And shake for 30 seconds; the colour of the chloroform layer is of no deeper shade of violet than that of a permitted in the sample under examination.

2.3.6. Limit Test for sulphates

Reagents-

Barium sulphate reagent: Mix 15 ml of 0.5M barium chloride, 55 ml of water, and 20 ml of sulphate-free alcohol, add 5 ml of a 0.0181 per cent w/v solution of potassium sulphate, dilute to 100 ml with water, and mix. Barium sulphate Reagent must be freshly prepared.

0.5 M Barium chloride: Barium chloride dissolved in water to contain in 100ml. 122.1 g of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$.

Method

Dissolve the specified quantity of the substance in water, or prepare a solution as directed in the text, transfer to a Nessler cylinder, and add 2 ml of dilute hydrochloric acid, except where hydrochloric acid is used in the preparation of the solution. Dilute to 45 ml with water, add 5ml of barium sulphate reagent stir immediately with a glass rod, and allow to stand for five minutes. The turbidity produced is not greater than the standard turbidity, when viewed transversely. Standard turbidity: place 1 ml of 0.1089 per cent w/v solution of potassium sulphate and 2 ml of dilute hydrochloric acid in a Nessler cylinder, dilute to 45 ml with water, add 5 ml of barium sulphate reagent, stir immediately with a glass rod and allow to stand for five minutes.

APPENDIX 3

PHYSICAL TESTS AND DETERMINATIONS

3.1.1 Determination of Boiling or Distilling Range

The boiling range of a liquid is temperature interval, corrected for a pressure of 760 torr within which the liquid or a specified fraction of the liquid, distils under the conditions specified in the test. The lower limit of the range is the temperature indicated by the thermometer when the first drop of condensate leaves the tip of the condenser, and the upper limit is the temperature at which the last drop evaporates from the lowest point in the distillation flask without taking into account any liquid remaining on the sides of the flask; it may also be the temperature observed when the proportion specified in the individual has been collected.

Apparatus-

Use an apparatus consisting of the following:

1. **Distilling flask:** A round-bottom distilling flask of 200 ml capacity and having a total length of 17 to 19 cm and an inside neck diameter of 20 to 22 mm. Attached about midway on the neck approximately 12 cm from the bottom of the flask, is a sidearm 10 to 12 cm long and 5 mm in internal diameter which is at an angle of 70° to 75° with the lower portion of the neck.
2. **Condenser:** A straight glass condenser 55 to 60 cm long with a water-jacket about 40 cm long any other type of condenser having equivalent condensing capacity. The lower end of the condenser may be bent to provide a delivery tube, or it may be connected to a bent adapter that serves as a delivery tube.
3. **Receiver;** A 100 ml cylinder, graduated in 1 ml subdivisions.
4. **Thermometer:** An accurately standardized partial immersion thermometer having the smallest practical sub-divisions (not greater than 0.2°). When placed in position, the stem is located in the centre of the neck and the top of the bulb is just below the bottom of the outlet to the side arm.

Method

If the liquid under examination distils below 80°, cool it to between 10° and 15° before measuring the sample for distillation.

Assemble the apparatus, and place in the flask 100 ml of the liquid under examination, taking care not to allow any of the liquid to enter the side-arm

Insert the thermometer and seal the entire heating and flask assembly from external air currents.

Add a few pieces of porous material and heat rapidly to boiling using a Bunsen burner an asbestos plate pierced by a hole 33 mm in diameter. Record the temperature at: h the first drop of distillate falls into the cylinder, and adjust the rate of heating to in a regular distillation rate of 4 to 5 ml per minute. Record the temperature when the drop of liquid evaporate from the bottom of the flask or when the specified entage has distilled over. Correct the observed temperature readings for any variation le barometric pressure from the normal (760 torr) using the following expression:

$$t_4 = t_2 + k(a-b)$$

Where

t_4 = the corrected temperature

t_2 = the observed temperature

a = 760(torr)

b = the Barometric pressure in torr at the time of determination

k = the correction factor indicated in the following table

Distillation range	k
Less than 100°	0.040
100° to 140°	0.045
140° to 190°	0.050
190° to 240°	0.055
More than 240°	0.060

3.1.2 Determination of congealing range of temperature

The congealing temperature is that point at which there exists a mixture of the liquid (fused) phase of a substance and a small but increasing proportion of the solid phase. It is distinct from the freezing point, which is the temperature at which the liquid and solid state of a substance are in equilibrium.

The temperature at which a substance solidifies upon cooling is a useful index of its purity of heat is liberated when solidification takes place.

The following method is applicable to substances that melt between 200 and 1500

Apparatus-

A test-tube about 25mm in diameter and 150 mm long placed inside a test-tube about mm in diameter and 160 mm long; the inner tube is closed by a stopper that carries a stirrer and a thermometer (about 175 mm long and with 0.2 graduations) fixed, so that the bulb is about 15 mm above the bottom of the tube. The stirrer is made from a glass rod or suitable material formed at one end into a loop of about 18 mm overall diameter at an angle to the rod. The inner tube with its jacket is supported centrally in a 1-liter beaker containing a suitable cooling liquid to within 20 mm of the top. A thermometer is ported in the cooling bath.

Method

Melt the substance, if solid, at a temperature not more than 20° above its expected congealing point and pour it into the inner test-tube to a height of 50 to 57 mm. Assemble the apparatus with the bulb of the thermometer immersed half-way between the top and bottom of the sample in the sample in the test-tube. Fill the bath to almost 20 mm from the top with a suitable fluid at a temperature 4° to 5° below the expected congealing point. If the substance is liquid at room temperature, carry out the determination using a bath temperature about 15° below the expected congealing point. When the sample has cooled to about 5° above its expected congealing point stir it continuously by moving the loop up and down between the top and bottom of the sample, at a regular rate of 20 complete cycles per minute. Record the reading of the thermometer every 30 seconds and continue stirring only so long as the temperature is falling. Stop the stirring when the temperature is constant or starts to rise slightly. Continue recording the temperature for at least three minutes after the temperature again begins to fall after remaining constant.

The congealing point will be the average of not less than four consecutive readings that lie within a range of 0.2°.

3.1.3 Determination of pH values

The pH value conventionally represents the acidity or alkalinity of an aqueous solution. In the pharmacopoeia, standards and limits on pH have been provided for these pharmacopoeial substances in which pH as a measure of the hydrogen activity is important from the standpoint of stability or physiological suitability.

The measurement of pH is generally done with a suitable potentiometric meter known as the pH meter fitted with two electrodes, one constructed of glass and sensitive to hydrogen ion activity and the other a calomel reference electrode. The determination is carried out at a temperature of 25°C ± 2°, unless otherwise specified in the individual monograph.

Apparatus- The pH value of a solution is determined potentiometrically by means of a glass electrode, a reference electrode and a pH meter either of the potentiometric or of the deflection type.

Operate the pH meter and electrode system according to the manufacturer's instructions. Calibrate the apparatus using buffer solution D as the primary standard, adjusting the meter to read the appropriate pH value given in the Table 1, corresponding to the temperature of the solution. where provision is made for setting the scale, use a second reference buffer solution, either buffer solution A, buffer solution E or buffer solution G. in this case a check is carried out with a third reference buffer solution of intermediate pH, when the reading of the intermediate solution must not differ by more than 0.05 pH unit from the corresponding value indicated in the Table. Where there is no provision for setting the scale with a second reference buffer solution, checks should be made with two reference buffer solutions, the readings for which must not differ by more than 0.05 pH unit from the value corresponding to each solution.

TABLE 1 - pH of Reference Solutions at various Temperatures.

Temperature		Buffer solutions							
T °	A	B	C	D	E	F	G	H	
15	1.67	-	3.80	4.00	6.90	7.45	9.28	10.12	
20	1.68	-	3.79	4.00	6.88	7.43	9.22	10.03	
25	1.68	3.56	3.78	4.01	6.86	7.41	9.18	10.01	
30	1.68	3.55	3.77	4.02	6.85	7.40	9.14	9.97	
35	1.69	3.55	3.76	4.02	6.84	7.39	9.10	9.98	
$\Delta\text{pH}/\Delta\text{t} +0.001-0.001$			-0.002	+0.001	-0.003	+0.003	-0.008	-0.009	

Reference buffer solutions

The following reference buffer solution must be prepared using carbon dioxide free water; phthalate and phosphate salts should be dried at 110° for two hours before use. Buffer solutions should be stored in bottles made of alkali-free glass, and must not be used later than three months after preparation.

- Buffer solution A:** Dissolve 12.71 g of potassium tetraoxalate in sufficient carbon dioxide-free water to produce 1000ml.
- Buffer solution B:** A freshly prepared saturated solution, at 25°, of potassium hydrogen tartrate.
- Buffer solution C:** Dissolve 11.51 g of potassium dihydrogen citrate in sufficient carbon dioxide free water to produce 1000 ml.

NOTE – This solution must be freshly prepared.

- Buffer solution D:** Dissolve 10.21 g of potassium hydrogen phthalate in sufficient carbon dioxide free water to produce 100 ml.
- Buffer solution E:** Dissolve 3.40 g of potassium dihydrogenphosphate and 3.55 g of anhydrous disodium hydrogen phosphate, both previously dried at 110° to 130° for two hours, in sufficient carbon dioxide – free water to produce 100ml.
- Buffer solution F:** Dissolve 1.184 g of potassium dihydrogen phosphate and 4.303 g of anhydrous disodium hydrogen phosphate, both previously dried at 110° to 130° for two hours in sufficient carbon dioxide-free water to produce 1000ml.

7. **Buffer solution G:** Dissolve 3.814 g of borax in sufficient carbon dioxide- free water to produce 1000 ml.
8. **Buffer solution H:** Dissolve 7.155 g of sodium carbonate and 2.10 g of sodium bicarbonate in sufficient carbon dioxide-free water to produce 100ml.

Method

Immerse the electrodes in the solution to be examined and measure the pH at the same temperature as for the standard solutions. At the end of a set of measurements, take a reading of the solution used to standardize the meter and electrodes. If the difference between this reading and the original value is greater than 0.05, the set of measurements must be repeated.

When measuring pH values above 10.0 ensure that the glass electrode is suitable for use under alkaline conditions. And apply any correction that is necessary.

All solutions of substances being examined must be prepared using carbon dioxide free water.

3.1.4 Determination of melting range of temperature

In this pharmacopoeia, melting range or temperature of a substance is defined as those point of temperature within which or the point at which, the substance begins to coalesce and is completely melted except as defined otherwise for certain substance. The following procedures are suitable for the various substances described in the pharmacopoeia. Any other apparatus or method capable of the same accuracy may also be used. The accuracy should be checked frequently by use of one of the following reference substances that melts nearest to the melting range of the substance to be tested:

	Melting range
Venillin	81°-83°
Acetanilide	114°-116°
Phenacetin	134°-136°
Sulphapyridine	164.5°-166.5°
Sulphapyridine	191°-193°
Caffeine (dried at 100°)	234°-237°

Unless otherwise specified in the individual monograph, Method 1 should be used.

Method 1

Apparatus:

- (a) A glass heating vessel of suitable construction and capacity containing one of the following or any other suitable bath liquid, to a height of not less than 14 cm.
 1. Water for temperatures upto 60°
 2. Glycerin for temperatures upto 150°
 3. Liquid paraffin for sufficiently high boiling range for temperatures upto 250°
 4. Sesame oil or a suitable grade of liquid silicone for temperatures upto 300°
- (b) A suitable stirring device, capable of rapidly mixing the liquids.
- (c) An accurately standardized thermometer suitable for the substance under examination (see Appendix 1.2). The thermometer must be positioned in the bath liquid to its specified immersion depth and yet leave the bulb at about 2 cm above the bottom of the bath.
- (d) Thin-walled capillary glass of hard glass, about 12 cm long, with a wall thickness of 0.2 to 0.3 mm and an internal diameter of 0.8 to 1.1 mm. The tubes should preferably be kept sealed at both ends and cut as required.
- (e) Source of heat (open flame or electric heater).

Procedure: Reduce the substance to a very fine powder and unless otherwise directed, dry it at a temperature considerably below its melting temperature or under pressure over a suitable desiccant for not less than 16 hours. Introduce into a capillary glass tube, one end of which is sealed, a sufficient quantity of the dry powder to form a compact column about 3 mm high.

Heat the bath until the temperature is 10° below the expected melting point. Remove the thermometer and quickly attach the capillary tube to the thermometer by wetting both with a drop of the liquid of the bath or otherwise and adjust its height so that the closed end of the capillary is near the middle of the thermometer bulb. Replace the thermometer and continue the heating, with constant stirring, sufficiently to cause the temperature to rise at a rate of about 3° per minute. When the temperature is about 3° below the lower limit of the expected melting range, reduce the heating so that the temperature rises at a rate of about 1° to 2° per minute. Continue the heating and note the temperature at which the column of the sample considered to have begun and note also the temperature at which the sample becomes liquid throughout as seen by the formation of a definite meniscus. The two temperatures fall within the limits of the melting range.

Method II

Apparatus: Use the apparatus described under Method Ii1 except that the glass capillary tube is open at both ends and has an internal diameter of 1.1 to 1.3 mm and external diameter of 1.4 to 1.6 mm and length of 50 to 60 mm.

Procedure: Rapidly melt the material to be tested, at a temperature not more than 10° above the point of complete fusion. Draw it into a capillary tube to a depth of about 10 mm. Cool the charged tube at 10°, or lower, for 24 hours, or in contact with ice for at least 2 hours. Attach the tube to the thermometer and adjust it so that the column of substance is in level with the

thermometer bulb; suspend the thermometer in the heating vessel containing water at 15° so that the lower end of the column of the substance is 30 mm below the surface of the water and heat the water with constant stirring so that the temperature rises at the rate of 1° per minute the temperature at which the partly melted substance is observed to rise in the capillary tube is the melting temperature.

Method III

Apparatus:

- (a) A glass boiling-tube, overall length, 110 mm, internal diameter, 25 mm thermometer and with a groove cut in the side.
- (b) A cork about 25 mm long to fit into the boiling-tube, bored with a central hole to fit the standard thermometer and with a groove cut in the side.
- (c) A glass beaker, of such a size that when the apparatus is assembled, the boiling tube can be immersed vertically to two-thirds of its length in the water in the beaker with its lower end about 2.5 cm above the bottom of the beaker.
- (d) A stirrer or any of the device which will ensure uniformity of the temperature throughout the water in the beaker.
- (e) An accurately standardized thermometer suitable for the substances under examination (see Appendix 1.2)
- (f) suitable means of heating the water in the beaker.

Procedure: Melt a quantity of the substance slowly, while stirring, until it reaches a temperature of about 90°. Cool and allow the temperature of the molten substance to drop to a temperature of 8° to 10° above the expected melting point. Chill the bulb of the thermometer to 5°, wipe it dry and while it is still cold, dip it in the molten substance so that the lower half of the bulb is submerged. Withdraw it immediately, and hold it vertically away from the heat until the wax surface dulls then dip it for five minutes into a water-bath at a temperature not than 15°, Fit the thermometer through the bored cork into the boiling tube so that the lower part is 15 mm above the bottom of the tube. Suspend the tube in the beaker filled with water adjusted to about 15° and raise the temperature of the bath at rate of 2° per minute to 30° then adjust the rate to 1° per minute and note the temperatures at which the first drop of melted substances leave the thermometer. Repeat the determination twice on a freshly melted portion of the substance. If the three readings differ by less than 10, take the average of the three as the melting point. If they differ by more than 1° make two additional determinations and take the average of the five readings.

3.1.5 Optical rotation and specific optical rotation

Optical rotation is the property shown by certain substances of the plane of polarization of polarized light. Such substances are said to be optically active in the sense that they cause incident polarized light to emerge in plane forming a measurable angle with the plane of the incident light. Where this effect is large enough for measurement, it may serve as the basis for identifying or assaying a substance.

The optical rotation of a substance is the angle through which the plane of polarization is rotated when polarized light passes through the substance, if liquid, or a solution of the substance. Substances are described as dextro-rotatory or laevo-rotatory according to whether the plane of

polarization is rotated clockwise or anticlockwise, respectively, as determined by viewing towards the light source. Dextro-rotation is designated (+) and leavo-rotation is designated (-).

The optical rotation, unless otherwise specified, is measured at the wavelength of the D line of sodium ($\mu=589.3\mu\text{m}$) at 25° , on a layer dim thick. It is expressed in degrees.

The specific optical rotation (∞) D 25 of a solid substance is the angle of rotation ∞ of the plane of polarisation at the wavelength of the D line of sodium ($\mu=589.3\text{mm}$) measure at 25° calculated with reference to 1.0 dm thick layer of the liquid, and divided by the specific gravity.

The specific optical rotation (∞) D ²⁵ of a liquid substance is the angle of rotation ∞ of the plane of polarization at the wavelength of the D line of sodium measured at 25° and calculated with reference to a layer 1.0 dm thick of solution containing 1 g of the substance per ml. the specific optical rotation of solid is always expressed with reference to a given solvent.

Apparatus

A commercial instrument for use with a sodium lamp and capable of giving reading to the nearest 0.02° is suitable for most purposes. For certain applications, the use of a photo-electric polarimeter capable of taking measurements at the specified wave length may be necessary.

The accuracy and precision of optical measurements can be increased if the following precautions are taken.

- a. The instrument must be in a good condition. Optical elements must be very clean and in exact alignment. The match point should be close to. The normal zero mark.
- b. The light source must be properly aligned with respect to the optical bench. It should be supplemented by a filtering system capable of isolating the D line from sodium light.
- c. Specific attention should be paid to temperature control of the solution and of the polarimeter.
- d. Differences between the initial reading or between observed and corrected optical rotation calculated as either specific optical or optical rotation should not be more than one fourth of the range specified in the monograph for the substance.
- e. Polarimeter tubes should be filled in such a way as to avoid air bubbles. Particular care is necessary for semi-micro or micro tubes.
- f. For tubes with removable end-plate fitted with gaskets and caps, tighten the end plates only enough to ensure a leak-proof seal between the end-plate and the body of the tube.
- g. For substances with low rotator power, the end plates should be loosened and tightened again after each reading, in the measurement of both the rotation and the zero point.
- h. Liquids arid solutions of solids must be clear.

Calibration: The apparatus may be checked by using a solution of previously dried sucrose and measuring the optical rotation in a 2 dm tube at 25° and using the concentrations indicated below:

Concentration (g/100ml)	Angle of Rotation (+) at 25°
10.0	13.33
20.0	26.61
30.0	39.86
40.0	53.06
50.0	66.23

Method

For solids: weigh accurately a suitable quantity of the substance being examined to give a solution of the strength specified in the monograph, and transfer to a volumetric flask by means of water or other solvent if specified. If a solvent is used, reserve a portion of it for the blank determination. Unless otherwise specified, adjust the contents of the flask to 25° by suspending the flask in a constant- temperature bath. Make up to volume with the solvent at 25° and mix well. Transfer the solution to the polarimeter tube within 30 minutes from the time of the substances was dissolved and during this time interval maintain the solution at 25° Determine the zero point of the polarimeter and then make five reading of the observed rotation of the test solution at 25°. Take an equal number of readings in the same tube with the solvent in place of the test solution. The zero correction is the average of the blank readings, and is subtracted from the average observed rotation if the two figures are of the same sign or added if they opposite in sign, to give the corrected observed rotation.

For liquids: unless otherwise specified, adjust the temperature of the substance being examined to 25° transfer to a polarimeter tube and proceed as described. For solids, beginning at words "Determine the zero point.....".

Calculation – calculate the specific optical rotation using the following formula, dextro – rotation and laevo-rotation being designated by (+) and (-) respectively:

$$\text{For solid } (\infty)^{25} D = \frac{\infty}{25}$$

$$\frac{Id}{25}$$

$$\text{For solid } (\infty)^{25} D = \frac{100 \infty}{Lc}$$

Where

a= corrected observed rotation, in degrees, at 25°

D = D line of sodium light (μ= 589.3mm)

l = length of the polarimeter tube in dm,
 $d_{25/25}$ specific gravity of the liquid or solution at 25°
 c = concentration of the substance in per. Cent w/v

Note: THE REQUIREMENTS FOR OPTICAL ROTATION AND SPECIFIC OPTICAL ROTATION IN THE PHARMACOPOEIA APPLY TO THE DRIED, ANHYDROUS OR SOLVENT FREE MATERIAL.

3.1.6 Powder Fineness

The degree of coarseness or fineness of a powder is expressed by reference to the nominal mesh aperture size of the sieves for measuring the size of the powders. For practical reasons, the use of sieves, Appendix 1.1.2 for measuring powder for measuring powder finesses for most pharmaceutical purposes, is convenient but device other than sieves must be employed for the measurement of particles less than 100mm in nominal size.

The following terms are used in the description of powders:

Coarse powder: A powder, all the particles of which pass through s sieve with a nominal mesh aperture of 1.70 mm and not more than 40 per cent through a sieve with a nominal mesh aperture of 355 μ m.

Moderately coarse powder: A powder, all the particles of which pass through a sieve with a nominal mesh aperture of 710 μ m and not more than 40 per cent through a sieve with a nominal mesh aperture of 250 μ m.

Moderately fine powder: A powder, all the particles of which pass through a sieve with a nominal mesh aperture of 355 μ m and not more than 40 per cant through a sieve with a nominal mesh aperture of 180 μ m.

Fine powder: A powder, all the particles of which pass through a sieve with a nominal mesh aperture of 180 μ m.

Very fine powder: a powder, all the particles of which pass through a sieve with a nominal mesh aperture of 125 μ m.

When the fineness of a powder is described by means of a number, it is intended that all the particles of the powder shall pass through a sieve of which the nominal mesh aperture, in μ m is equal to that number.

When a batch of a vegetable drug is being ground and sifted, no portion of the drug shall be rejected but it is permissible except except in the case of assays, the withhold the final tailings, if and approximately equal amount o f tailings from a preceding batch of the same drug has been added before grinding.

Sieves: Sieves for testing powder fineness comply with the requirements stated under sieves, Appendix 1.1.2

Method

(1)For coarse and moderately coarse powders:place 25 to 100 g of the powder being examined upon the appropriate sieve having a close fitting receiving pan and cover.shak the sieve in a rotary horizontal direction vertically by tapping on a hard surface for not

less than twenty minutes or until shifting is practically complete. weigh accurately the amount remaining on the sieve and in the receiving pan.

[2] **For fine and very fine powder:** Proceed as described under coarse and moderately coarse powders, except that the sample should not exceed 25 g and except that the sieve is to be shaken for not less than thirty minutes, or until shifting is practically complete.

With oily or other powders which tend to clog the openings, care fully brush the screen at interval during siftings. Break up any lumps that may form. A mechanical sieve shaker which reproduces the circular and tapping motion given to sieves in hand sifting but has a uniform mechanical action may be employed.

NOTE- AVOID PROLONGED SHAKING THAT WOULD RESULT IN INCREASING THE FINENESS OF THE POWDER DURING THE TESTING

3.1.7 Refractive Index

The refractive index(n) of a substance with reference to air is the ratio of the sine of the angle of incidence to the angle of refraction of a beam of light passing from air into the substance. It varies with wavelength of the light used in its measurement.

Unless otherwise prescribed, the refractive index is measured at $25^\circ (\pm 0.5)$ with reference to the wavelength of the d line of sodium ($\lambda=589.3$ mm). The temperature should be carefully adjusted and maintained since the refractive index varies significantly with temperature.

The Abbe refractometer is convenient for most measurements of refractive index but other refractometer of equal or greater accuracy may be used. Commercial refractometers are normally constructed for use with white light but are calibrated to give the refractive index in terms of the d line of sodium light.

To achieve accuracy, the apparatus should be calibrated against distilled water; which has a refractive index of 1.3325 at 25° or against the reference liquids given in the following Table;

TABLE		
Reference Liquid	$n_D 20^\circ$ Temperatuer Co-efficient	$\frac{dn}{dt}$
Carbon tetrachloride	1.4603	-0.00057
Toluene	1.4969	-0.00056
a-Methylnaphthalene	1.6176	-0.00048

References index value for the ν line of sodium measured at 20°

The cleanliness of the instrument should be checked frequently by determining the refractive index of distilled water which at 25° is 1.3325.

3.1.8 Weight per Milliliter and Specific Gravity

Weight per milliliter- The weight per milliliter of a liquid is the weight in g of ml of liquid when weighed in air at 25°, unless otherwise specified.

Method – Select a thoroughly clean and dry pycnometer. Calibrate the pycnometer by filling it with recently boiled and cooled water at 25° and weighing the contents. Assuming that the weight of 1 ml of water at 25° when weighed in air of density 0.0012 g per ml, is 0.99602 g calculate the capacity of the pycnometer. (Ordinary deviations in the density of air from the value given do not affect the result of a determination significantly). Adjust the temperature of the substance to be examined, to about 20° and fill the pycnometer with it. Adjust the temperature of the filled pycnometer to 25°, remove any excess of the substance and weigh. Subtract the tare weight of the pycnometer from filled weight of the pycnometer. Determine the weight per milliliter dividing the weight in air, expressed in g, of the quantity of liquid which fills the pycnometer at the specified temperature, by the capacity expressed in ml, of the pycnometer at the same temperature.

Specific Gravity- The specific gravity of a liquid is the weight of a given volume of the liquid at 25°(unless otherwise specified) compared with the weight of an equal volume of water at the same temperature, all weighing being taken in air.

Method – proceed as. Described under Wt. per ml. – Obtain the specific gravity of the liquid by dividing the weight of the liquid contained in the pycnometer by the weight of Water contained, both determined at 25° unless otherwise directed in the individual monograph.

APPENDIX- 4

WEIGHT AND MEASURS

METRIC EQUIVALENTS OF UNANI CLASSICAL WEIGHT

1chawal	=	15 mg.
1Ratti	=	125 mg.
1Dang	=	500mg.
1Masha	=	1g.
1Dirham	=	3.5 g.
1Misqal	=	4.5g
1Tola	=	12 g
1Dam	=	21 g
1Chhatank	=	60 g.
1pao	=	240 g.
1Ser	=	960g.
1 Man Tabrizi	=	2kg.900g.
1Oqia	=	32g.
1Astar	=	1kg.
1Surkh	=	125 mg.
1Ratal Tibbi	=	420 g.
1Qeerat	=	250 g.

In case of liquid the metric equivalents would be the corresponding liter and milliter.

APPENDIX- 5

General principles of Treatment in Unani Medicine

Treatment in Unani Medical Science is either (A) Preventive or (B) Curative.

A. Preventive Treatment

It consists of suitable medication in the six essential causes/ prerequisites (Asbab e Sitta Zarureeyah) of life, that are constantly operating on the body. These essential causes are:

- 1) Atmospheric Air.
- 2) Foods and Drinks.
- 3) Physical or Bodily Movement and Repose.
- 4) Mental or psychic Movement and Repose.
- 5) Sleep and Wakefulness.
- 6) Evacuation and Retention.

B. Curative Treatment

Unani Medicine has the following modes of curative treatment depending upon the nature of ailment and its cause.

- 1) Regimenal therapy (Ilaj Bil Tadbir)
- 2) Dietotherapy (Ilaj Bil Ghiza)
- 3) Pharmacotherapy (Ilaj Bil Dawa)
- 4) Surgery (Ilaj Bil Yead)

1) Regimenal therapy (Ilaj Bit Tadbir)

The Regimental Therapy is the special regiment to maintain the body in good health and to treat the patient by the following effective methods:

a) Venesection /Blood Letting (Fasd):

Among various methods of Ilaz-bit-Tadabeer (Regimental Therapies), Venesection / Blood Letting (Fasd) is an important method by which abnormal blood is made to flow out the body by making a cut (Shigaf) in vessels. It is a method of general evacuation which removes the excess and surplus humour in the same proportion as is present in the vessels.

b) Cupping (Hajamat):

The cupping is being used as a method of Ilaz-bit-Tadabeer (Regimental Therapies) in unani system of Medicine. Cupping is the application to the skin of a glass vessel, from which air has been exhausted by heat or of a special suction apparatus in order to draw blood to the surface. This procedure is also called as Hajamat. As this therapy is done to reduce counter-irritation, it moves material from one part to another, draw inflammatory process from deep part to the surface to make it accessible to a less important organ; also sometimes restores an organ (such as hernia) to its proper position.

i. Diaphoresis (Tareeq) :

To emit moisture through the skin's pores is known as Diaphoresis (Tareeq). Diaphoresis is a method used for lowering body temperature (Taqleel-e-hararat) and cleansing and evacuations of morbid material from blood (Tanquia –e-hararat)The procedure of diaphoresis has been used in various ailments such as Ascitis, Uraemia, Leucoderma, Nasal Catarrh, certain inflammatory conditions, providing nutrition to the skin. Hot fomentation (dry and wet) bath with warm water, massage, keeping the patient in a room and blowing hot air some of the methods of diaphoresis (Sweating).

ii. Dieresis (Adrar-e-Bowl):

This method is used in cases of diseases of the heart, lung and liver etc,

iii. Therapeutic Bath (Hammam):

In Unani system of Medicine the term Hammam refers to hot bath it is aimed not only to clean the body but also to obtain beneficial effects for skin and different organs and prevention from humoural diseases. It evacuates the superfluous matter or waste material from the body in the form of sweat and vapours, Unani physician sweet water (Aab-e-Sheen) for the purpose of prevention of helth Hammam reduces repletion and increases attractive power for nutrients and thus prevent and promote health.

The Unani physicians were very much skilled in the use of therapeutic (medicated) bath, They use Alum water, Copper water, Iron water, Ferrous sulphate water and decoction fo medicinal herbs for the cure of different diseases like metabolic diseases (e.g. obesity and gout). Skin diseases, arthritis, paralysis, liver, renal diseases, haemoptysis, haemetemesis, metrorrhagia, prolapsed of rectum and spasmodic pain. It also relieves lethargic condition.

iv. Massage (Dalak):

Unani System of Medicine have very effective Regimental Therapies (Ilaj-bit-Tadabeer). Dalak (massage) is one of them, which is of high significance. From ancient times, it is considered as an effective therapy. Massage tone up the muscles and nerves. It gives an enhanced circulation of blood in the system that brings the accumulated waste in to the blood stream and is removed through the excretory system. It also helps the patient to have more vital energy and helps to absorb the fatty substances through skin and prevent from skin diseases.

v. Cauterization:

By this pathogenic matters, which are attached to structures, are removed. It is performed either by fire (hot metal) or by strong corrosive medicines.

vi. Purging.

Purgatives and laxatives are widely used by Unani physicians. This method has a resolving anti-spasmodic and detoxicating effect. There are certain said pattern of rules for adopting this method.

vii. Vomiting (Qai):

Emetics are used certain cases for relief.

viii. Exercise (Riayazat)

Exercise (Riayazat) is one among the Regimental Therapies (*Ikah-but-Tadabeer*), used since ages to treat various ailments. According to Avicenna (*Ibn-e-sina*), exercises are a series of voluntary movements, which produce deep and rapid respiration. A moderate amount of exercise, taken regularly, is an effective prophylactic, provided, due attention is paid to the other essentials of health. Exercise prevents the accumulation of impure liquids dispersing and assisting the propulsion to waste matter in the channels of excretion and diverting towards their outlets. Hence accumulation of waste products does not occur. By increasing the innate heat of the body, exercise also strengthens the muscles and joints and increases their resistance to damage and disease. By elimination wastes, it accelerates absorption of food by tissues, expands and softens the organs, liquefies secretion and dilates the pores. Therapeutic exercise has been defined as the prescription of bodily movements of improve function, relieve symptoms or maintain state of well being. Unani physicians have laid down rules regarding hard, moderate and light exercises and also indicated the timings and conditions for various physical exercises.

ix. Leeching /Hirudotherapy (*Irsaal-e-Alaq*):

Commonly known as *Irsaal-e-Alaq* in Medical science. This is a regimental therapy (*Ilaj-bit-Tadbeer*) is performed by medicinal leeches (*Hirudinaria medicinalis*) for the purpose of *Istafragh/ Tanquia* (Evacuation). As per the classical literature, it has been used in the system for skin affections only. But at present time vigorous studies has been carried out on the Anatomy, Physiology and Biomolecules present in the saliva of leeches, especially the body. The fibrinolytic, anticoagulant and vasodialatory effects of these enzymes have been exploited in the management of cardiovascular disorders successfully. Leech Therapy/ Hirudotherapy reduces tissue congestion in areas where arterial input is maintained but venous returns are severely compromised. Leech Therapy, has been used successfully as adjunct therapy. Following cosmetic or reconstructive surgery, reimplantation surgery such as digit reattachment, breast surgery, scalp avulsion, and certain diseases of skin graft procedures and in the treatment of per orbital haemotomas.

x. Hydrotherapy (Ilaj-bil-Ma):
Ilaj-bil-Ma (Hydrotherapy) is distinguishing line of treatment in present era. It is quite beneficial in preventing and cures various diseases.

xi. Acupuncture (Ilaj bil Aabar)

2) Dietotherapy (Ilaj Bil Ghiza)

Unani Medicine lays great stress on treating certain ailments by administration of specific diets or by regulating the quality and quantity of food. Many books are available on this in Unani system of medicine.

3) Pharmacotherapy (Ilaj bil Dawa):

Natural drugs like plants, minerals and animals are used in Unani Medicine.

Dosage and timings:

While determining the dosages of drugs, factors like temperament and potency of drugs, temperament and age of the patient, nature of disease, severity of disease, route of drugs, etc, are kept in mind. Some drugs are used only when the stomach is empty while some are used after meals.

Route of drug used:

In addition to oral drugs, Unani physicians also administered drugs through Enema (Huqna), Abzan (Ablution), Suppository (Farzaja/ Shaiaf), Paste (Zimad), Liniment (Tayla), Inhalation (Lakhlakha).

Ointment/ Cream etc.

Forms and shapes of drugs used:

Powders, Tablets, Decoctions, Infusions, Distillates, Jawarish, Majoor, Sharbat, Khameerajat, Lauooq, perfumes, Inhaler etc. are used to achieve the desired effect.

Compounding and correction (detoxification) of harmful effects of drugs:

The harmful effects are either corrected by simple methods or by compounding with other drugs. Drugs are compounded for the following purposes also:

- (i) To potentiate the drug effect (Synergism).
- (ii) To decrease the harmful or excessive effect (Antagonism)
- (iii) For sharp diffusion of the drug.
- (iv) For slow diffusion of the drug.
- (v) For preservation of active principles.
- (vi) To increase the quantity of a drug.

(vii) To increase the quantity of a drug.

Substitute of drugs:

Rhaza (920 AD) had compiled a Treatise titled *Miqala fil- Abdal-Il-adviah –fit –tibbon wal –ilaj* on the subject of medicinal substitutes wherein he has described the laws of substitutes of drug and had mentioned substitutes for some 122 single drugs.

4) Surgery (Ilaz Bil Yad):

Unani physicians were in surgery and had developed their own instruments and techniques. Abul Qasim Zahravi wrote a book entitled *Altasrif* on this subject.

