THE AYURVEDIC PHARMACOPOEIA OF BANGLADESH

PART - I
VOLUME - I

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

DIRECTORATE GENERAL OF HEALTH SERVICES

DEPARTMENT OF HOMEO & TRADITIONAL MEDICINE

MOHAKHALI, DHAKA

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AYURVEDIC PHARMACOPOEIA
OF
BANGLADESH

PART - I
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FIRST EDITION
APRIL - 2006

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MLNISTRY OF HEALTH & FAMILY WELFARE
DIRECTORATE GENERAL OF HEALTH SERVICES
DEPARTMENT OF HOMEO & TRADITIONAL MEDICINE
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OF

BANGLADESH

Published by : The Line Director, Alternative Medical Care (AMC), DGHS, Mohakhali, Dhaka

First Published : April – 2006

Ownership : The Director Homeo & Traditional Medicine and Line Director, Alternative Medical Care (AMC), DGHS, Mohakhali, Dhaka

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Price : Tk. 250.00
US $ 10.00

Printed by : The Provati Printers
13/Ka/1, K.M. Das Lane, Tikatuli
Dhaka-1203

On behalf of : Government of the People's Republic of Bangladesh
Ministry of Health & Family Welfare
Directorate General of Health Services

ISBN :

Re-print: June-2022

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Foreward

In Bangladesh, Ayurvedic 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 Ayurvedic 109 medical Officer/Lecturers at different upazila Health complexes, district & medical college Hospitals under the alternative medical care (AMC) operation plan of DGHS.

Ayurvedic pharmacopoeia in the basic requirement of Ayurvedic Practitioners for preparation of Ayurvedic 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 Ayurvedic pharmacopoeia (part:1 volume: I) is going to be published for Ayurvedic practitioners. This will be a good resource for Ayurvedic practitioners for the management of common ailments faced by the Ayurvedic physicians in upazilla , district & medical college Hospitals and also in private sector. I cordially thank to all experts of Ayurvedic 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 Ayurvedic 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 Bashar Mohammed Khurshid Alam.
Director General
Directorate General of health Service
Mohakhali, Dhaka.

FORWARD

In Bangladcsh Traditional and Homeopathic system of Mcdicinc have been used in medical practice for thousands of years and have played a significant role in maintaining human health. Most of the people of our country meet their health care needs by these systems, as they are unable to access conventional mcdicine due to poverty.

To strengthen the system of Traditional and Homeopathic Medicinc, the Government of Bangladcsh has appointed 45 Alternative Medical Care (15 Unani, 15 Ayurvedic & 15 Homeopathic) medical officers at the Districts level Hospitals of Bangladesh. They are providing health services with existing health facilities following the National formularies of Traditional & Homeopathic system of medicine. There is yet no Pharmacopoeia for Traditional & Homeopathic system of Medicine. I am glad to know that, "The Ayurvedic Pharmacopoeia of Bangladesh" is going to be published.

This Pharmacopoeia will be a guide book for production of Traditional and Ayurvedic Medicine, Medical practitioners, basically for the graduate physicians. In this Pharmacopoeia Monographs of herbs alongwith, necessary informations like treatment of different diseases with their doses, side effects, duration, route of administration, contra indications etc. have been included. The expert teachers from different departments of Government Unani & Ayurvedic Degree College, scientists from different University / Institutions and Medical officers of Alternative Medical Care participated actively of development of this Pharmacopoeia.

I am very much grateful to Director, Homeo & Traditional Medicine and other officials who contributed immensely for the development of the Ayurvedic Pharmacopoeia. I would like to thanks to all the scientists and members of National & Ayurvedic pharmacopoeia committee, expert teachers from different departments of Government Unani & Ayurvedic Degree College and medical officers of Alternative Medical Care who devoted their time to perform the edition.

Prof. Dr. Md. Shahadat Hossain
Director General
Directorate General of Health Services
Mohakhali, Dhaka

FORWORD

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

I would like to express my thanks to all, who contributed immensely to the development of the Ayurvedic 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.

FORWARD

Now a days, many people of Bangladesh meet their health needs from natural/traditional medicine. Ayurved is the ancient wisdom for nature and Ayurvedic culture started from Himalayan region of Indo-Pak sub-continent long long ago. I feel proud to mention, Bangladesh Government and WHO, though delayed, have included Ayurved in national health & drug policy.

Ayurvedic graduate doctors are actively working in the health delivery system of our country and performing very satisfactory role with existing health facilities. To have better services from the doctors and to aware them of current therapeutic informations, monographs of herbs with identity, purity & strength, important formulations of drugs for management of diseases etc. as well as a national authentic guide book for production of Ayurvedic Medicine, it has become very much essential to publish a standard Ayurvedic Pharmacopoeia.

To establish government policy, publication of this pharmacopoeia will be continued, where the monographs of herbal, mineral and animal drugs and the pharmacy of Ayurvedic Medicine are incorporated, readily available, therapeutically effective, safe enough and inexpensive.

My heartfelt gratitude to the doctors, experts, scientists and members of the national pharmacopoeia committee and Ayurvedic sub-committee whose active participation and co-operation made it easier to publish the first edition of this pharmacopoeia.

It is worth mentioning "Nature is our best friend, we are brought up in nature and Return to Nature.''

Dr. Firoza Akhter Banu
Director, Homeo & Traditional Medicine
&
Line Director, Alternative Medical Care
DGHS, Mohakhali, Dhaka

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General Definition

Title of book- The title of the book is "The Ayurvedic Phannacopoeia of Bangladesh". Wherever the abbreviation A.P .B. is used, it may be presumed to stand for the same and the supplements thereto.

Title of the Drugs - The name given on the top of each monograph of the drug is in Bengali as mentioned in the Ayurvedic classics will be considered official. These names have been arranged in English alphabetical order. The Latin name (taxonomical nomenclature) of each drug as found in authentic scientific literature has been provided in the monograph in the introductory paragraph. The official name will be the main title of the drug and its scientific name will also be considered as legal name.

Synonyms - Synonyms of each drug appearing in each monograph in Bengali, Sanskrit, English and Urdu have been mentioned as found in the classical texts, Ayurvedic Formulary and as procured from the experts, scholars of Ayurveda.

Italic- Italic type has been used for scientific name of the drug appearing in the synonyms paragraph of each monograph.

Odour and Taste - Wherever a specific odour has been found it has been mentioned but the description as 'odourless' or 'no odour' has in many cases been avoided in the description as large number of drugs have got no specific odour. The "odour" is examined by directly smelling 25 g of the powdered drug contained in a package or freshly powdered. If the odour is discernible the sample is rapidly transferred to an open container and re-examined after 15 minutes. If the odour persists to be discernible, it is described as having odour .

The "Taste" of a drug is examined by taking a small quantity of 85 mesh powder by a tip of moist glass rod and applying it on tongue previously rinsed with water. This may not be done in case if poisonous drugs, indicated in monograph.

Mesh Number - Wherever the powdering of the drug has been required the sieve "Mesh Number 85" has been used. This will not apply for drugs containing much oily substance.

Weights and Measures - The metric system of weights and measures is employed. Weights are given in multiples or fractions of a gram (g) or of a milligram (mg). Fluid measures are given in multiples or fractions of millilitre (ml).

When the term "drop" is used, the measurement is to be made by means of a tube which delivers in 20 drops 1 gram of distilled water at 15°c.

Metric measures are required by the Pharmacopoeia to be graduated at 20°c and all measurements involved in the analytical operations of the Pharmacopoeia are intended, unless otherwise stated to be made at that temperature.

Identity, Purity and Strength - Under the heading "Identification" tests are provided as an aid to identification and are described in their respective monographs.

The term "Foreign Matter" is used to designate any matter which does not form part of the drug as defamed in the monograph. Vegetable drugs used as such or in formulations, should be duly identified

and authenticated and be free from insects, pests, fungi, micro-organisms, pesticides, and other animal matter including animal excreta, be within the permitted and specified limits for lead, arsenic and heavy metals, and show no abnormal odour, colour, sliminess, mould or other evidence of deterioration.

The quantitative tests e.g. total ash, acid-insoluble ash, water-soluble ash, alcohol-soluble extract, water-soluble extract, ether soluble extract, moisture content, volatile oil content and assays are the methods upon which the standards of Pharmacopoeia depend. The methods for assays are described in their respective monographs and for other quantitative tests, methods are not repeated in the text of monographs but only the corresponding reference of appropriate appendix is given. The analyst is not precluded from employing an alternate method in any instance if he is satisfied that the method which he

uses will give the same result as the Pharmacopoeial Method. In suitable instances the methods of microanalysis, if of equivalent accuracy, may be substituted for the tests and assays described. However, in the event of doubt or dispute the methods of analysis of the Pharmacopoeia are alone authoritative.

Standards - For statutory purpose, statements appearing in the APB under Description, those of definition of the part and source plants, and Identity, Purity and Strength, shall constitute standards.

Thin Layer Chromatography (T .L.C.)- Under this head, wherever given, the number of spots and Rf values of the spots with their colour have been mentioned as a guide for identification of the drug and not as Pharmacopoeial requirement. However, the analyst may use any other solvent system and detecting reagent in any instance if he is satisfied that the method which he uses, even by applying known reference standards, will give better result to establish the identity of any particular chemical constituent reported to be present in the drug.

Quantities to be weighed for Assays and Tests - In all description quantity of the substance to be taken for testing is indicated. The amount stated is approximate but the quantity actually used must be accurately weighed and must not deviate by more than 10 per cent from the one stated.

Constant Weight - the term "Constant Weight" when it refers to drying or ignition means that two consecutive weighings do not differ by more than 1.0 mg per g of the substance taken for the determination, the second weighing following an additional hour of drying on further ignition.

Constituents- Under this head only the names of important chemical constituents, groups of constituents reported in research publications have been mentioned as a guide and not as pharmacopoeial requirement.

Percentage of Solutions – In defining standards, the expression per cent *(%),* is used, according to circumstances, with one of the four meanings given below.

Per cent *w/w* (percentage weight in weight) expresses the number of grams of active substance, in 100 grams of product.

Per cent *w/v* (Percentage weight in volume) expresses the number of grams of active substance in 100 millilitres of product.

Per cent v/v (percentage volume in volume) expresses the number of millilitres of active substance in 100 millilitres of product.

Per cent *v/w* (percentage volume in weight) expresses the number of millilitres of active substance in 100 grams of product.

Percentage of alcohol - All statements of percentage of alcohol (C_2H_5OH) refer to percentage by volume at 15.56°C.

Temperature - Unless otherwise specified all temperatures refer to centigrade (celsius), thermometric scale.

Solutions - Unless otherwise specified in the individual monograph, all solutions are prepared with purified water.

Reagents and Solutions - The chemicals and reagents required for the test in Pharmacopoeia are described in Appendices.

Solubility - When stating the solubilities of Chemical substances the term "Soluble" is necessarily sometimes used in a general sense irrespective of concomitant chemical changes.

Statements of solubilities which are expressed as a precise relation of weights of dissolved substance of volume of solvent, at a stated temperature, are intended to apply at that temperature. Statements of approximate solubilities for which no figures are given, are intended to apply at ordinary room temperature.

Pharmacopoeial chemicals when dissolved may show slight physical impurities, such as fragment of filter papers, fibres, and dust particles, unless excluded by definite tests in the individual monographs.

When the expression "parts" is used in defining the solubility of a substance, it is to be understood to mean that I gram of a solid or 1 millilitre of a liquid is soluble in that number of millilitres of the solvent represented by the stated number of parts.

When the exact solubility of pharmacopoeial substance is not known, a descriptive term is used to indicate its solubility.

The following table indicates the meaning of such terms :-

Descriptive terms	*Relative quantities of solvent*
Very soluble	Less than 1 part.
Freely soluble	From I to 10 parts.
Soluble	From 10 to 30 parts.
Sparingly soluble	From 30 to 100 parts.
Slightly soluble	From 100 to 1000 parts.
Very slightly soluble	From 1000 to 10,000 parts.
Practically insoluble	More than 10,000 parts.

Therapeutic uses and important formulations - Therapeutic uses and important formulations mentioned in this Pharmacopoeia are, as provided in the recognised Ayurvedic classics and in the Ayurvedic Formulary of Bangladesh as well as authentic texts.

Doses - The doses mentioned in each monograph are in metric system of weights which are the approximate conversions from classical weights mentioned in Ayurvedic texts. A conversion table is appended giving classical weights of Ayurvedic System of Medicine with their metric equivalents. Doses mentioned in the Ayurvedic Pharmacopoeia of Bangladesh (A.P.B.) are intended merely for general guidance and represent, unless otherwise stated, the average range of quantities per dose which is generally regarded suitable by clinicians for adults only when administered orally.

It is to be noted that the relation between doses in metric and Ayurvedic systems set forth in the text is of approximate equivalence. These quantities are for convenience of prescriber and sufficiently accurate for pharmaceutical purposes.

Rasa:

The term 'Rasa' refers to the direct and immediate actio of a drug when it comes in contact with the sense organ of taste i.e. tongue. The existence of different types of rasas (tastes) in different substances is attributed to their varying pancabhautika composition. The 'Rasa' of different substances have difinite relationship to the increase or decrease of Dosha and they have certain actions in the body. The drugs are selected keeping in view their(taste) and the predominate doshas in the body of the patient. There are six ropes of rasas (tastes) Katu (pungent) and kasaya (astringent) etc In other contexts the word rasa also applied to nutrition, to the end product of digestion of food, to the first dhatu (tissue) and to the principal metal drug Mercury etc.

1. Madura-Sweet	2. Amla- Sour	3. Lavana-salty
4. Katu (Pungent)	5. Tikta- Bitter	6. Kashaya-Astringent

Guna:

The term 'guna' refers to the physico-chemical and also the pharmacodynamic pro['erties of drugs and dietary. Articles, which are responsible for the action of therespective drugs/diets in the body. A total of 41 gunas are discribed in Ayurveda but out of these twenty are more important. These are

1. Guru-Heaviness	2. Laghu-Lightness
3. Sheet-cold	4. Ushna-Hot
5. Snigdha-Unctuousness	6. Ruksha-Non-unctousness or dryness

7. Manda-Dullness
8. Teelshana-Sharpness
9. Sthira-Immobility
10. Chala-Mobility
11. Mrudu-Softness
12. Kathina-Hardness
13. Vishada-Clarity
14. Picchi la-Sliminess
15. Sh1akshana-Smoothness
16. Khara-Roughness
17. Shkshama-Fineness
18. Sthlla-Bulkiness
19. Sandra-Densnes
20. Drava-fluidity

Vipaka :

Vip aka is the aciton of the drug after it has undergone digestive and assimilative transformations. The Vipaka of a drug overcomes the action of' rasa' (taste) but is itself overcome by virya; vipaka refers to drug metabolism i.e. action of a drug through drug metabolism. The tex describe three kinds of drug metaboljsm viz. Katu (pungent) amla (sour) madhura (sweet) responsible in turn for increase in vata, pitta and kapha respectively.

Viya :

Virya refers to the potency of a drug/drug action such an action is not accounted for the rasa, guna or vip aka of a drug. According to the most commonly held view virya is of two kinds: usna (Literal meaning; hot) and sit a (literal menaning: cold).

Abbreviations of technical terms— The abbreviations commonly employed are as follows :

m	Metre
l	Litre
mm.	Millimetre
cm.	Centimetre
μ	Micron (0.001 mm)
kg.	Kilogram
g.	Gramme
mg.	Milligram
ml.	Millilitre
IN.	Normal solution
0.5 N	Half-normal solution
0.I N	Decinormal solution
IM.	Molar solution
Fam.	Family
PS.	Primary Standards

Abbreviations used for languages

Sansk	Sanskrit
Assam.	Assamese
Beng.	Bengali
Eng.	English
Guj.	Gujrati
Kan.	Kannada
Kash.	Kashmiri
Mal.	Malayalam
Mar.	Marathi
Ori.	Oriya
Puj.	Punjabi
Tam.	Tamil
Tel.	Telgu

Preface

Ayurved is the science of life and encyclopedia of ancient medical wisdom. The Ayurvedic system of medicine has been used in Indo-Pak subcontinent region since the Vedic period and as early as the dawn of human civilization. Though Ayurved has under gone many changes in the course of its long history, it still remains the mainstay of medical relief to a large section of population of the nation. Bangladesh Goverment has included Ayurvedic Medicine in national health & drug policy so that now mass production of medicines in the Ayurvedic Pharmaceutical units are running on commercial scale.

In view of the new trend in Ayurvedic Pharmaceutical field, Government of Bangladesh considered it expedient to utilise the existing Drug Act 1982, to also control to a limited measure the Ayurvedic, Homeo and Unani drugs by amending the Act.

The Act was accordingly amended to ensure control over the production and sale of these medicines namely :

i. The manufacture should be carried under prescribed hygienic conditions, under supervision of a person having a prescribed qualification

ii. The raw materials used in the preparation of durgs should be genuine and properly identified

iii. The formula or the true list of all the ingredients contained in the drugs, should be displayed on the label of every container.

To start with, development of standards for the identity, purity and strength of single drugs and formulations at a later stage, assumed importance for the effective enforcement of the provision of the Act. If the raw materials to be used in a medicine and stage by stage processes of manufacturer standardised, the final product namely, the compound formulation could be expected to conform to uniform standards. The requirements that the list of ingredients be displayed on the label will enable analysts in important cases to verify label claims and to that extent will bind the manufacture to a true claim. Arrangements to envolve and lay down physical, chemical and biological tests, where necessary, to identify the drugs and ascertain their quality and to detect adulterations, are an urgent necessity of the profession. Setting up of Drug Standardisation Units, Research Centres, Drug Testing Institutes and Central Drug Laboratories for Ayurvedic Medicines both for this purpose are therefore, essential. The several Committees appointed by the govemment of Bangladesh to assess and evaluate the status and practice of Ayurvedic Medicine have stressed the importance of preparing an Ayurvedic Pharmacopoeia.

In our country an Ayurvedic Formolary book Published by (1992) Bangladesh Unani & Ayurvedic board is now available for preperation of Ayurvedic Pharmaceutical Products but still now no Ayurvedic Pharmacopoeia has been developed. Dept. of Homeo & Traditional Medicine under DGHS has taken effective steps to prepare & publish a standard pharmacopoeia for Ayurvedic Medicine in HNPSP Since 2003-2006 Period. Under this programe a huge number of works for preperation of the Ayurvedic Pharmacopeia of Bangladesh is going on rapidly.

The Ayurvedic Phannacopoeia of Bangladesh is the legal document of standards for the quality of drugs. This Volume consists, of 52 monographs of single drugs of plant Origin, Phannacognostical, chemical and ayurvedic standards of the parts of the plants used in Ayurveda are described in detail in each monograph.

One monograph is exclusively devoted to the one part of the drug of plant origin which describes the macroscopic, microscopic characters alongwith their chemical standards on the protocol developed and designed by Ayurvedic Pharmacopoeia Committee. It deals in detail about the permissible limits of foreign matter, total ash, acid insoluble ash, alcohol soluble extract, water soluble extract and

chromatographic pattern of TLC. All this work was carried out in Pharmacopoeial Laboratory for Bangladesh. The data has been finalised after confirmation of various samples obtained from different agroclimatic conditions by the crosssection of experienced scientists in Ayurvedic Pharmacopoeia Committee after careful scientific scrutiny. These standards have been consciously kept modest so that its implementation by the manufacturing companies becomes easily acceptable in order to maintain their quality control and avoid batch to batch variations.

Ayurvedic pharmacological properties like Rasa, Guna, Virya, Vipaka, Karma etc. are also mentioned in each monograph alongwith their therapeutic uses, some of the important classical formulations and therapeutic dose. Appendix of this volume contains the details of the protocols used in determination of various scientific standards. References of ancient Ayurvedic literature in its original form are an added attraction in order to authenticate the Ayurvedic statements made in each and every monograph. In the end English equivalents of Ayurvedic terms have been given to make the volume more useful for the people who are not conversant with Ayurvedic terminologies.

In general, this book is more user friendly for scientists involved in drug quality testings of Ayurvedic medicines, teachers of Dravyaguna, Pharmacy, Medicine, Research scholars, physicians, students of Ayurveda and many others who have interested in Ayurvedic medicines.

On behalf of the Ayurvedic Pharmacopoeia Committee I feel proud to mantion our sincere thanks & appreciation to the goverment of Bangladesh, Director General of Health, Dr. Khairun Nessa Khanom, Executive Director Homeo and Traditional Medicine Scientists and Ayurvedic Scholars for their whole hearted co-operation in preparing the monographs on single drugs. I cordialy thanks all the members of the Ayurvedic Pharmacopoeia Committee specialy Dr. Nihar Ranjan Datta & Dr. Mohd. Zahangir Hossain without whose co-ordination this volume would not have seen the light of day. Lastly I am aware that there will always be open for improvement suggestion & comments from exparts working in this field are welcome as this will help us in bringing out improved versions in the subsequent editions.

Dr. M. A. Mannan Sarkar
Chairman
Ayurvedic Pharmacopoeia Committee
&
Deputy Director, Homeo & Traditional Medicine
DGHS, Mohakhali Dhaka

INTRODUCTION

Every medicine of every disease is in our natural yard which is given by HIM (Allah) during the creation of human being i.e, Nature is the best physician for any kinds of diseases in the world. Ayurved is the science of health & healing and of life. It is an encyclopedia of ancient medical wisdom. This science is based on Athorva-veda of the oldest scriptures of the Hindus, about 3,000 years old. The object of Ayurveda is to counteract the imbalance of the three essential elements Vata (air), Pitta (bile) and Kapha (Phlegm). These three elements constitute the tridosh from which the human body originate; the tridosh regularizes the normal working of the human body.

Bangladesh, due to its unique variety of geographical & climatic factors, has had a rich and varied flora of the medicinal plants since the vedic period. 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. Ayurveda 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 western / modern world has slowly started the appreciating value of herbal medicines and under standing the basic comprehensive philosophy of Ayurveda. 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 & side effects, easily availability, in expensiveness and environment friendly.

There are three source of medicine in Ayurveda like herb/plant, animal & mineral. 90% of ingredients used in Ayurvedic medicine are plant based and 10% are of mineral & animal origin. A uniform nomenclature or common name / group used for the identification of plants which the ancients used as sources of drugs have yet not been established. According to the demand of medical practitioner and science a standard general classification of Ayurvedic drugs, fixed recognized rules for the determination of dosage and preparation of Ayurvedic Pharmacopoeia is essential as far best which will be regulated by the Government of Bangladesh.

The demand for Ayurvedic & plant based medicine is growing up rapidly within our country and abroad. The Government of Bangladesh Ministry of Health & Family welfare appreciated the need to prescribe quality standards for Ayurvedic drugs and the drugs act was amended in 1982. After this one volume of Bangladesh National Ayurvedic Formolary-1992 has been Published by Bangladesh Unani & Ayurvedic Board, one Directorate office at DGHS and one Graduate Medical College with 100 bed Hospital at Mirpur has been stablished which is running with best.

A huge number of Ayurvedic Practionars are practicing throught the country by poly herbal Ayurvedic drugs manufactured by Ayurvedic Pharmaceutical Industries. But for developing standards of quality, purity and strength of Ayurvedic Medicine no Pharmacopoeia/ Pharmacopeial Laboratory for Ayurvedic Medicine yet been established in Bangladesh. Considering the necessity of legal document of standared quality of drugs Director, Homeo & Traditional Medicine had been taken work plan to preparation the Ayurvedic Pharmacopeia under HNPSP since 2003 – 2006 which was recognized by ECNEC.

Having regard to all these considerations the Line Director, Alternative Medical Care (AMC) & Director H & TM Proposed a National Constitution of Pharmacopoeia Committee headed by Director General (Health) consisting of experts on Ayurvedic/ Unani / Homeopathic & other sciences including experts of Pharmacognosy, Chemistry & Pharmacy. Director General of health accepted the National Pharmacopoeia Committee of AMC since 06.01.2005 and three (for Unani / Ayurvedic / Homeopathic) sub-committee had been appointed by the National Committee

FOR PREPARATION OF ALTERNATIVE MEDICAL CARE PHARMACOPOEIA NATIONAL COMMITTEE

1. Director General of Health Directorate general of health services, Mohakhali, Dhaka	Chairman
2. Additional Director General (Admin) Directorate general of health services, Mohakhali, Dhaka	Member
3. Additional Director General (Development) Directorate general of health services, Mohakhali, Dhaka	Member
4. Joint Secretary (WHO & Public Health) Ministry of Health & Family welfare, Dhaka	Member
5. Director Homeo & Traditional Medicine and line Director (AMC) Directorate general of health services, Mohakhali, Dhaka	Member Secretary
6. Dr. Chowdhury Mahmud Hasan Professor, Dept. of Pharmacy, University of Dhaka	Member
7. Dr. Md. Abul Hasan Professor, Dept. of Botany, University of Dhaka	Member
8. Dr. Abdul Malek Dean, Dept. of Nutrition, University of Dhaka	Member
9. Professor, Md. Shahabuddin Kabir Choudhury Dept. of Pharmacy, Jahangirnagar University, Savar, Dhaka	Member
10. Director (Drug) Dept. of Drug Administration, Motijheel, Dhaka	Member
11. Chief Scientific Officer Bangladesh science & Research council, Dhaka	Member

Functions :

1. Three Pharmacopoeia (one for Ayurvedic/Unani/Homeopathic will be prepared according to OP (Operation plan) of PIP (Programme Implementation Plan) under HNPSP (2003-2006) which recognised by ECNEC
2. Necessary all steps have to be taken for preparation of three complete Pharmacopoeia by three sub-committee within the limitation of OP.
3. Activities for preparation of three Pharmacopoeia will be completed within the period (-----2006) of OP under HNPSP and submited to the Director General (Health).
4. If necessary, member/members may be Co-opted in the committee.

AYURVEDIC PHARMACOPOEIA SUB-COMMITTEE

1.	**Dr. M. A. Mannan Sarkar** Deputy Director Homeo & Traditional Medicine, DGHS, Mohakhali Dhaka	Chairman
2.	**Dr. Md. Abu Yusuf Mia** Asistant Director Homeo & Traditional Medicine, DGHS, Mohakhali Dhaka	Member
3.	**Professor, Md. Shahabuddin Kabir Choudhury** Dept. of Pharmacy, Jahangirnagar University, Savar, Dhaka	Member
4.	**Register** Bangladesh Unani & Ayurvedic Board, Farmgate, Dhaka	Member
5.	**Dr. Nihar Ranjan Datta** Lecturer, Head of the Dept., Pharmacy & Chief (Addition Duty) Research & Production Unit, Govt. Unani/Ayurvedic Medical College, Dhaka	Member
6.	**Dr. A. S. M. Shaman-ur Rashid** Lecturer, Dept. of Gynae & obs. Govt. Unani/Ayurvedic Medical College, Dhaka	Member
7.	**Dr. Md. Toyebur Rahaman** Lecturer, Dept. of Medicine Govt. Unani/Ayurvedic Medical College, Dhaka	Member
8.	**Dr. Mohd. Zahangir Hossain** Medical Officer (Ayurvedic), DGHS, Dhaka & Lecturer (Additional Duty), Dept. of Medicine Govt. Unani/Ayurvedic Medical College, Dhaka	Co-ordinator
9.	**Dr. Md. Shahjahan** Medical Officer (Ayurvedic), Sadar Hospital, B. Baria	Member
10.	**President/Secretary** Ayurvedic Medicine Manufacturers Association, Dhaka	Member

Functions :

1. To prepare an Ayurvedic Pharmacopoeia of Single drugs and compound drugs.
2. Ayurvedic Pharmacopoeia Sub-committee will be carried out scientific works to generate data on monographs of single drugs in which lay down standards for compound formulations
3. To prepare monographs on single drugs about 250 in two years period will be included in the Pharmacopeia providing information on identity, vernacolar names, descriptions, important formulations, therapeutical index, pharmacognostical standards etc.

To prepare an Ayurvedic Pharmacopoeia the Sub-committee had carried out scientific works to generate data on various monographs of single drugs. Plant origin of Monograph is now being brought out. The Ayurvedic Pharmacopoeia of Bangladesh Part-I comprise of 52 monographs of Ayurvedic single drugs of plant origin, which go into one or more. In compiling the monographs, the title of each drug had been given in Bengali, then comes the definition of the drug giving its identity in scientific nomenclature and very brief information about its source, occurrence, distribution and precautions in collection if any, etc.

The monograph then gives norms and limits under "Identity, Purity and Strength" like tolerance of foreign matter, total ash, acid insoluble ash, alcohol soluble extract, water soluble extract, volatile oil contents etc. Some of them have a direct bearing on the purity and strength. Where possible, Assay of one constituent or group of constituents like total alkaloids or total volatile oils has been given. However, under the heading 'Constituents' one or more constituents or group of constituents like oleoresins, essential oils, alkaloids have been mentioned which only have an informative value based on published research work in phytochemistry. In the case of water soluble or alcohol soluble extract specification of lower limit has an added relevance to the maturity of the drug in addition to its authenticity.

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.

THE
AYURVEDIC PHARMACOPOEIA
OF
BANGLADESH

PART – 1
MONOGRAPHS OF SINGLE DRUGS / HERBS

ADA

(Fam-Zingiberaceae)

Synonyms:

Beng - Ada

Sansk - Adraka

Eng - Ginger root, Ginger

Urdu - Sonth, Zanjabeel

Botanical - *Zingiber officinale Roxb*

Description:

Ada is a slender, perennial rhizomatous herb; leaves linear, sessile, glabrous; flowers yellowish green in oblong, cylindric spikes. Fruits oblong capsules.

a) Macroscopic:

Rhizome, laterally compressed bearing short, flattish, ovate, oblique, branches on upper side each having at its apex a depressed scar, pieces about 5-15 cm long, 1.5-6.5 cm wide (usually 3-4 cm) and 1-1.5 cm thick; extrenally buff coloured showing longitudinal striations and occasional loose fibres; fracture short, smooth, transverse surface exhibiting narrow cortex (about one-third of radius); a well marked endodermis and a wide stele showing numerous scattered fibro-vascular bundles and yellow secreting cells; odour, agreeable and aromatic; taste, agreeable and pungent.

b) Microscopic:

Transverse section of rhizome shows cortex of isodiametric thin – walled, parenchym with scattered vascular strands and numerous isodiametric idioblasts, about 40-80 μ in diameter containing a yellowish to reddish- brown oleo- resin; endodermis slightly thick walled, free from starch; immediately inside endodermis a row of nearly continuous collatrral bundles usually without fibres stele of thin walled, parenchyma cells, arranged radially around numerous scattered, collateral vascular bundles, each consisting of a few unlignified, reticulate or spiral vessels upto about 70 μ in diameter; a group of phloem cells, unlignified, thin walled; septate fibres upto about 30 μ wide and 600 μ long with small oblique slit, like pits, present; numerous scattereds idioblasts, similar those of cortex, and associated with vascular bundles, also present; idioblasts about 8-20 μ wide and upto 130μ long with dark reddish-brown contents; in single or in axial rows, adjacent to vessels, present; parenchyma of cortex and stele packed with flattened, rectangular, ovate; starch grains, mostly 5-15 μ 30-60μ long about 25 μ wide and 7 μ thick, marked by five transverse striations.

ACTIVE CONSTITUENTS :

An aromatic volatile oil having a characteristic flavour and containing terpenses, cineol, borneol, citral, camphene, phelandrene, gingerol, shogaol, zingerfone, zinziberin.

HABITAT– Widely Cultivated in allover Bangladesh, India

IDENTITY, PURITY AND STRENGTH: (Sunthi)

Foreign matter	- Not more than	1	per cent,
Total ash	- Not more than	6	per cent,
Water-Soluble ash	- Not less than	1.5	per cent,
Acid-insoluble ash	- Not more than	1.5	per cent,
Alcohol (90%) soluble extractive	- Not less than	3	per cent,
Water-soluble extractive	- Not less than	10	per cent,

PROPERTIES AND ACTION:

Rasa : Katu

Guna : Laghu, Snigdha

Virya : Usna

Vipaka : Madhura

Karma : Dipana, Pacana, Anulomana, Amadosahara, Vatakaphapaha, Hrdya

PARTS USED: Dry and fresh rhizome..

THERAPEUTIC USES/INDICATION :

Agnimandya; Adhmana; pandu; Svasa; Udararoga; Amavata.

PHARMACOLOGICAL ACTIONS :

Ada possesses stimulant, aromatic and carminative properties when taken internally; and when chewed it acts as a sialagogue. Externally applied it is rubefaclent. It is of much value in atonic dyspepsia, especially if it is acompined with much flatulence; and as an adjunct to purgative medicines to correct griping. When chewed it is serviceable in relaxed conditions of uvulva and tonsils. As a rubefacient it relieves headache.

IMPORTANT FORMULATIONS: Trikatu Curna; Vaisvanara curna; Sawbhagya Vati, Sawbhagyasunthi;

DOSAGE - 1-2 g. in powder form (In a dose)

1-5 ml of fresh juice (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Use should be avoid the person who suffuring from Leprosy /anemiae (Kamala)/painful micturation/haematemesis/ulcer's causes fiver. Use should be avoid at Autumn & Summer.

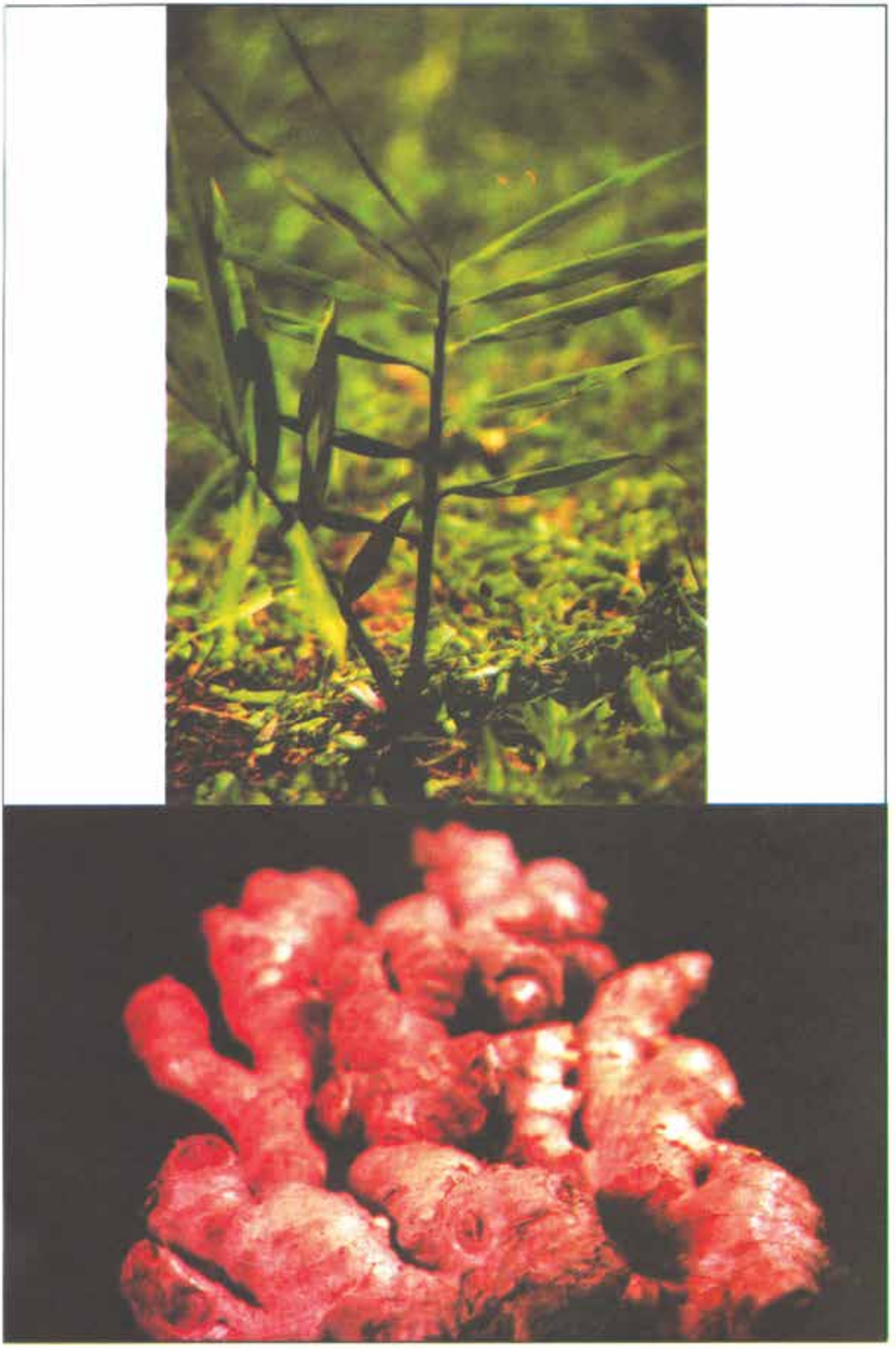
DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duraction.



Ada (*Zingiber officinale* Roxb)

Akand (*Calotropis procera* Ait.)

AKAND

(Fam: Asclepia-daceae)

Synonyms:

Beng	-	Akanda, Akone
Sansk	-	Ravi, Bhanu, Tapana
Eng	-	Madar Tree
Urdu	-	Madar, Aak
Botanical	-	*Calotropis procera* (Ait.)

Description:

Akanda is a large hard much-branched milky shrub, very pale in colour, the branches, leaves and inflorescence covered with loose soft white wool; leaves opposite, subsessile, ovate, cordate at base; flowers beautiful lilac, rosy or purple tinted in umbellate lateral cymes; fruits fleshy follicles, green, seeds with abundant with coma.

Root:

a) **Macroscopic –** Root— rough, fissured longitudinally, corky and soft; externally yellowish-grey while internally white, central core cream coloured; bark easily separated from xylem; odour, characteristic; taste, bitter and acrid.

b) **Microscopic-** Transverse section of root shows outer most cork tissue consisting of 4—8 rows of tangentially elongated and radially arranged cells followed by 3—6 rows of moderately thick-walled, irregular cells of secondary cortex devoid of calcium oxalate crystals and starch grains; cortex composed of large polyhedral parenchymatous cells containing abundant rounded starch grains, some cortical cells contain rosette crystals of calcium oxalate; scattered laticifer cells with brown contents; phloem consists of sieve elements and phloem parenchyama; sieve tubes thick-walled, cells more prominent towards inner region of phloem traversed by uni-to-tetraseriate medullary rays; phloem cells contain crystals of calcium oxalate, starch grains and laticifers similar to these found in cortex; cambium present just within the phloem consisting of 2—5 rows of thin-walled, tangentially elongated cells; xylem form the central part of root composed of vessels, tracheids, fibres and xylem paren chyma; vessels present throughout xylem region and arranged radially in groups of 2—7, sometime single vessels also occur, usually cylindrical having bordered pits on their walls, xylem fibres long, lignified with wide lumen, tapering on ends and have simple pits on walls; medullary rays 1—4 seriate and triseriate in outer region and uni or biseriate in inner region; cells of medullary rays radially elongated, filled with starch similar to those presant in cortical cells.

ACTIVE CONSTITUENTS: Leaves and stalks contain calotropin and calotropangenin. Latex contains usharin, calotoxin and calactin. Flowers contain evandin 3-rhamnoglucoside.

HABITAT–All over Bangladesh. Throughout India in worn dry places.

IDENTITY, PURITY AND STRENGTH- (Root powder)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 4 per cent,

Acid-insoluble ash - Not more than 1 per cent,

Alcohol-soluble extractive - Not less than 2 per cent,

Water-soluble extractive - Not less than 8 per cent,

PROPERTIES AND ACTION-

Rasa : Katu, Tikta

Guna : Laghu

Virya : Usna

Vipaka : Katu

Karma : Kaphavatahrt, Dipana, Bhedana, Krmighna, Vranahara, Visaghna, Kusthaghna.

PARTS USED: Root-barks, leaves, flowers and latex.

THERAPEUTIC USES/INDICATIONS– Kandu; Kustha; Krmiroga; Gulma; Udararoga; Vrana; Svasa.

PHARMACOLOGICAL ACTIONS :

Akanda is purgative, alexipharmic, anthelmintic; cures leprosy, leucoderma, ulcers, tumours, piles, diseases of spleen, liver, and abdomen. Juice is anthelmintic and laxative; cures piles and kapha. Dried and powdered plant is taken with milk acts as a good tonic. Action is similar to digitalis on the heart. Root-bark and jujce have diaphoretic, alterative and purgative properties. It is regarded as a great remedy in syphilitic affections and is called "Vegetable mercury". In Intermitent fevers it is used as antiperiodic and diaphoretic. It cures asthma and syphilis. In form of paste applied to elephantiasis. Tincture of leaves used in intermittent fevers. Latex is bitter, heating, oleagenous and irritant, used in combination with Euphorbia nerifolia as purgative. Flowers are sweet, bitter, digestive, stomachic, tonic, anthelmintic, analgesic, astringent; cure inflammations, tumours, kapha; and are good in ascites.

IMPORTANT FORMULATIONS : Arka Lavan, Mahavisagarbha taila; Dhanvantari ghrita, Arka taila.

DOSAGE : 1-3 g. of the root powder for decoction.

0.5-1 g. root bark powder (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose (3-6g. root-bark) may cause stomac burning, regret & vomiting.

PRECAUTIONS/WARNINGS: It is a poisonus plant. Use should be after purification.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

AMALAKI

(Fam: Euphorbiaceae.)

Synonyms:

Beng	-	Amlaki, Amla, Dhatri,
Sansk	-	Amalaka, Amrtaphala, Dhatriphala,
Eng	-	Emblic, Myrobalan,
Urdu	-	Amla, Amlaj,
Botanical	-	*Emblica officinalis* Gaertn/*phyllanthus emblica*

Description:

A small to medium sized deciduous tree. 8-18m in height with thin light Grey bark exfoliating in small thin irregular flakes; leaves simple, very many, subsessile, closely set along the branchlets, light green having the appearance of pinnate leaves; flowers greenish yellow, in axillary fascicles, unisexual, males numerous on short slender pedicels, females few, subsessile ovary 3- celled.

Fruit:

c) **Macroscopic:** Fruit, globose, 2.5-3.5 cm in diameter, fleshy, smooth with six prominant lines; greenish when tender, changing to light yellowish or pinkish colour when mature, with a few dark specks; taste, sour and astringent followed by delicately sweet taste.

d) **Microscopic:** Transverse section of mature fruit shows an epicarp consisting of single layer of epidermis and 2-4 layers of hypodermis; epidermal cell, tabular in shape, covered externally with a thick cuticle and appear in surface view as polygonal; hypodermal cells tangentially elongated, thick-walled, smaller in dimension than epidermal cells; mesocarp forms bulk of fruit, consisting of thin walled parenchymatous cells with intercellular spaces, peripheral 6-9 layers smaller, ovoid or tangentially elongated while rest of cells larger in size, isodiametric and radially elongated; several collateral fibrovascular bundles scattered throughout mesocarp consisting of xylem and phloem; xylem composed of tracheal elements fibre tracheids and xylem fibres; tracheal elements show reticulate, scalari form and spiral thickenings; xylem fibres elongated with narrow lumen and pointed end; measocarp contains large aggregates of numerous irregular silica crystals.

ACTIVE CONSTITUENTS: Fruits and leaves contain tannins; polyphenolic compound 1,3,6-trigalloylglucose, terchebin, corilagin, ascorbic, ellagic and phyllenbic acids also alkaloids phyllantidine and phyllantine. Fruit rich source of Vitamin C. Phyllembin from fruit pulp identified as ethyl gallate.

HABITAT: Commonly grown throughout Bangladesh, India.

Amalaki (*Emblica officinalis* Gaertn)

IDENTITY, PURITY AND STRENGTH-

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	7	per cent,
Acid-insoluble ash	- Not more than	2	per cent,
Alcohol- soluble extractive	- Not less than	40	per cent,
(On dried basis)			
Water-soluble extractive	- Not less than	50	per cent,
Moisture content	- Not lest than	80	per cent,

PROPERTIES AND ACTION-

Rasa : Amla, Kasaya, Madhura, Tikta, Katu

Guna : Ruksa, Laghu

Virya : Sita

Vipaka : Madhura

Karma : Tridosajt, Vrsya, Rasayana, Caksusya,

PARTS USED: Fresh/Dried fruit mainly.

THERAPEUTIC USES/INDICATIONS: Raktapitta; Amlapitta; Prameha; Daha.

PHARMACOLOGICAL ACTIONS :

Fresh fruit is mild purgative, diuretic, improving liver function Raw fruit is aperient, Dried fruit is cooling and anti haemorrhagic, useful in haemorrhage, diarrhoea and dysentery. It is especially good for abundant growth of hair. It has been found to be effective in the treatment of peptic ulcer and scurvy. Fruit, juice and its sediment and residue are antioxidant due to gallic acid. carminative and stomachic. Fruit juice with lemon juice and sugar is taken for arresting bacillary dysentery. Juice with turmeric powder and honey used to cure diabetes insipidus. In combination with iron it is used for anaemia, jaundice and dyspepsia. Powder of fruit is useful for heamorrhoids, diarrhoea, menorhhagia. Fermented liquor prepared from the fruit is used in jaundice, dyspepsia and cough.

IMPORTANT FORMULATIONS – Cyavanaprasa, Amalaki rasayan, Dhatri rasayan, Dhatri lauha, Dhatryadi ghrita, Triphala curna.

DOSAGE : 5-10ml of fresh juice. (Per dose)

3-6 g. powder form.(Per dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

APARAJITA

(Fam : Fabaceae)

Synonyms:

Beng	-	Aparajita
Sansk	-	Girikarnika, Visnukranta.
Eng	-	Clitoria
Urdu	-	
Botanical	-	*Clitoria ternatea Linn.*

Description:

Aparajita is a good-looking perennial twining herb with terete stems and branches, leaves compound, imparipinnate, leaflets 5-7, sub- coriaceous, elliptic-oblong, obtuse; flowers blue or white, solitary, axillary or in fascicles, corolla papilionaceous; fruits nearly straight, flattened pods, sharply beaked; seeds 6-10, smooth, yellowish brown.

a) Macroscopic:

Drug consisting of a stout tap root with a few tortuous branches, cylindrical, 1-5 mm in thickness, a few places show cracks due to presence of lenticels, colour, lightbrown, fracture, fibrous; taste, bitter.

b) Microscopic:

Root- Shows 10-20 or more layers of rectangular, thin-walled, tangentially elongated exfoliating cork cells; secondary cortex consists of 10-20 rows of large, polygonal, thin-walled cells filled with starch grains, a few cells contain prismatic crystals of calcium oxalate in this region; single or groups of 2-10 lignified cortical fibres distributed in the lower half of the cortex secondary phloem consists of usual elements; phloem fibres 2-8 in groups, a few solitary fibres also present, very long, thin-walled with narrow lumen and pointed tips; secondary xylem consists of usual elements; vessels pitted with oblong, bordered pits and have short conical tail at one end, mostly occur 2 or 3 in groups; xylem fibres similar to those of phloem fibres, a few showing slit-like pits; medullary rays 1-5 cells wide, oblong and pitted; xylem parenchyma irregular in shape and pitted walls; starch grains simple as well as compound having 2-6 components; single grains measuring 3-13 μ in dia., found in secondary cortex, phloem and xylem parenchyma.

Powder- Yellowish-brown; shows simple and compound starch grains, measuring 3-13 μ in dia., vessels with oblong bordered pits and fragments of fibres.

CHEMICAL COMPOSITION :

The high calcium concentration in the plant showed that it can be exploited as a significant source of calcium brewed as herbal drink. The presence of stigmast-4-ene-3, 6, diene is reported from the plant. The roots contain taraxerol and teraxerone. The leaves contain 3- monoglucoside, 3- rutinoside, 3-neohesperidoside, 3-0-rhamnosyl-glucoside, 3-0-rhamnosyl-galactoside, of kaempferol, besides

kaempferol-3-0-rhamnsyl-0-rhamnosyl-glucoside. The also contain aparajitin and β-sitosterol. The blue flowers contain delphinidin-3,5- diglucoside, delphinidin-3β-glucosed and its 3-methyl derivative, malvidin-3βglucoside, kaempferol and cyanin chloride; the white flowers yield only kaempferol other substances present in the seeds are: p-hydorxycinnamic acid, flavonol-3glycoside, ethyl-ά –D-galactopyranoside, adenosine, 3, 5, 7, 4'-tetrahydroxyflavone-3 rhamnoglucoside, a polypeptide, hexacosanol, β-sitosterol and an anthoxanthin glucoside. The seeds also contain oligosaccharides or flatulene.

HABITAT : Throughout India and Bangladesh in hedges and thickers, also cultivated in gardens.

IDENTITY, PURITY AND STRENGTH: (Root)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 5 per cent,

Acid-insoluble ash - Not more than 2 per cent,

Alcohol soluble extractive - Not less than 5 per cent,

Water-soluble extractive - Not less than 8 per cent,

T.L.C-

T.L.C. of alcoholic extract of the drug on Silica gel 'G' using Chloroform: Ethylacetate: Formic Acid (5:4:1) v/v shows one spot at Rf. 0.79 (dull yellow) in visible light. Under UV (366 nm) a spot is seen at Rf. 0.79 (blue). On exposure to lodine vapour two spots appear at Rf. 0.54 and 0.79 (both yellow). On spraying with 10% aqueous solution of Ferric Chloride and heating the plate at 105°C for about fifteen minutes one spots appears at Rf. 0.79 (Grey).

PROPERTIES AND ACTION :

Rasa : Tikta, Kasaya, Katu,

Guna :

Virya : Sita

Vipaka : Katu

Karma : Vatahara, Pittahara, Kaphahara, Kanthya, Medhya, Caksusya, Visahara, Buddhiprada.

PARTS USED: Leaf, Root,

THERAPEUTIC USES/INDICATIONS: Mutraroga, Kustha, Sotha, Vrana, Sula.

PHARMACOLOGICAL ACTIONS :

Aparajita root, bitter, emetic, cathartic, purgative and diuretic, useful in ascites and fevers; used by tribals to cause abortion. Root bark, diuretic and laxative, infusion of root-bark is useful in irritation of bladder and urethra. In konkan, root-juice is given in cold milk to remove phlegm in chronic bronchitis. Seeds are purgative and aperient . Seed roasted and powdered are given in ascites and enlargement of abdominal viscera. Plant is used in snake bite.

IMPORTANT FORMULATIONS: Misraka Sneha, Vataraktantaka Rasa,

DOSAGE : 1-3 g. in powder form (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

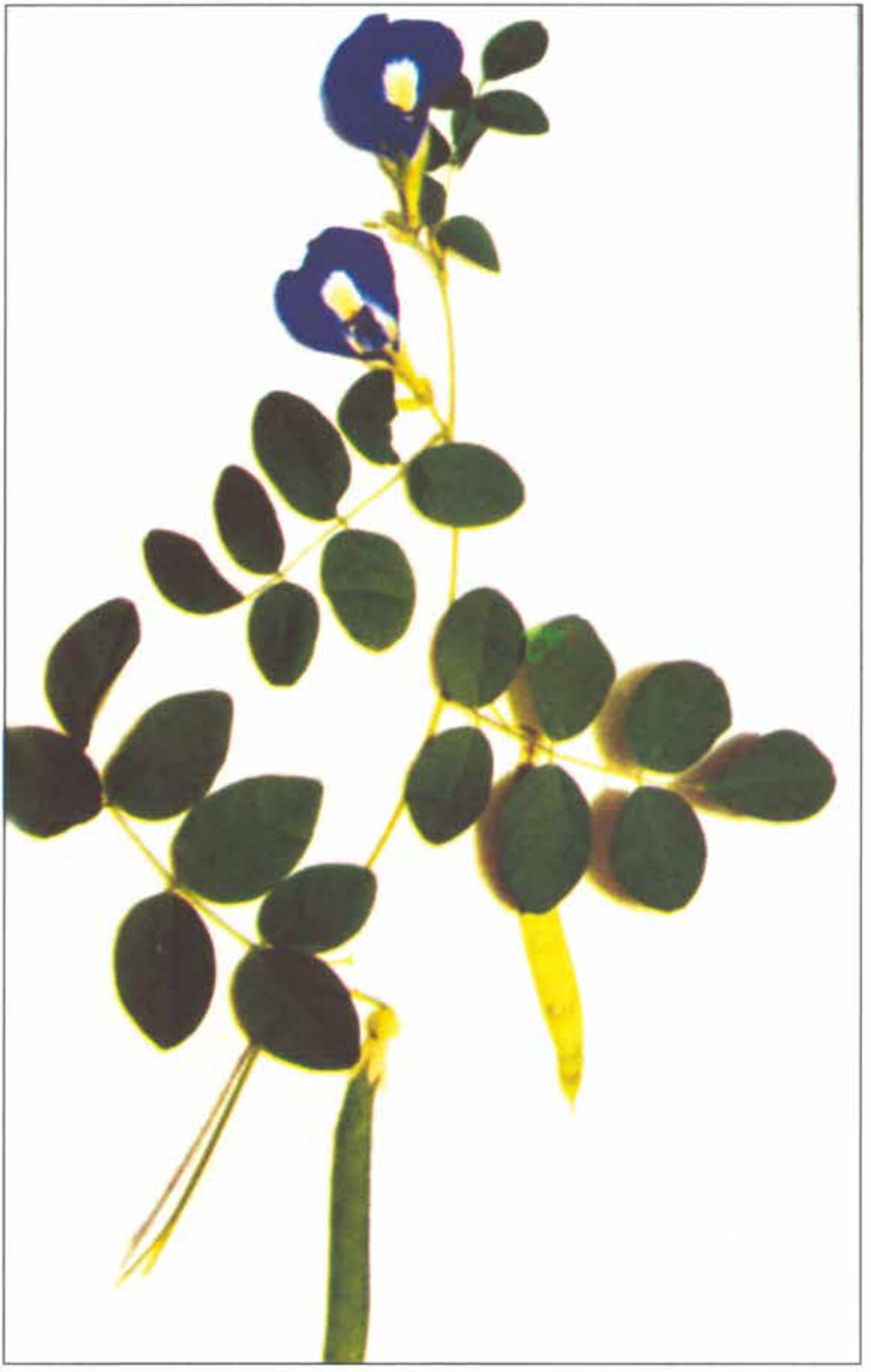
DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.



Aparajita (*Clitoria ternatea* Linn.)

Arjuna (*Terminalia arjuna.*)

ARJUNA

(Fam : Combretaceae)

Synonyms:

Beng	-	Arjuna
Sansk	-	Partha
Eng	-	Myrobalan
Urdu	-	Arjun
Botanical	-	*Terminalia arjuna.*

Description:

Arjuna is a large evergreen tree with butter-seed trunk & spreading crown with drooping branches. Leaves simple subopposite, oblong or elliptic, coriaceous, crenulate, pale dull green above, pale brown beneath, often unequal sided, nerves 10-15 pairs, reticulate flowers white in panicles of spikes with linear bracteoles; fruits ovoid or oblong with 5-7 short, hart angles or wings, the lines on the wings oblique and curving upwards.

Stem bark:

a) Macroscopic:

Bark available in pieces, flat, curved, recurved, channelled to half quilled, 0.2-1.5 cm thick, market samples upto 10 cm in length and up to 7 cm in width, outer, surface somewhat smooth and Grey, inner surface somewhat fibrous and pinkish, transversely cut smoothened bark shows pinkish surface, fracture, short in inner and laminated in outer part; taste, bitter and astringent.

Microscopic:

Stem Bark: Mature bark shows cork consisting of 9-10 layers of tangentially elongated cell, a few outer layers filled with brown colouring matter; cork cambium and secondary cortex not distinct and medullary rays observed traversing almost upto outer bark; secondary phloem occupies a wide zone, consisting of sieve tubes, companion cells, phloem parenchyma and phloem fibres, traversed by phloem rays, usually uniseriate but biseriate rays also occasionally seen; in the middle and outer phloem region, sieve tubes get collapsed and form ceratenchyma; phloem fibres distributed in rows and present in groups of 2-10; rosette crystals of calcium oxalate measuring 80-180μ in dia. present in most of the phloem parenchyma, alternating with fibres; idioblasts consisting of large cells having aggregates of prismatic and rhomboidal crystals of calcium oxalate in row throughout the zone, measuring 260-600 μ in dia., starch grains, mostly simple, compound of 2-3 components, sometimes up to 5 components, round to oval, elliptical, measuring 5-13 μ in dia., distributed throughout the tissue (absent in T. alata); in a tangential section the uniseriate phloem rays 2-10 cells high and biseriate, 4-12 cell high; in longitudinal section rosette crystals of calcium oxalate found in the form of strands in phloem parenchyma.

Powder- Reddish-brown; shows fragments of cork cells, uniseriate phloem rays, fibres, a number of rosette crystals of calcium oxalate, a few rhomboidal crystals, starch grains simple and compound, round to oval, elliptic, having 2-3 components with concentric striations and small narrow hilum, measuring 5-13 μ in diameter.

ACTIVE CONSTITUENTS: Arjunolic acid, tomentosic acid, B-sitosterol, ellagic acid, saponin and (+) leucodelphinidin. Bark contains a crystabine compound arjunine, a laactone, arjunetin, essential oil, tannin (12%) pyrocatachol, large quantities of calcium salts and traces of aluminium and magnesium salts, reducing sugars and colouring matter.

HABITAT : Arjun is commonly found throughout Bangladesh.

IDENTITY, PURITY AND STRENGTH: (Stam bark)

Foreign matter	- Not more than	2 per cent,
Total ash	- Not more than	25 per cent,
Acid-insoluble ash	- Not more than	1 per cent,
Alcohol- soluble extractive	- Not less than	20 per cent,
Water-soluble extractive	- Not less than	20 per cent,

PROPERTIES AND ACTION-

Rasa	:	Kasaya
Guna	:	Ruksa
Virya	:	Sita
Vipaka	:	Katu
Karma	:	Kaphahara, Pittahara , Hrdya, Vrananasana, Bhagnasandhanakara, Vyanga hara.

PARTS USED –Bark.

THERAPEUTIC USES/INDICATIONS– Hrdroga, Ksataksaya, Medoroga, Prameha, Vrana, Trsa, Vyanga.

PHARMACOLOGICAL ACTIONS :

Leaves are used externally as a cover for sores and ulcers. Juice of fresh leaves is used for earache. Bark is astringent, antidysenteric, cardiotonic, styptic, febrifuge, cooling internally and wholesome for heart. It is used in heart diseases as a cardiac tonic, and in billous affections. If cores wounds and urinary diseases. Powdered bark relieves hypertension, has a diuretic and a general tonic effect in case of cirrhosis of liver; is given internally with milk in bone fractures and contusions with excessive ecchymosis. The decoction is used as a wash in ulcers and cancer. Ashes of bark prescribed in scorpion sting. Fruit is tonic and deobstruent.

IMPORTANT FORMULATIONS: Arjunarista, Parthadyarista, Nagarjunabhra Rasa, Arjuna Ghrita.

DOSAGE : 3-6 g. of the bark powder form (in a dose).

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trauble not-yet known.

PRECAUTIONS/WARNINGS: Use should be avoid in Hypertention & High bloodpressure condition.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

ASHOKA

Fam : Leguminosae

Synonyms:

Beng	-	Ashoka,
Sansk	-	Kankeli,
Eng	-	Asok Tree,
Urdu	-	Asoka
Botanical	-	*Saraca. asoca* Rosc./ *Saraca indica* Linn.

Description:

Asoca is a medium sized handsome evergreen tree. Leaves pinnate, 30-60 cm long having 2-3 pairs of lancelate leaflets; flowers orange or orange yellow in dense corymbs, very fragrant; fruits flat black pods, leathery, compressed; seeds 4-8 per pod, ellespsoid, oblong and compressed.

Stem bark:

a) **Macroscopic:** Bark channelled, externally dark green to greenish Grey; smooth with circular lenticels and transversely ridged, sometimes cracked, internally reddish- brown with fine longitudinal strands and fibers; fracture splintery exposing striated surface; a thin whitish continuous layer is seen beneath the cork layer; taste, astringent.

b) **Microscopic:** Transverse section of stem bark shows periderm consisting of a wide layer of cork, radially flattened, narrow cork cambium; secondary cortex wide with one or two continuous layers of stone cells with many patches sof sclereids; parenchymatous tissue contains yellow masses and prismatic crystals; secondary phloem consits of phloem parenchyma, sieve tubes with companion cells and phloem fibres occuring in groups; crystal fibres present.

ACTIVE CONSTITUENTS :

24- methylcholest-5-3n 3B-ol, -24-ethycholesta-5, 22-dien-3B-ol and 24-ethylcholest-5en-3B-ol isolated from bark; wax from bark contained n- alkanes; palmitic, steraric, linoleic and linlenic acid in fixed oil from flowers, β- sitosterol, quercetin, kaempferol quercetin etc. in flowers. Tannis.

HABITAT : Commonly found throughout Bangladesh and India.

IDENTITY, PURITY AND STRENGTH: (Bark)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	11	per cent,
Acid-insoluble ash	-	Not more than	1	per cent,
Alcohol-(90%) soluble extractive	-	Not less than	15	per cent,
Water-soluble extractive	-	Not less than	11	per cent,

PROPERTIES AND ACTION:

Rasa : Kasaya, Tikta

Guna : Laghu, Ruksa

Virya : Sita

Vipaka : Katu

Karma : Grahi, Varnya, Hrdya, Sothahara, Visaghna,

PARTS USED: Bark, Seeds & Flowers

THERAPEUTIC USES/INDICATIONS: Asrgdara; Apaci; Daha; Raktadosa; Sotha.

PHARMACOLOGICAL ACTIONS :

Asoka is known as an uterine tonic. It imparts a healthy tone and strenth to uterus. In bloody leucorrhoea whether acute or chronic, it exerts an exhilarating and permanent curative action. It is an excellent remedy in suppressed menses for which colicky abdominal pains supervine, also useful for complaints of menopause and barrenness. Bark is refrigerant, astringent, alexiteric, demulcent, emollient, anthelmintic; cures dyspepsia, burning sensation, diseases of blood billousness, tumours, enlargenment of abdomen, colic, piles, ulcers, bloody discharges from uterus, menorrhagia. Flowers pounded and mixed with water are used in haemorrhagic dysentery and for bleeding piles and retention of urine.

IMPORTANT FORMULATIONS: Asokarista; Asokaghrita.

DOSAGE : 20-30 g. of the bark for decoction. (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

Ashoka (*Saraca indica* Linn.)

Ashvagandha (*Withania somnifera* Dunal.)

ASHVAGANDHA

(Fam : Solanaceae)

Synonyms:

Beng	-	Ashvagandha,
Sansk	-	Hayagandha, Vajigandha,
Eng	-	Vegetable rennet,
Urdu	-	Asgand,
Botanical	-	*Withania somnifera Dunal*,

Description:

Ashvagandha is an erect branching under shurb reaching about 150 cm in height usually clothed with minutely stellate tomentum; leaves ovate up to 10 cm long; Flowers greenish or lurid yellow in axillary fascicles.fruits globase berries which are orange coloured when mature enclosed in apersistant calyx.

a) Macroscopic:

Roots straight, unbranched, thickness varying with age, roots bear fibre-like secondary roots, outer surface buff to grey-yellow with longitudinal wrinkles; crown consists of 2-6 remains of stem base; stem bases variously thickened; nodes prominent only on the side from where petiole arises, cylindrical, green with longitudinal wrinkles; fracture, short and uneven; odour, characteristic; taste, bitter and acrid.

b) Microscopic:

Transverse section of root shows cork exfoliated or crushed; when present isodiamatric and non-lignified; cork cambium of 2-4 diffused rows of cells; secondary cortex about twenty layers of compact parenchymatous cells; phloem consists of sieve tubes, companion cells, phloem parenchyma; cambium 4-5 rows of tangentially elongated cells; secondary xylem hard forming a closed vascular ring separated by multiseriate medullary rays; a few xylem parenchyma.

ACTIVE CONSTITUENTS:

Roots contain several pyrazole alkaloids. Withasomnine and steroidal lactones, withaferin A and withanolides. They also contain starch, reducing sugars, hentriacontane, glycosides, dulcitol, withaniol, an acid and a neutral compound. Withaferin is a bacteriostatic and antitumerous agent.

HABITAT : It grows throughout the dried parts of Bangladesh, India, Pakistan.

IDENTITY, PURITY AND STRENGTH- (Root)

Foreign matter	-	Not more than 2 per cent,
Total ash	-	Not more than 7 per cent,
Acid-insoluble ash	-	Not more than 1 per cent,
Alcohol (25%) soluble extractive	-	Not less than 15per cent,

ASSAY- Awwagandha consists of not less than 0.2 per cent alkaloids, when assayed as follows:

Take about 30g accurately weighed of the powdered drug, cover with Alcohol (90%) and allow to stand overnight, Extract for 6 hours so wet apparatus and concentrate to a syrup residue. Treat with 25,20,15 and 10 ml portions of 5% ***sulphuric Acid*** *until complete extraction of alkaloid is affected.*

To the combined acid extracts add an excess of Dragandorf's reagent. Filter under suction and dissolve the residue in Acetone, Shake the acetone solution with freshly prepared suspension of 2g Silver Carbonate in 10 ml of Water. Filter the solution and wash the precipitate with Acetone, Alcohol and water in that order. Pass sufficient Hydragen Sulphide through the filtrate, Boil the solution for 10 minutes, filter and evaporate under vacuum in a tared flask. Add to the residue 5 ml of Ethyl Alcohol, evaporate to dryness, repeat the process once again and weight the residue to constant weight in a vacuum dessicator.

PROPERTIES AND ACTION:

Rasa : Tikta, Kasaya,

Guna : Laghu,

Virya : Usna,

Vipaka : Madhura,

Karma : Vatakaphapaha, Balya, Rasayana, Vajikarana,

PARTS USED : Root, leaves, fruits & seeds,

THERAPEUTIC USES/INDICATIONS: Ksaya; Daurbalya; Vataroga; Sotha; Klaibya.

PHARMACOLOGICAL ACTIONS :

Asvagandha plant is sedative, tonic, stimulant, aphrodisiac and helps toning up of uterus of women internally it is used in marasmus in children externally it is used in the treatment of inflammatory conditions, ulcers and scabies. Root is adaptogenic, alterative, aphrodisiac, deobstruent, diuretic and tonic. It is useful in cough, dropsy hiccup, leucorrohea and menstrual troubles. It restores loss of memory and is used in cases of nervous exhaustion, spermatorrhoea and senile debility. Powder of root mixed with un-equal parts of ghee and honey is beneficial in impotency or seminal debility. Decoction boiled with milk and ghee promotes nutrition. Root and leaves are used for emphysematous dyspnea. Leaves are bitter, antipyretic and anthelmintic. Bruised leaves and ground root is locally applied in carbuncles, scabied, painful swellings and ulcers. Fruit is sweet, applied to wounds, and is used in asthma, biliousness and strangury. Ripe fruits are anodyne or sedative. Round capsular fruit is used in fresh state as an emetic and when drid is used as a stomachic. In small doses it is a remedy in dyspepsia and flatuent colic. It coagulates milk. Seeds are emmenagogue, diuretic, useful in lumbago, ophthalmia. They lessen inflammation of piles.

IMPORTANT FORMULATIONS: Asvagandhadyarista, Asvagandhasav, Asvagandhadi curna, Asvagandhadi leha; A. taila, Balasvagandha laksadi taila. A. ghrita, A. rasayan.

DOSAGE : 3-6 g. root in powder form (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion and long term use may couse nurvous debility.

PRECAUTIONS/WARNINGS: Use should be avoid in diarrhoeal condition.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

BAHERA

(Fam : Combretaceae)

Synonyms:

Beng - Bayada, Baheda,

Sansk - Vibhita, Aksa, Aksaka,

Eng - Beleric Myrobalan,

Urdu - Bahera,

Botanical - *Terminalia belerica* Roxb,

Description:

A large deciduous butter seed tree, 20-30 m in height with thick brownish Grey back having shallow longitudinal fissures; leaves simple, alternate, long-petioled, crowded about the extremities of the branches, broady elliptic, margins entire, main nerves 6-8 pairs, midrib prominent on both surfaces; flowers pale greenish yellow with an offensive odour, in axillary spikes, longer than the petioles but shorter than the leaves; fruit ovoid grey drupes obscurely 5 angled, narrowed into a very short stalk.

Fruit :

a) Macroscopic:

Fruit nearly spherical to ovoid, 25-4.0 cm in diameter; fresh ripe fruits slightly sil very or with whitish shiny pubescent surface; mature fruits Grey or greyish brown with slightly wrinkled appearance; rind of fruit shows variation in thickness from 3-5 mm; taste, astringent.

b) Microscopic:

transverse section of fruit shows an outer epicarp consisting of a layer of epidermis, most of epidermal cells elongate to form hair like protuberance with swollen base; composed of a zone of parenchymatous cells, slightly tangentially elongated and irregularly arranged, intermingled with stone cells of varying shape and size; elongated stone cells found towards periphery and spherical in the inner zone of mesocarp in groups of 3-10; mesocarp traversed in various directions by numerous vascular strands; bundles collateral, endarch; simple starch grains and some stone cells found in stone cells present in parenchymatous cells; endosperm composed of stone cells running longitudinally as well as transversely.

ACTIVE CONSTITUENTS :

Fruits contain about 17% tannin and β- sitosterol, gallic acid, ellagic acid, ethyl galate, galloyl glucose and chebulagic acid. Heartwood and bark contain ellagic acid and the seed coat of the fruit contains gallic acid. A new cardiac glycoside- bellericanin. Kernel oil had a purgative action, and fruit extract produced fall in blood pressure and significant increase of bile secretion in experimental animals.

HABITAT : Found in the plains and lower hills, throughout Bangladesh & India.

IDENTITY, PURITY AND STRENGTH: (Fruit pulp)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 7 per cent,

Acid-insoluble ash - Not more than 1 per cent,

Bahera (*Terminalia belerica* Roxb.)

Alcohol soluble extractive - Not less than 8 per cent,

Water-soluble extractive - Not less than 35 per cent,

PROPERTIES AND ACTION:

Rasa : Kasaya,

Guna : Ruksa, Laghu,

Virya : Usna,

Vipaka : Madhura,

Karma : Kaphapittajit, Bhedaka, Krminasana, Caksusya, Kesya, Kasahara,

PARTS USED: Fruits.

THERAPEUTIC USES/ INDIGATIONS :

Svarabheda; Netraroga; Kasa; chardi; Krimiruga; Vibandha.

PHARMACOLOGICAL ACTION :

Fruit of Bahera is bitter, astringent, tonic, laxative, antipyretic, used in piles, dropsy, diarrhoea, headache, leprosy, dyspepsia and billiousness; useful in coughs, hoarseness, eye diseases; purgative when half ripe and astringent when ripe. Kernel is narcotic, useful in thirst, vomiting, bronchitis and corneal ulcers.

IMPORTANT FORMULATIONS : Triphala curna; Talisadi curna, Triphaladi taila; Lavangadi vati, Fala-trikadi kath.

DOSAGE : 3-6 g. in powder form (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BANARMUL

(Fam- Poaceae)

Synonyms:

Beng - Venarramula, Khaskhas,

Sansk - Virana, Adhaya, Sevya,

Eng - Cuscus Grass,

Urdu - Khas,

Botanical - *Vetiveria zizanioides* (Linn.),

Description : (Root)

Clusters of wiry roots upto 2 mm in diameter, minute, longitudinally grooved; colour varies from cream, grey or light yellow to brown; fracture, short and splintery; odour, strong aromatic; taste, slightly bitter.

Microscopic:

Root shows an epidermis consisting of tangentially elongated cells having brownish content followed by a layer of hypodermis, consisting of thin-walled cells, similar to epidermis; cortex consisting of 2-3 layers of thick-walled, lignified sclerenchymatous cells towards periphery and aerenchymatous cells towards centre; endodermis, single layered of barrel-shaped cells with highly thickened inner walls; pericycle many layered with thick-walled, sclerenchymatous cells enclosing radial vascular bundles arranged in a ring; simple, round to oval, starch grains measuring 8-12 μ in diameter present in aerenchyma, pericycle and pith cells.

Powder- Ash-coloured; odour, strongly aromatic and bitter in taste, shows fibres in groups, isolated, xylem vessels, simple, round to oval, starch grains measuring 8-12 μ in dia.

ACTIVE CONSTITUENTS:

Essential oil containing β-vetivone. Isobisabolene, khusol and azulene from oil.

HABITAT : It is Found every where in Bangladesh, rever side of India, Srilanka & Mayanmar.

IDENTITY, PURITY AND STRENGTH: (Root)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 9 per cent,

Acid-insoluble ash - Not more than 6 per cent,

Alcohol soluble extractive - Not less than 4 per cent,

Water-soluble extractive - Not less than 5 per cent,

Volatile oil - Not less than 1 per cent,

T.L.C.—

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n-Butanol : Acetic acid : Water (4:1:5) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.49 and 0.72 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.28, 0.75 and 0.94 (all yellow). On spraying with 5%

Methanolic Sulphuric acid reagent and heating the plate at 105°C for ten minutes four spots appear at Rf. 0.19, 0.33, 0.73 and 0.94 (all grey).

PROPERTIES AND ACTION:

Rasa : Tikta, Madhura

Guna : Laghu, Snigdha

Virya : Sita

Vipaka : Madhura

Karma : Vataghna, Dahaklantihara, Pittaghna, Pacana, Stambhana and Kaphapitahart

PARTS USED –Root

THERAPEUTIC USES/INDICATIONS :

Jwara, Trisna, Mutrakrcchra, Vrana

PHARMACOLOGICAL ACTIONS :

Usira roots are tonic, diuretic, refrigerant, stomachic stimulant, antispasmodic, diaphoretic and emmenagogue. Infusion of roots is refrigerent, febrifuge, diaphoretic, stimulant and emmenagogue; pulvereized and made into paste in water is used as a cooling external application in fevers; their essence used as tonic.

IMPORTANT FORMULATIONS : Usirasava, Yogarajaguggulu, Sadanga Kwatha Curna

DOSAGE : 3-6 g. powder form (in a day)

2.5-5.0 ml Arka (in a day)

50-100 ml Fant (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause not-yet known.

PRECAUTIONS/WARNINGS: Use should be avoid in Diabetis Insepitus (Bahomutrata)

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BARUN

(Fam : Capparidaceae)

Synonyms:

Beng	-	Varuna,
Sansk	-	Varana,
Eng	-	Three leaved caper,
Urdu	-	
Botanical	-	*Crataeva nurvala Buch-Ham .*

Description:

Varuna is a moderate sized deciduous tree. Bark grey, smooth horizontally wrinkled. Leaves trifoliate. Flowers white, or cream in many flowered terminal corymbs. Fruits multiple seeded, ovoid berry. Seeds are embedded in yellow fleshy pulp.

Stem bark:

a) **Macroscopic:** Thickness of bark varies, usually 1-1.5 cm according to the age and portion of the plant from where the barks is removed, outer surface, greyish to greyish- brown with ash-grey patches; at places, surface rough due to a number of lenticels, shallow fissures and a few vertical or longitudinal ridges; inner most surface smooth and cream white in colour; fracture tough and short; odour, indistinct; taste, slightly bitter.

b) **Microscopic:** Transverse section of mature stem bark shows, an outer cork composed of thin-walled, rectangular and tangentially elongated cells, phellogen single layered, thin-walled, tangentially elongated cells followed by a wide secondary cortex, consisting of thin walled, polygonal to tangentially elongated cells with a number of starch grains; starch grains mostly simple, occasionally compound with 2-3 components also present; large number of stone cells in groups of two or more, found scattered in secondary cortex, single stone cells not very common, stone cells vary in size and shape, being circular to rectangular or elongated with pits and striations on their walls; stone cells distributed somewhat in concentric bands in phloem region except in inner region of phloem which is devoid of stone cells; secondary phloem comparatively a wide zone, consisting of sieve tubes, companion cells, parenchyma and groups of stone cells, alternating with medullary rays; sieve elements found compressed forming ceratenchyma in outer phloem region whereas in inner region of phloem, intact; medullary rays mostly multiseriate composed of thin-walled, radially elongated cells, tangentially elongated towards outer periphery, a number of starch grains similar to secondary cortex also present in phloem and ray cells; few rhomboidal crystals of calcium oxalate also found this region; inner most layer is cambium.

ACTIVE CONSTITUENTS:

Triterpenoids lupeol and varunol have been isolated from root and stem bark. The water extract also contains tertiary and quartemery bases including choline. The leaves yield flavonoids including rutin, quercetin and isoquercetin.

Barun (*Crataeva nurvala* Buch-Ham.)

HABITAT : All over Bangladesh; Evergreen tree growing widely in all parts of India.

IDENTITY, PURITY AND STRENGTH: (Bark powder)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	13	per cent,
Acid-insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	1	per cent,
Water-soluble extractive	- Not less than	8	per cent,

PROPERTIES AND ACTION:

Rasa : Tikta, Kasaya

Guna : Laghu, Ruksa

Virya : Usna

Vipaka : Katu

Karma : Dipana, Bhedi, Vataslesmahara

PARTS USED: Roots, stem bark, leaves & flowers.

THERAPEUTIC USES/INDICATIONS: Asmari; Mutrakrcchra; Gulma; Vidradhi.

PHARMACOLOGICAL ACTIONS :

Urolithiasis and crystalluria, Urinary tract infections. In Ayurvedic practice, varuna is used as a litholytic agent, in treating 'Kapha' and 'Vata' varieties of ashmari. It also clears rystalluria. It is the drug of choice in all kapha disorders of the urinary tract, and in renal and bladder calculi. It is also use as a cholagogue, anti-helmintic and antiameobic in both intestinal and hepatic infestation. Its action as an anti-inflammatory agent is utilized in its used in deep-seated suppurative inflammations, in small joint, diseases and in osteomyelitis. It is also used as an antipyretic.

IMPORTANT FORMULATIONS: Varunadi kvatha, Varunadi churna, Varunadya lowha.

DOSAGE: 20-30 g. of the bark for decoction. (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BASAK

(Fam- Acanthaceae)

Synonyms:

Beng	-	Baksa, Vasaka,
Sansk	-	Vrsa, Atarusa, Vasaka,
Eng	-	Vasaka,
Urdu	-	Adusa, Basa,
Botanical	-	*Adhatoda vasica Nees/A. Zeylanica/Justicia A. Linn,*

Description:

Basak is a small evergreen, subherbacious bush. The leaves are minulety pubescent and broadly lanceolate. The inflorescence is dense, short pedunculate, bractate and spike terminal. The corolla is large and white with lower lip streaked phrple, the corolla is a 4-seeded small capsule.

Leaves-

a) Macroscopic:

Leaves, 10-30 cm long and 3-10 cm broad, lanceolate to ovate-lanceolate, slightly acuminate, base tapering, petiolate; petioles 2-8 cm long, exstipulite, glabrescent, 8-10 pairs of lateral vein bearing few hairs; dried leaves dull brown above, light greyish brown below; odour, characteristic; taste, bitter.

b) Microscopic:

transverse section of leaf shows, dorsiventral surface with 2 layers of palisade cells; in surface view, epidermal cells sinuous with anomocytic stomata on both surfaces, more numerous on the lower; clothing trichomes few, 1-3, rarely upto 5 celled, thin-walled, uniseriate, upto 500 μ and glandular trichomes with unicellular stalk and 4 celled head measuring, 25-36 μ in diameter in surface view; cystoliths in mesophyll 1 a yers, elongated and cigar shaped ; acicular and prismatic forms of calcium oxalate crystals present in mesophyll; palisade ratio, 5-6, 5-8. 5; stomatal index, 10.8-14.2-18.1 for lower surface.

ACTIVE CONSTITUENTS:

A. vasica is a source of quinozoline alkaloids-vasicolin, adhatodine, vacicolinone and anisotine. It contains betaine, vasicinone and new alkaloid vasicine (1%); in addition B- sitosterol and tritriacontane in different parts. Leaves, visicine (0.79%); and flowering tops, 0.47%. Peganine (vasinine)-the chief active principle in quinazoline alkaloids yield from different leaf samples from India, 0.54 to 1.11% dry wt. basis while in foreign samples it is high 2.18% Adhatodic acid. Alcoholic extract of leaves is useful as hypotensive, bronchodilator, respiratory stimulent, hypoglycemic and antispasmodic. Oil from leaves flowers and roots is active against Tubercule bacilli. Essential oil from leaves is bronchodilator, also vasicinone and ephedrine, potentiated; anti-insect and juvenile hormone mimicking activity.

HABITAT: All over Bangladesh. Commonly cultivated as a hedge plant, often grows wild near human inhabitation's.

Basak (*TAdhatoda vasica* Nees)

IDENTITY, PURITY AND STRENGTH: (Dried fresh leaves)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	21	per cent,
Acid-insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	3	per cent,
Water-soluble extractive	- Not less than	22	per cent,

PROPERTIES AND ACTION-

Rasa : Tikta, Kasaya

Guna : Laghu,

Virya : Sita

Vipaka : Katu

Karma : Kaphapittahara, Raktasamgrahika, Kasaghna, Hrdya.

PARTS USED: Roots, leaves, bark and flowers.

THERAPEUTIC USES/INDICATIONS:

Kasa; Svasa; Kasaya; Raktapitta; Prameha; Kamala; Kustha.

PHARMACOLOGICAL ACTIONS :

Vasaka is a reputed remedy for all sorts of cough and cold, bronchitis and other respiratory disorders due to its expectorant action. It is the main constituent of cough syrup "Adulsa syrup". Plant is bitter, astringent, diuretic, antispasmodic, expectorant and alterative. It cures vomiting, thirst, dermatosis, jaundice, fever, phthisis and haematemesis. It is particularly useful in fevers associated with bilious and respiratory troubles and also in piles. Roots are expectorant and mild bronchial antiseptic; given in intermittent fever, pulmonary and catarrhal affections. Leaves and roots are hypoglycemic. Juice of leaves relieves cough by its soothing action on nerves and by liquefying sputum.

IMPORTANT FORMULATIONS: Vasakasava; Vasaka-rista, Vasavaleha, Vasa- chandanadi taila

DOSAGE : 10-20 ml. of juice of fresh leaves (In a day)

10-20 ml of fresh flower juices

10-20 g of the dried leaf for decoction.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS: Bilter in test.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BEL

(Fam : Rutaceae)

Synonyms:

Beng	-	Bela, Bilva
Sansk	-	Sriphala
Eng	-	Bengal Quince, Bael fruit
Urdu	-	Bel
Botanical	-	*Aegle marmelos Corr.*

Description:

Bel is a medium sized armed deciduous tree up to 8 m height with straight, sharp, axillary thorns and yellowish brown shallowly furrowed corkly bark; leaves trifoliate, aromatic, alternate leflets ovate of ovate – lanceolate; crenate, pellucid-punctate, the laterals subsessile and the terminal long-pertioled; flowers greenish white, e, sweet scented, in axillary panicles; fruits globese, woody berry with yellowish ring; seeds numerous oblong, compressed, embedded in orange brown sweet gummy pulp.

a) **Macrospic—**

Fruit, sub-globose, 5-18 cm in diameter, externally greenish when young, yellowish-brown when ripe, rind about 1.5 mm-3mm thick, hard and woody, surface smooth or slightly granular bearing a circular scar at the point of attachment with peduncle; carpels, 10-15, central, each containing several hairy seeds embedded in yellowish brown, extremely sticky mucilage; seeds oblong, flat, woody, and having white hair; fresh pulp of ripe fruit, brown, of sticky shreads; dried pulp hard and pale to dark red in colour frequently breaks away from the rind durin drying, leaving a thin layer attached to it, odour, faintly aromatic; taste, mucilaginous and slightly astringent.

ACTIVE CONSTITUENTS: Umbelliferon, skimmianine, marmin, B-sitosterol, lupeol and γ-sitosterol from immature bark and roots. Fruit contains psoralein and tannic acid; aegellnol. furocoumarins, furanocoumarin, marmelosin, marmelide, Ripe fruit xanthotoxol, marmesin etc. The pulp contains moucilage, pectin, reducing sugars, tannin, a volatile oil, bitter principle. Fresh leaves yield a yellowish green oil, (Extract of fruits lowered blood sugar level normal rabbits but diabetic rabbits reduction was insignificant. Essential oil is antifungal.)

HABITAT : All over Bangladesh, India, also cultivated.

IDENTITY, PURITY AND STRENGTH: (Fruit pulp)

Total ash	-	Not more than 4 per cent,
Acid-insoluble ash	-	Not more than 1 per cent,
Alcohol- soluble extractive	-	Not less than 6 per cent,
Water-soluble extractive	-	Not less than 50 per cent,

Bel (*Aegle marmelos* Corr.)

PROPERTIES AND ACTION:

Rasa : Katu, Tikta, Kasaya,

Guna : Laghu, Ruksa,

Virya : Usna,

Vipaka : Katu,

Karma : Dipana, Pacana, Grahi, Pittakar, Vatakaphahara, Balya,

PARTS USED: Bark, Leaf, Fruits.

THERAPEUTIC USES/INDICATIONS: Pravahika; Agnimandya; Grahaniroga,.

PHARMACOLOGICAL ACTIONS :

Bilva is astringent, cooling, carminative, restorative, laxative, febrifuge and stomachic. It is used in colitis, colic, dysentery, diarrhoea, flatulence, difficult micturition, fever and vomiting. Root bark is used in intermittent fever and useful in hypochondriasis, melancholia and palpitation of heart. Alcoholic extract of fruit or root is hypoglycemic and spasmogenic. Leaves are febrifuge. Leaf juice is applied externally in abscess. Unripe or half-ripe fruit is astringent, digestive, stomachic, used in diarrhoea. Pulp of ripe fruit is aromatic, cooling and laxative. Seed oil is antibacterial. Ash is used to kill worms and for injuries caused by animals.

IMPORTANT FORMULATIONS: Bilvadi kvath, Bilvadi Curna, Bilvadi, taila & Ghrita, Bilvadi leha; Brihatgangadhara curna, Brihatpanchamul & Dasamul.

DOSAGE : 3-6 g. of fruit pulp powder form.

SIDE EFFECTS: Not yet known

ADVERSE REACTION:

PRECAUTIONS/WARNINGS: It is difficult to digust.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BHERENDA

(Fam- Euphorbiaceae)

Synonyms:

Beng	-	Bherenda,
Sansk	-	Gandharvahasta, Vatari, Pancangula, Citra, Urubu, Rubu,
Eng	-	Castor oil plant,
Urdu	-	Bedanjir, Arand,
Botanical	-	*Ricinus communis* Linn.

Description:

It is a Shrub or small trees to about 4-m high conspicuous ring- like scars on the hollow stem. Leave alternate, long petiolate, palmate with 7-11 lobes and serrated edges, 20-60 cm long and often tinged with red. The terminal inflorescence is a narrow panicle; there are separate unisexual flowers, Fruit a spiny subglobose schizocarp about 1.5 cm long, splitting into three sections when mature, each section containing one mottled smooth brown seed in each of three section. Flowers and fruit available throughout the year.

a) Macroscopic:

Root light in weight almost straight with few rootlets, outer surface dull yellowish brown, nearly smooth but marked with longitudinal wrinkels, some places whitish-yellow and soft; odourless; taste, acrid.

b) Microscopic:

Transverse section of root shows thin layers of cork of squarish to tangentially elongated, thin-walled cells; beneath cork, secondary cortex of thin-walled, tangentially elongated cells, narrow cortex of rounded to tangentially elongated thin-walled parenchymatous cells, some containing large oil globules, rosettes of calcium oxalate crystals and round simple or compound starch grains; phloem a broad zone, consisting of sieve tubes, phloem parenchyma and phloem fibres; fibres long, mostly septate highly thicknened, having narrow lumen, some fibres surrounded by concentric rows of cells containing crystals of calcium oxalate; sieve tubes, thin-walled with companion cells and phloem parenchyma in the inner region of phloem more prominent; some phloem parenchyma cells contain crystals of calcium oxalate; cambium 3-5 layered, cells rectangular in shape; xylem occupies major part of root, pentarch, five groups of primary xylem distinct in the centre of the wood,. xylem. consists of vessels, parenchyma and fibres; vessels uniformly scattered throughout the xylem region either solitary or in groups, larger in size towards phloem, with bordered pits; xylem parenchyma less in number around vessels containing strach grains; xylem fibres long and thick-walled; medullary rays uni-to-biseriate, more or less straight, 4-5 seriate rays, sometimes found near protoxylem groups ray cells, thin-walled slightly radially elongated in phloem region, thick-walled in xylem region, all ray cells contain starch grains.

ACTIVE CONSTITUENTS:

Ricinine and ricin in plant. Castor oil contains palmitic, stearic, arachidic, hexadecenoic, oleic, linoleic, linolenic, ricinoleic and dihydroxystearic acids as methyl esters. Luoeol and 30- norupan-3B-ol-20-one in seed coat of castor bean.

Bherenda (*Ricinus communis* Linn.)

HABITAT : Found wild and also cultivated throughout Bangladesh, hotter parts of India, tropical parts of Africa.

IDENTITY, PURITY AND STRENGTH: (Root)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	8	per cent,
Acid-insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	3	per cent,
Water-soluble extractive	- Not less than	9	per cent,

PROPERTIES AND ACTION:

Rasa : Madhura

Guna : Guru, Snigdha

Virya : Usna

Vipaka : Madhura

Karma : Vrsya, Vatahara, Amapacana.

PARTS USED: Oil, leaves, bark of roots & seeds

THERAPEUTIC USES/INDICATIONS: Amavata; Sotha; Vastisula; Katisula; Udararoga; Jvara.

PHARMACOLOGICAL ACTIONS :

The name Erandah indicates the property of the plant to dispel diseases. Eranda is sweet, light, bitter, purgative and hot. From its mild action castor oil is especially adapted for young children and child-bearing women. It is a reputed remedy for all kinds of rheumatic affections. It cures dyspnoea, hydrocele, flatulence, dysentery, ascites, piles, cough, lumbago, headach, leprosy, arthritis, calculus and dysuria. It alleviates phantom tumour, splenic disorders, impurity of blood, dyspepsia and worm troubles. Root is used as an ingredient of various prescriptions for nervous diseases, pleurodynia and sciatica. Dried root is a febrifuge. Fresh leaves or leaves warmed over a fire when applied to the breasts of women act as a galacta-gogue. Leaves applied to the abdomen promote menstruation. They are applied to painful joints with much benefit. Tender leaves cure pain in bladder. Leaf applied to the head to relieve headache and as poulitice for boils. Seed and oil from seed are purgative. Seeds are counterirritant, are used in scorpion sting, and as fish poison, Castoroil congeals to a gel mass when the alcoholic solution is distilled in presence of sodium salts of higher fatty acids. This gel is uselful in dermatosis and is a good protective in occupational eczemas and dermatitis.

IMPORTANT FORMULATIONS: Aranda pak, Aranda-muladi kvath, Aranda-Saptak Kvath, Ambatari taila & Brihat sandhabadi taila. Gandharvahastadi kvatha curna; Vatari guggulu; Gandharvahasta taila.

DOSAGE : 20-30 g. of the drug for decoction. (In a day)

10-20 ml fresh juice (In a day)

5-10 ml oil (in a day)

2-6 g. seed (in a day)

4-16 ml oil (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion & vomating.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

BHUI-KUMRA

(Fam : Fabaceae)

Synonyms:

Beng	-	Bhuikumra
Sansk	-	Vidari, Vidarika, Bhumikusmanda
Eng	-	
Urdu	-	Badarikand.
Botanical	-	*Pueraria tuberosa* DC.

Description:

Bhui-Kumra is a large woody deciduous climbing shrub with huge tuberous root. Tubers globose or pot-like, about 25 cm across, white inside, starchy and mildly sweet. Branchlets with dense appressed velvety hairs. Leaves alternate, 3-foliolate; leaflets egg-shaped, about 18 x 16 cm, base rounded and unequal sided, apex acuminate, margin with fringed hairs, hairless above, densely pubescent below; leaf stalks up to 18 cm long; lateral nerves 7-8 pairs. Flowers bisexual, about 1.5 cm across, bluish purple to pale violet, shortly stalked, densely arranged in 15-25 cm long axially panicles panicles. Pod linear, 2-5 cm long , distinctly constricted between the seeds covered with dense bristly reddish brown hairs. Seeds 3-6.

Tuberous Root:

a) Macroscopic:

Drug available in the form of longitudinally sliced pieces of variable size; outer surface reddish-brown, smooth except for protuberances at some places; cut surface creamish-brown, starchy and somewhat porous; usually does not break, but pliable; taste, sweetish.

b) Microscopic:

Mature tuber shows 20-30 layers of cork consisting of rectangular, thin-walled, tangentially elongated and radially arranged cells filled with dark reddishbrown content except in a few inner layers; secondary cortex consists of 6-15 layers of circular, oval to rectangular and tangentially elongated thin-walled cells, yellow band of 2-6 layers of compactly arranged stone cells present towards inner side of cortex; stone cells moderately thick-walled, varying in shape and size and having well marked striations and pits; a number of prismatic crystals of calcium oxalate found in parenchymatous cells and also rarely in stone cells; secondary phloem consists of sieve elements and phloem parenchyma having a number of strands of phloem fibres and a few stone cells; sieve elements somewhat collapsed in outer region forming tangential bands; phloem fibres much elongated, highly thickened, lignified with narrow lumen; a number of tanniniferous ducts filled with brown content, distributed throughout this region; xylem forms whole of inner white spongy zone, consisting of several concentric rings of one or a few xylem vessels associated with a few xylem elements; vessels mostly drum-shaped having reticulate thickening; xylem rays multiseriate and well marked consisting of thin-walled, radially elongated cells, a few latex duct also present; plenty of starch grains mostly simple, somewhat round, angular to oval, having central hilum and striations, measuring 5.5-13.75 μ in dia, present in all parenchymatous cells.

Powder- Buff coloured; shows plenty of starch grains with central hilum and striations measuring 5.5-13.75 μ in dia., frangments of cork, prismatic crystals of calcium oxalate, a few xylem vessels with reticulate thickening and phloem fibres.

ACTIVE CONSTITUENTS:

Dry matter total carbohydrates, crude fibre, crude protein, ether extr, β-Sitosterol, sucrose, glucose and fructose have been identified.

HABITAT : Dry deciduous to moist deciduous forest of Bangladesh & India.

IDENTITY, PURITY AND STRENGTH: (Tuber)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 17 per cent,

Acid-insoluble ash - Not more than 4.5 per cent,

Alcohol soluble extractive - Not less than 4 per cent,

Water-soluble extractive - Not less than 24 per cent,

PROPERTIES AND ACTION:

Rasa : Madhura,

Guna : Snigdha, Guru,

Virya : Sita,

Vipaka : Madhura,

Karma : Vatahara, Pittahara, Stanyada, Sukrala, Mutrala, Jivaniya, Rasayana, Bringhaniya, Svarya, Varnya, Balya.

PARTS USED: Tuberous Root.

THERAPEUTIC USES/INDICATIONS: Daha, Raktapitta, Angmarda, Daurbalya, Sosa.

PHARMACOLOGICAL ACTIONS :

Tubers used for treatment of dysuria, cough, rheumatism, erysipelas and malarial fever. The roots are said to be used in medicine as a demulcen and refrigerant in fevers as cataplasam for swellings of joints and a lactagogue.

IMPORTANT FORMULATIONS: Vidaryadikvatha Curna, Vidaryadi Ghrta, Marma Gutika, Manmathabhra Rasa, Pugakhanda (Aparah).

DOSAGE : 3-6 g. in powder form (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BHUMI-AMALAKI
(Fam : Euphorbiaceae)

Synonyms:

Beng	-	Bhumi-amalaki, Bhumamlaki
Sansk	-	Mahidhatrika, Bhumyamalaki, Bahuphala
Eng	-	
Urdu	-	
Botanical	-	*Phyllanthus niruri* Hook. / *P. fraternus* webst.

Description:

a) Macroscopic :

Root— small, 2.5—11.0 cm long. nearly straight, gradually tapering, with a number of fibrous secondary and tertiary roots, external surface light brown; fracture, short.

Stem— slender, glabrous; light brown, cylindrical, 20—75 cm long, branching profuse towards upper region bearing 5—10 pairs of leaves, internode, 1—3.5 cm long; odour, indistinct; taste, slightly bitter.

Leaf—compound and leaf-let arranged in two rows with a rachis; alternate, opposite and decussate almost sessile, stipulate, oblong, entire; upto 1.5 cm long and 0.5 cm wide, greenish-brown, in colour; odour, indistinct; taste, slightly bitter.

Flowers— yellowish, very numerous, axillary, the male flowers 1-3, female flowers solitary. Capsules 2.5 mm diameter depressed globose, smooth scarcely lobed.

b) Microscopic :

Root—transverse section shows, 4—6 layers of cork consisting of thin-walled, rectangular, tangen tially elongated and radially arranged cells, filled with reddish-brown content; secondary cortex consists of 8—10 layers of thin-walled, tangentially elongated parenchymatous cells; secondary phloem narrow consisting of sieve elements phloem parenchyma and traversed by narrow phloem rays; secondary xylem represented by a broad zone of tissue, composed of vessels, tracheids, fibres and parenchyma, all elements being thick-walled and lignified having simple pits; xylem rays uniseriate.

Stem—transverse section shows, a single layered epidermis composed of thick-walled, flattened, tangentially elongated cells; older stem shows 4—5 layers of cork, composed of thin-walled, tabular, tangentially elongated and radially arranged cells, filled with reddish-brown content; cortex composed of 4—6 layers of oval, tangentially elongated, thin-walled, parenchymatous cells, some cortical cells filled with yellowish-brown content; endodermis quite distinct; pericycle represented by a discontinuous ring, composed of several tangentially elongated strands of lignified fibres with thick walls and narrow lumen; secondary phloem narrow, composed of sieve elements, dispersed in mass of phloem parenchyma; secondary xylem composed of vessels, fibres, parenchyma and traversed by numerous uniseriate rays; vessels mostly simple pitted, a few show spiral thickenings; fibres narrow elongated, with narrow or sometimes blunt ends with simple pits; centre, occupied by a pith composed of thin-walled, circular to oval parenchymatous cells, occasionally cluster crystals of calcium oxalate present in parenchymatous cells of ground tissue.

Leaf—transverse section of leaf shows, a biconvex outline; epidermis on either side, single layered covered externally by a thick cuticle; a palisade layer present beneath upper epidermis, intercepted by a few parenchymatous cells in the middle; meristele composed of small strands of xylem towards upper suface and phloem towards lower surface, rest of tissue of leaf composed of thin-walled, parenchymatous cells some having cluster crystals of calcium oxalate; lamina shows a dorsiventral structure, mesophyll differentiated into palisade and spongy parenchyma; epidermis on either side composed of thin-walled, tangentially elongated cells, covered externally by a thick cuticle; anisocytic type stomata present on both epidermises; palisade single layered; mesophyll composed of 3—5 layers of loosely arranged cells having a number of veins traversed in this region, a few cluster crystals of calcium oxalate present in spongy parenchyma.

Powder: Powder of the plant, brown coloured, under microscope shows, fragments of cork cells, vessels and fibres.

ACTIVE CONSTITUENTS:

Leaves contain bitter substance phyllanthin, hypophyllanthin.Three new lignans- niranthin, and phyltetralin from leaves. Kaempferol-4-rhamnopyranoside and eriodictyol-rhasmnopyranoside from roots. Stem contains saponin.

HABITAT : It is found waste places and shady gardens allover Bangladesh. Common throughout the hotter parts of India.

IDENTITY, PURITY AND STRENGTH: (Five parts)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 16 per cent,

Acid-insoluble ash - Not more than 7 per cent,

Alcohol soluble extractive - Not less than 3 per cent,

Water-soluble extractive - Not less than 13 per cent,

PROPERTIES AND ACTION:

Rasa : Kasaya, Tikta, Madhura,

Guna : Laghu, Ruksa,

Virya : Sita,

Vipaka : Madhura,

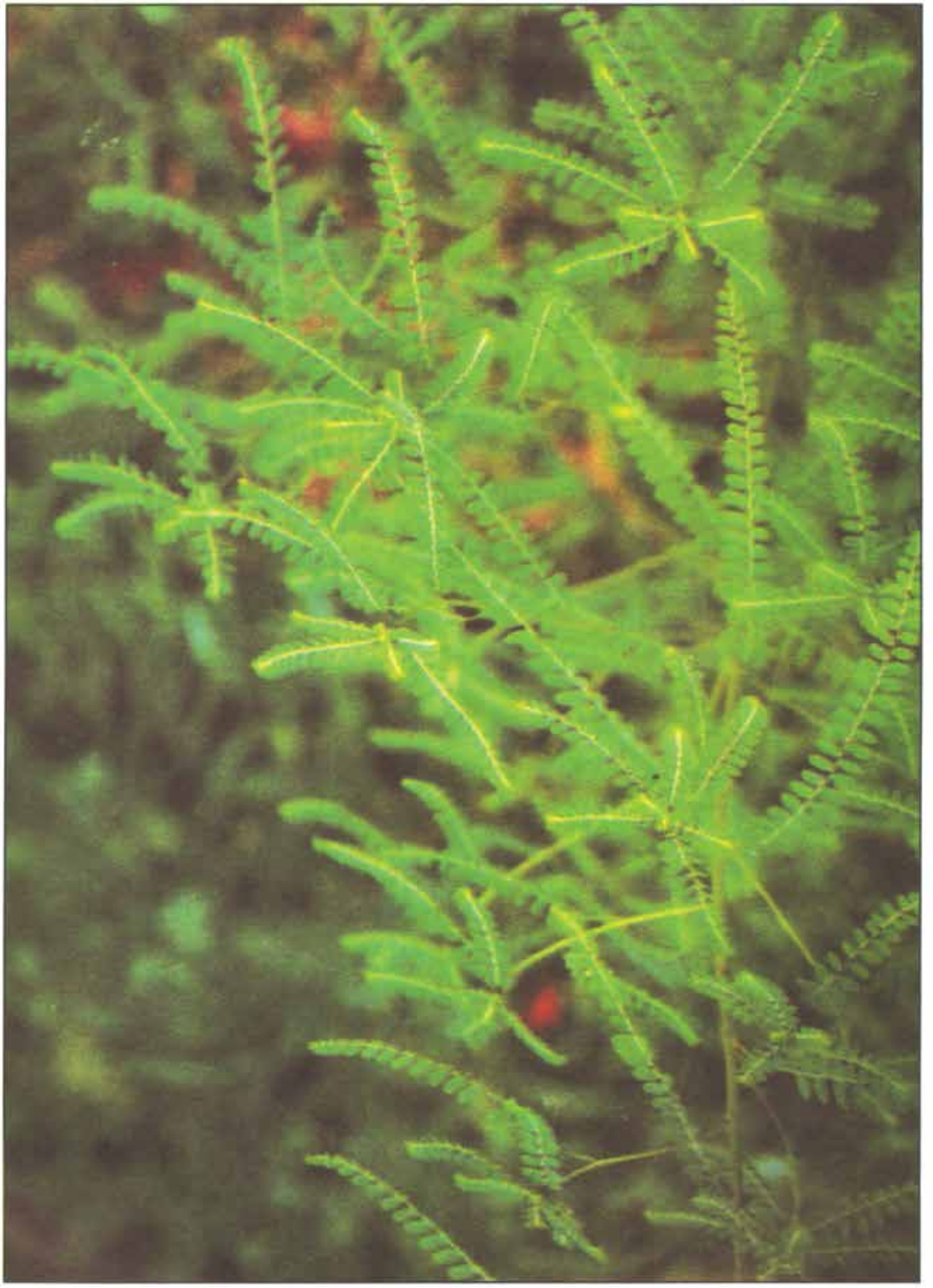
Karma : Rocana, Dahanasani, Pittasamaka, Mutrala,

PARTS USED: All five parts

THERAPEUTIC USES/INDICATIONS: Trsa; Kasa; Amlapitta; Pandu; Ksaya; Ksata; Kustha; Prameha; Mutraroga.

PHARMACOLOGICAL ACTIONS :

Bhumyamalaki is used as a diuretic in dropsical affections, gonorrhoea and other troubles of genito-urinary tract. Herb is bitter, astringent, deobstruent, diuretic, febrifuge and antiseptic. It is used in stomach troubles such as dyspepsia, colic, diarrhoea and dysentery and also for dropsy and diseases of urinogenital system. Fresh root is a remedy for jaundice. Leaves stomachic. Milky juice used as application to sore. Powdered leaves and roots, pulverized and made into polutice with ricewater used to



Bhumi Amalaki (*Phyllanthus niruri* Hook.)

lessen oedematous swellings and ulcers. Leaves are a popular remedy against fever. Infusion of young shoots given in dysentery.

IMPORTANT FORMULATIONS: Cyavanaprasa; Citraka haritaki; Madhuyastyddi taila; Pippalyddi ghrta; Satavariguda.

DOSAGE : 10—20 ml. of the juice (in a dose)

3—6 g. powder from. (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS: It is bitter in tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BRAHMI

(Fam : Scrophulariaceae)

Synonyms:

Beng	-	Brahmi,
Sansk	-	Saraswati, Kapotavamka,
Eng	-	Thyme Leaved Gratiola,
Urdu	-	Brahmi,
Botanical	-	*Bacopa monnieri* (Linn).

Description:

a) Macroscopic:

Root- Small, wiry, small, branched creamish- yellow.

Stem- thin, green or purplish green, about 1-2 mm thick, Soft, nodes and internodes prominent, glabrous; taste, slightly bitter.

Leaf- Simple, opposite, decussate, green, sessile, 1-2 cm long, obovate-oblong; taste, slightly bitter.

Flower- Small, axillary and solitary, pedicels 6-30 mm long, bracteoles shorter than pedicels.

Fruit- Capsules upto 5 mm long, ovoid and glabrous.

b) Microscopic:

Root- Shows a single layer of epidermis, cortex having large air cavities; endodermis single layered; pericycle not distinct; stele consists of a thin layer of phloem with a few sieve elements and isolated material from xylem shows vessels with reticulate thickenings.

Stem- Shows single layer of epidermis followed by a wide cortex of thin- walled cells with very large intercellular spaces; endodermis single layered; pericycle 3 consisting of 1-2 layers; vascular ring continuous composed of a narrow zone of phloem towards periphery and a wide ring of xylem towards centre; centre occupied by small pith with distinct intercellular spaces; starch grains simple, round to oval, present in a few cells of cortex and endodermis, measuring 4-14 μ in dia., and 8.0-14.0 x 2.5-9.0 μ in dia respectively.

Leaf- Shows a single layer of upper and lower epidermis covered with thin cuticle; glandular hairs sessile, subsidiary cells present on both surfaces; a few prismatic crystals of calcium oxalate occasionally found distributed in mesophyll cells; mesophyll traversed by small veins surrounded by bundle sheath; no distinct midrib present.

Powder- Yellowish-brown; shows xylem vessels with reticulate thickening glandular hairs, simple, round and oval starch grains, measuring 4-14 μ in diameter.

ACTIVE CONSTITUENTS:

Alkaloid brahmine; its therapeutic action resembles strychnine, but it less toxic. Three bases isolated, B1 oxalate, B2 oxalate, B3 chloroplatinate and a sterol. Contains alkaloid herpestine. Plant saponins, bacoside A&B; monniern, hersaponin, betulic acid, d-mannitol, stigmasterol, β-sitosterol and stigmastanol Hersaponin possesses cardiotonic sedative and spasmodic properties.

Brahmi (*Bacopa monnieri* Linn.)

HABITAT : All over Bangladesh; moist & lowland of India.

IDENTITY, PURITY AND STRENGTH: (Five parts)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 18 per cent,

Acid-insoluble ash - Not more than 6 per cent,

Alcohol soluble extractive - Not less than 6 per cent,

Water-soluble extractive - Not less than 15 per cent,

PROPERTIES AND ACTION:

Rasa : Tikta, Kasaya, Madhura,

Guna : Laghu, Sara,

Virya : Sita,

Vipaka : Madhura,

Karma : Vatahara, Kaphahara, Rasayana, Ayusya, Medhya, Matiprada, Swarya, Prajasthapana, Visahara, Mohahara.

PARTS USED: Whole plants.

THERAPEUTIC USES/INDICATIONS: Kustha, Jwara, Sopha, Pandu, Prameha Manasavikara..

PHARMACOLOGICAL ACTIONS:

The Bramhi is astringent, bitter, sweet, cooling , laxative, intellect promoting, anodyne, carminative, digestive, anti-inflammatory, anticonvulsant, depurative, cardiotonic, bronchodilator, diuretic, emmenagogue, sudorific, febrifuge and tonic. It is usefule in vitated conditions of kapha and vata, biliousness, reuralgia, inflammations, epilepsy, insanity, amentia, tumours, ulcer, spenomegaly, ascites, dyspepsia, flatulence, constipation, asthma, bronchitis, skin diseases, leprosy, leucoderma, erysipelas, syphilis, hoarseness, strangury, elephantiasis, dysmenorrhoea, sterility, fever and general debility.

IMPORTANT FORMULATIONS: Brahmi Rasayan, Saraswatarista, Brahmi Ghrita, Brahmi taila, Ratnagiri Rasa, Brahmi Vati, Saraswata Curma, Smrtisagara Rasa.

DOSAGE: 1-3 g. powder form (In a dose)

5-10 ml of fresh juice. (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

BREHATI

(Fam : Solanaceae)

Synonyms:

Beng	-	Brehati, Byakud,
Sansk	-	Sanhika,
Eng	-	Indian Solanum,
Urdu	-	Kateli kala,
Botanical	-	*Solanum indicum* Linn.

Description:

Brehati is a much branched, common, very prickly undershrub 0.3-1.5 m in height; leaves simple, large, ovate, subentire, sinuate or lobed, sparesely prickly on both sides, base cordate, often unequal; flowers blue in extra- axillry cymes, penduncles stellately hairy and prickly; fruits globose berries, reddish or dark yellow, seeds smooth or minutely pitted.

Roots:

a) Macroscopic:

Brehati root well developed, long, ribbed, woody, cylindrical, pale yellowish-brown, 1-2.5 cm in dia., a number of secondary roots and their branches present, surface rough due to presence of longitudinal striations and root scars, fracture, short and splintery; no distinct odour and taste.

b) Microscopic:

Root shows thin cork composed of 5-15 layers of thin- walled, tangentially elongated, rectangular cells filled with yellowish brown content; cork cambium single layered; secondary cortex composed of 5-9 layers of thin walled, oval and tangentially elongated cells; stone cells present in singles or groups of 2-5 or more in this region; secondary phloem composed of sieve elements, parenchyma and stone cells, traversed by phloem rays; phloem parenchyma much abundant, thin walled; stone cells present in outer phloem region in singles or in groups of 2-5, varying greatly in shape and size; phloem rays 1-3 cells wide, isodiametric to slightly radially elongated in inner phloem region and radially elongated in outer phloem region, occasionally stone cells also found in medullary rays; wood occupies bulk of root and composed of vessels, tracheids, fibres and xylem parenchyma, traversed by xylem rays, all elements being lignified, vessels occur singly or in groups of 2-5 with simple pits; xylem fibres moderately thick- walled with simple pits and pointed ends found in adundance; xylem parenchyma have simple pits or reticulate thickening; xylem rays uni to biseriate, thick- walled, cells radially elongated and pitted, microsphenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in some cells of secondary cortex, phloem and medullary rays; simple and rounded to oval starch grains, measuring 5.5-11.6 μ in diameter.

Powder- Cream coloured; shows groups of thin- walled, parenchymatous cells, aseptate fibres, vessels with simple pits, oval to elongated stone cells and simple, rounded to oval starch grains, measuring 5.5-11.6 μ in diameter.

ACTIVE CONSTITUENTS:

Enzyme in fruits. Alkaloids solanine, solanidine in roots and leaves. Fruits contain 1.8% of alkaloids and can form a good source material for cortisone and sex hormone preparations.

Dhutra (*Datura metel* Linn.)

HABITAT : All over Bangladesh , India.

IDENTITY, PURITY AND STRENGTH: (Root)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 6.5 per cent,

Acid-insoluble ash - Not more than 1 per cent,

Alcohol soluble extractive - Not less than 3 per cent,

Water-soluble extractive - Not less than 4 per cent,

PROPERTIES AND ACTION:

Rasa : Katu, Tikta

Guna : Laghu,

Virya : Usna

Vipaka : Katu

Karma : Vatahara, Kaphahara, Dipana, Pacana, Hrydya, Grahi

PARTS USED: Root, leaves fruits & seeds.

THERAPEUTIC USES/INDICATIONS: Hrdroga, Jvara, Svasa, Sula, Agnimandya.

PHARMACOLOGICAL ACTIONS :

Brhati plant and root, both are pungent, bitter, stimulant, digestive, astringent, anthelmintic, carminative, diaphoretic and expectorant. They are beneficial in catarrhal affections, asthma, dry couph, dropsy, colic, dysuria, flatulence, cardiac troubles, leucoderma, worm complaints, fevers, difficult parturiton, toothache and ischuria. It removes foulness of mouth. Plant is used as aphrodisiac. Juice of leaves with fresh juice of ginger is taken to stop vomiting. Leaves and fruit rubbed up with sugar used as external application for itch. Fruits are digestive and laxative and their juice is beneficial in alopecia. Decoction of seeds is used in dysuria and vapour from seeds is useful in otalgia.

IMPORTANT FORMULATIONS: Dasamularista, Dasamula Ghrita, Dasamula kvatha, sutica-Desamula kvatha, Brihattadi kvath.

DOSAGE : 10-20 g. for decoction. (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION:

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TO ADULTERATE: Solanum torvum, Solanum Khasianum.

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

DHUTRA

(Fam : Solanaceae)

Synonyms:

Beng	-	Dhutura, Dhutra,
Sansk	-	Kanaka, Ummatta, Dhustura,
Eng	-	White Thorm Apple,
Urdu	-	Dhatura,
Botanical	-	*Datura metel* Linn/*D. fastuosa* L.

Description:

Small herbaceous plant, 1-1.4 high Braches pubescent when young, marked with leaf scars, leaves alternate, unequal at the base, minutely pubescent on both surfaces; margins wavy. Flowers large, white, colitary in the leaf axil. Capsule globese, covered with slender spines. Seeds numerous, blackish-brown.

Seed:

a) Macroscopic:

Seed reniform, compressed, flattened, surface finely pitted; 0.6 cm long, 0.4 cm wide; light brown to yellowish-brown in colour; thicker towards the curved edge, which is rugose; large, pale strophiole near micropyle; odourless; taste; bitter.

b) Microscopic:

Shows in outline more or less elongated, irregular or wavy structure having bulgings at either side; testa single layered consists of thick-walled, lignified, sclerenchymatous cells forming club-shaped structure, followed by 3-5 layered more or less tangentially elongated, thin-walled, parenchymatous cells; endosperm encloses more or less curved embryo composed of polygonal, thin-walled, parenchymatous cells, filled with aleurone grains and abundant oil globules.

Powder: Brown and oily; shows fragments of testa of groups of thick-walled, light brown sclerenchymatous cells; polygonal, thin-walled parenchymatous cells containing oil globules and aleurone grains.

ACTIVE CONSTITUENTS:

The whole plant, especially the leaves and flowers, contain alkaloids, Scopolamine, hyoscyamine, atropine and norhyoscyamine, as well as vitamin C. The total alkaloid content of the roots is 0.10-20% leaves 0.1-0.5% flowers 0.25-0.60% fruits 0.12%.

HABITAT : All over Bangladesh & Inda.

IDENTITY, PURITY AND STRENGTH: (Seed)

Foreign matter	-	Not more than 2 per cent,
Total ash	-	Not more than 6 per cent,
Acid-insoluble ash	-	Not more than 1 per cent,
Alcohol soluble extractive	-	Not less than 5 per cent,
Water-soluble extractive	-	Not less than 7 per cent,

Brehati (*Solanum indicum* Linn.)

T.L.C.-

T.L.C. of the alcoholic extract on Silica gel 'G' plate, using Toluene: Ethylacetate: Diethylamine (7:2:1), shows under U.V. (366 nm) three fluorescent zone at Rf. 0.18, 0.33, (both light blue) and 0.93 (blue). On exposure to Iodine vapour three spots appear at Rf. 0.33, 0.47 and 0.93 (all yellow). On spraying with Dragendorff reagent two spots appear at Rf. 0.33 and 0.47 (both orange).

PROPERTIES AND ACTION:

Rasa : Madhura, Katu, Kasaya, Tikta

Guna : Tiksna, Ruksa, Guru

Virya : Usna

Vipaka : Katu

Karma : Madakari, Kaphahara, Visahara, Krmihara, Vranahara, Kanduhara, Bhramahara, Varnya, Vamaka

PARTS USED: Seeds.

THERAPEUTIC USES/INDICATIONS: Krmi, yuka, Liksa

PHARMACOLOGICAL ACTIONS :

Dhutra is bitter, acrid, astringent, germicidal, anodyne, antiseptic, antiphlogistic, narcotic and sedative. It gives good complexion, improves digestion, cures skin diseases such as itching, scabies, ulcers and leprosy, dandruff, fever, dysuria, piles, anaemia and inflammatory swellings. It is also useful in respiratory ailments, rheumatism, elephantiasis, insanity, ear ache and eye diseases. Seeds, leaves and roots are considered useful in insanity, fever withcatarrhal and cerebral complications, diarrhoea, skin diseases, lice etc. Root is boiled in milk and administered withclarified butter and treacle in insanity. In traditional medicine, it isa reputed drug in the treatment of rabid dog-bites and poisonous insect bites. The dried leaves and flowering tops are known for their narcotic and anti-spasmodic properties. They are used for thesame purposes as leaves of bella-donna and stramonium.

IMPORTANT FORMULATIONS: Kanakasava, Suta Sekhara Rasa, Jwarankusa Rasa, Laksmi Vilasa Rasa (Naradiya), Kanakasundara Rasa, Dugdha Vati, Piyusavalli Rasa.

DOSAGE: 30-60 mg. per dose

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause madness.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

DRUN-PUSPI

(Fam : Lamiaceae)

Synonyms:

Beng	-	Bholghasiya
Sansk	-	Katumba
Eng	-	
Urdu	-	
Botanical	-	*Leucas cephalotes* Spreng/*L. aspera* spreng.

Description:

An erect or diffuse much branched herbaceous annual, 15-20 cm in height with hispid or scabrid quadrangular stems and branches; leaves sub-sessile, linear or linear-oblong or linear-lanceolate, obtuse, entire or crenate, pubescent upto 7.5 cm long and 1.25 cm broad; flowers pure white, small, in dense terminal or axillary whorls; fruits nutlets, 2.5 mm long, oblong, brown, smooth, inner face angular and outer face rounded.

a) Macroscopic:

Root—Cylindrical, zig-zag, smooth, long with numerous wiry, fine rootlets, size variable, fracture, fibrous; taste, characteristic.

Stem—Light greenish-yellow, surface rough, hairy, quadrangular with four prominent furrows, upto 4 mm thick, nodes and internodes distinct; taste, slightly bitter.

Leaf— Yellowish-green, 3-9 cm long, 1-2.5 cm wide, ovate or ovate-lanceolate, subacute, more or less pubescent, crenate, serrate; taste, pungent.

Inflorescence—Sessile, white, crowded in dense, globose, about 2-3.5 cm across, surrounded by numerous foliaceous bracts, thin, lanceolate, acute, ciliate, 1.2-1.5 cm long and 0.3-0.35 cm wide; calyx, tubular, slightly curved, 1-2.25 cm long, glabrous in lower part, hairy on upper part, 10 dentate with a villous throat; corolla, white, 1.7-2 cm long, bilipped, upper lip about 4 mm long, wooly, lower lip nearly twice as long as upper one; lateral lobes small.

Fruit—Schizocarpic carcerule, nutlets 3 mm smooth, brown.

Seed — 0.3 cm long and 0.1 cm wide, oblong, trigonous, smooth, dark brown.

b) Microscopic:

Root— Shows a single layered epidermis composed of rectangular, thin-walled cells; sec- ondary cortex consists of thin-walled, tangentially elongated, parenchymatous cells; sec- ondary phloem consists of sieve elements and phloem parenchyma; secondary xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels long with spurs, vessels and tracheids have simple pits, xylem fibres much elongated with pointed ends and have moderately thick walls, some having simple pits; medullary rays 1-2 seriate, upto 8 cells high.

Stem—Shows squarish outline with four ridges and furrows, consists of a single layered epidermis, composed of oval to rectangular, thin-walled cells having a number of uni to tricellular trichomes; secondary cortex 5-9 layered, consisting of 3-5 layers of circular, oval or irregular

Drun-puspi (*Leucas aspera* Spreng)

collenchymatous cells at the ridge and 2-4 layers of thin-walled, tangen- tially elongated, parenchymatous cells; endodermis single layered, consisting of barrel- shaped, thin-walled cells; pericycle single layered of thin-walled cells comparatively smaller than the cells of endodermis, a few pericyclic cells converted into pericyclic fibres; phloem very narrow consisting of usual elements; xylem consists of vessels, tra- cheids, fibres and large amount of xylem parenchyma; vessels mostly cylindrical with simple pits and spiral thickening; tracheids and xylem parenchyma have simple pits on their walls; pith wide consisting of cit;cular to oval, thin-walled, parenchymatous cells.

Leaf—

Petiole— shows a single layered epidermis, uni to tricellular trichomes with pointed ends, cortex consisting of single layered, round to angular collenchyma; parenchyma consists of thin-walled cells containing prismatic crystals of calcium oxalate, vascular bundles 4, 2 smaller located towards each corner and 2 larger in centre.

Midrib— shows epidermis on either side with uni to tricellular trichomes, followed by 1-2 layers collenchyma towards lower surface,3-4 layers towards upper surface, followed by round to oval parenchyma,4- 7 layered; vascular bundle arc-shaped, present in centre.

Lamina— shows epidermis on either side with uni to tricellular trichomes rarely on upper surface; palisade single layered; spongy parenchyma 3-5 layered, irregular, thin-walled cells; a few veins present in this region; stomata diacytic, present on both surfaces; stomatal index 16.6-40.5 on lower surface, 16.6-30.7 on upper surface; palisade ratio 7-9.

Powder: Dull yellow; shows groups of round to polygonal parenchymatous cells, pitted and spiral vessels, aseptate fibres, uni to tricellular trichomes and diacytic stomata.

ACTIVE CONSTITUENTS: Two sterols, two alkaloids, galactose, oleanolic acid, ursolic acid and β-sitosterol. An alcoholic extract of leaves antibacterial against Micrococcus pyogenes and Escherichia coli.

HABITAT : This plant found throughout Bangladesh & India.

IDENTITY, PURITY AND STRENGTH: (Five parts)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	17	per cent,
Acid-insoluble ash	- Not more than	6	per cent,
Alcohol- soluble extractive	- Not less than	5	per cent,
Water-soluble extractive	- Not less than	14	per cent,

PROPERTIES AND ACTION:

Rasa	:	Madhura, Lavana, Katu,
Guna	:	Guru, Ruksa, Tiksna,
Virya	:	Usna,
Vipaka	:	Madhura,
\Karma	:	Vatakara, Pittakara, Kaphahara, Bhedani, Rucya,

PARTS USED: Whole plants, leaves & Flowers

THERAPEUTIC USES/INDICATIONS: Kamala, Sotha, Tamaka svasa, Kasa, Agnimandya, Visamajvara

PHARMACOLOGICAL ACTIONS :

Dronapuspi is antipyretic and insecticide. It is a reputed home remedy for worms, fever and intestinal catarrh in children. It is antipyretic, antiseptic, carminative, febrifuge, wormifuge, antihistaminic. It is used in anorexia, cough, dyspepsia, fever, jaundice, psoriasis, respiratory and skin diseases. Leaves are considered useful in chronic rheumatism. Juice of leaves is applied in psoriasis, scabies and chronic skin eruptions. Flowers are used in cold.

IMPORTANT FORMULATIONS: Plihari Vatika, Gorochadi Vati

DOSAGE: 1-3 g. of the drug in powder form.

5-10 ml of the drug in juice form (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any complecation not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

DURBA

(Fam : Poaceae)

Synonyms:

Beng	-	Durva.
Sansk	-	Satavirya.
Eng	-	Creeping Cynodon, Conch Grass,
Urdu	-	Doob Ghas, Doob
Botanical	-	*Cynodon dactylon* (Linn).

Description:

Durva is a prostrate extensively creeping glabrous, highly branched perennial grass, rooting at every nods, forming matted tufts; leaves narrow, linear, soft, smooth, distinchous at the base, ligule a very fine ciliate rim; inflorescence terminal spikes Green or purplish, rachis slender, involucral glumes acute to subulate-mucronulate, floral glume obliquely oblong to semi-ovate;fruit- grains, oblong, laterally compressed about 1 mm long.

Root

a) Macroscopic:

Root fibrous, cylindrical, upto 4 mm thick, minute hair- like roots arise from the main roots, cream coloured.

b) Microscopic:

Mature root shows epiblema or piliferous layer composed of single layered, thin-walled, radially elongated to cubical cells; hypodermis composed of 1-2 layered thin- walled, tangentially elongated to irregular shaped cells, cortex differentiated into two zones, 1 or 2 layers of smaller, thin-walled, polygonal, lignified sclerenchymatous and 4-6 layers of thin-walled elongated parenchymatous cells being larger; endodermis quite distinct being single layered, thick-walled, tangentially elongated cells; pericycle 1-2 layers composed of thin-walled sclerenchymatous cells; vascular bundles consisting of xylem and phloem, arranged in a ring on different radials; xylem exarch, having usual elements; centre occupied by wide pith, composed of oval to rounded thick-walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4-16 μ in dia., and compound starch grains having 2-4 components.

Powder:

Cream coloured; fragments of xylem vessels with pitted walls, thick-walled lignified sclerenchymatous cells and numerous simple round to oval or angular starch grains measuring 4-16 μ in dia, and compound starch grains having 2-4 components.

ACTIVE CONSTITUENTS: β-ionone, 2-propionic, 4-hydroxybenzoic, 2- propionic and 3- methoxy-4-ydroxybenzoic acids, phytol, β- sitosterol- D- glucoside, stigmasterol acetate and a phagostimulant, phytone, glycosides, saponins, tannis, flavonoids and carbodhydrates.

HABITAT : Throughout Bangladesh, India, Sri Lanka.

IDENTITY, PURITY AND STRENGTH: (Root)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	7	per cent,
Acid-insoluble ash	- Not more than	3	per cent,
Alcohol- soluble extractive	- Not less than	1	per cent,
Water-soluble extractive	- Not less than	5	per cent,

T.L.C. –

T.L.C. of alcoholic extract on silica gel ' G' plate using n- Butanol: Acetic acid Water (4:1: 5) shows under U.V. (366nm) three fluorescent zones at Rf. 0.70, 0.89 (both blue)and 0.92 (pink). On exposure to Iodine vapour six spots appear at Rf 0.22, 0.30, 0.37, 0.80, 0.89 and 0.92 (all yellow). On spraying with 5% Methanolic-sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appear at Rf. 0.22, 0.30, 0.37, 0.80, 0.89, 0.92 (all grey).

PROPERTIES AND ACTION:

Rasa : Kasaya, Madhura, Tikta

Guna : Laghu,

Virya : Sita

Vipaka : Madhura

\Karma : Kaphapittasamaka, Raktapittanasaka, Dahaghana, Atisaraghnna, Sramahara, Trptikara.

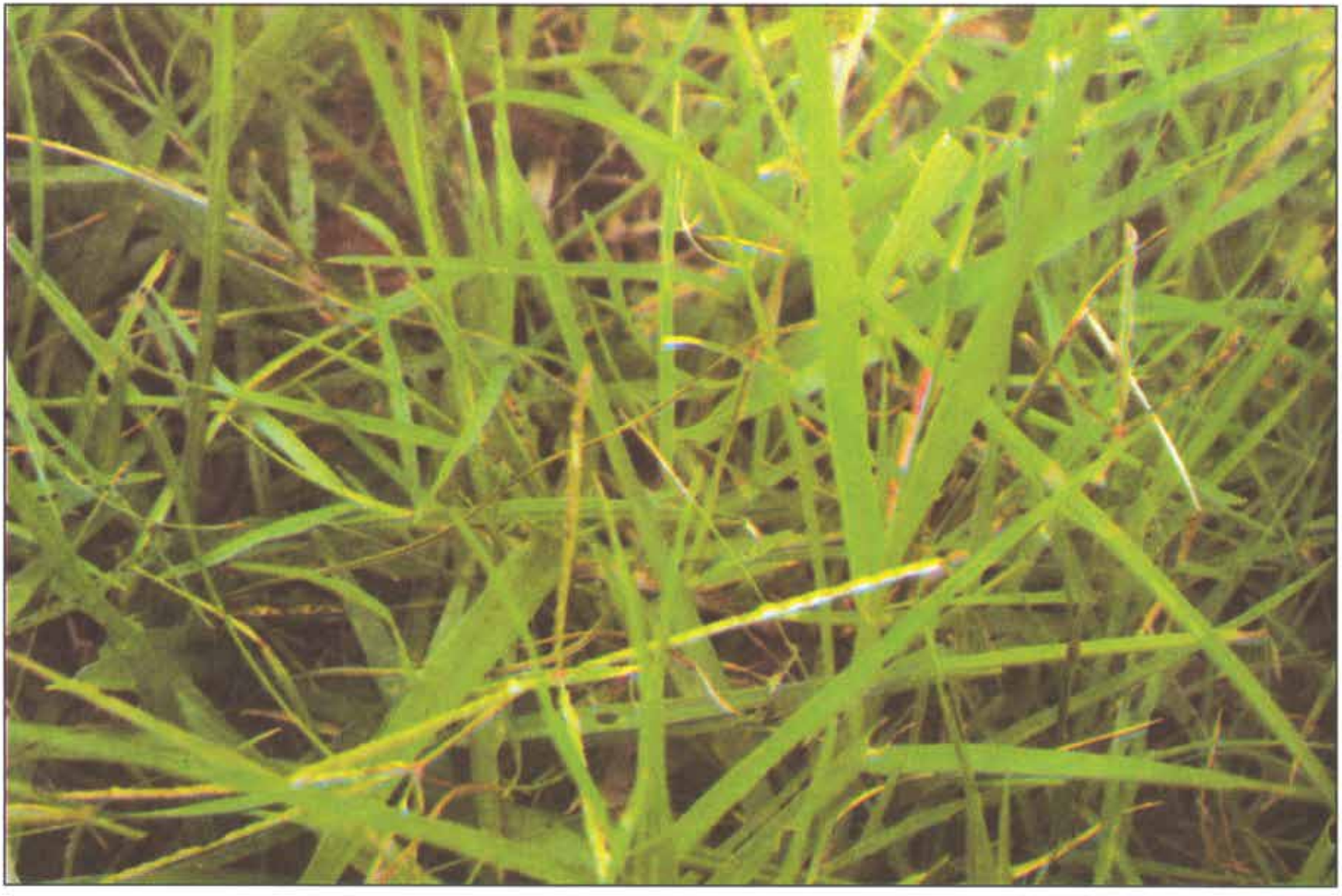
PARTS USED: Whole plant

THERAPEUTIC USES/INDICATIONS: Raktapitta, Trsnaroga, Daharoga, Visarpa, Tvakaroga, Arocaka, Duhswapna, Bhutaroga, Raktapitta, Chardi, Murccha, Raktapradara, Mutra Daha,

PHARMACOLOGICAL ACTIONS :

Durva is reputed as a remedy in epitaxis, haematuria and scabies, plant is used in inflammed tumors, whitlows and fleshy excrescences. Juice of plant is astringent, used as application to fresh cuts and wounds; diuretic used in dropsy and ansarca, in hysteria, epilepsy, insanity; astringent in chronic diarrhoea and dysentery; useful in catarrhal ophthalmia. Infusion of root is used for stopping bleeding from piles. Decoction of roots is diuretic and used in dropsy and secondary syphilis. Crushed roots mixed with curds used in chronic gleet. Rhizome is cooling, astringent, diuretic, demulcent, aperient, ophthalmic, haemostatic and suppurative. It checks bleeding from cuts and wounds and is useful in fever, burning sensation, chronic diarrhoea, dysentery, anasarca, dropsy, catarrhal ophthalmia, dysuria bleeding piles, eye affections, epilepsy, hysteria and insanity. Used in urinary and bladder complaints, cystitis, nephritis. Also recommended in gout and rheumatism.

IMPORTANT FORMULATIONS: Balasvagandha Laksadi Taila, Madhuyastyadi Taila, Marma Gutika, Manasa Mitra Vataka, Candrakala Rasa.



Durba (*Cynodon doctylon* Linn.)

DOSAGE: 5-10 ml. (Swaras)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

GAMAR

(Fam : Verbenaceae)

Synonyms:

Beng	-	Gamar, Gambhar,
Sansk	-	Kasmari, Kasmarya,
Eng	-	Candhar Tree,
Urdu	-	Ghomari
Botanical	-	*Gmelina arborea Roxb,*

Description:

Gamar tree about 18 m high a clear bole of 6-9 m and a girth of 1.5-2.1 m.

a) Macroscopic:

Root- occurs in pieces with secondary and tertiary branches, root pieces nearly cylindrical with uneven surface, greyish brown, fracture somewhat tough in bark, brittle and predominant in woody portion.

Root bark- mature root bark when fresh, yellowish in colour; dry pieces curved and channelled, thinner ones forming single quilts, external surface rugged due to presence of vertical cracks, ridges, fissures and numerous lenticels; fracture short and granular; taste, mucilaginous, sweetish with slight bitterness.

b) Microscopic:

Root- transverse section of root shows 6-8 layers of cork cells, secondary cortex, including primary and secondary phloem about two third consisting of wood; cork brownish, cells arranged in tangential direction and broken at places towards upper layers, cortex characterised by the presense of thin- walled parenchymatous cells with starch grains; resin ducts present in abundance throughout cortex; scattered stone cells fibre like or elongated common; fibres present, occurring mostly in singles; cells of cortex also contain rosette crystals of calcium oxalate and oil globules; primary phloem characterised by the presence of sieve tubes with companion cells, phloem parenchyma, soft bast fibres and ray cells; phloem fibres occur singly and scattered cortical cells 40-70 μ by 25-35 μ and bast fibres, 300-1000 μ by 10-15 μ development of cork takes place in second or third layer of primary cortex; wood consists of simple pitted wood parenchyma and medullary rays; wood cells mainly composed of vessels and tracheids and inner wood consists of a major portion of fibres together with a few vessels, vessels numerous and form almost a ring near the periphery of xylem cylinder and somewhat spares being scattered in groups or singly nearer the central region; lumen of vessels somewhat large dimensions of vessels 130-250 μ by 50-100 μ and those of the tracheids 175-300 μ by 30-50 μ; wood fibres abundant and with simple pits; cambium distinct; meduallry rays generally 1-2 celled thick with abundant starch grains cells oblong to rectangular.

Root bark: transverse section of mature root bark shows cork represented by 10-18 layers of tangeatially elongated rectangular cells; secondary cortex composed of parenchyma and groups of stone cells; secondary phloem consists of parenchyma, groups of stone cells, sieve tube elements and medullary rays.

ACTIVE CONSTITUENTS:

Drupes contain butyric acid, tartaric acid (traces), resinous and saccharine substances. The bark and root contain- benzoic acid (trace), resinous and ascharine substances; wood contains- pyroligenous acid 37. 1%; esters 3.42% acetone 2.38%; menthol 1.23%, carbon dioxide 59% and unsaturated hydrocarbon.

HABITAT : It grows all over Bangladesh; found in India, Srilanka, Philippine.

IDENTITY, PURITY AND STRENGTH: (Root bark powder)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	5	per cent,
Acid-insoluble ash	-	Not more than	0.3	per cent,
Alcohol soluble extractive	-	Not less than	7	per cent,
Water-soluble extractive	-	Not less than	20	per cent,

PROPERTIES AND ACTION:

Rasa : Tikta, Kasaya

Guna : Guru

Virya : Usna

Vipaka : Katu

Karma : Dipana, Pacana, Bhedana, Medhya, Tridosajit, Sothahara, Visaghna, Jvarahara.

PARTS USED – Root, bark, leaves, & fruit.

THERAPEUTIC USES/INDICATIONS– Jvara : Trisna; Daha; Arsa; Sotha;

PHARMACOLOGICAL ACTIONS :

Gamar root an important ingredient of dashamula. It is astringent, bitter tonic, stomachic, digestive, cardiotonic, laxative, galactagogue, pulmonary and nervine tonic. It improves memory, overcomes giddiness and is useful in burning sensation, fever, thirst, emaciation, heart diseases, nervous disorders and piles, Pulversed root is applied locally for gout. The drupes are sweetish and bitter and are used as an astringent of refrigerant decoctions for fevers and billous affections. The tender leaves are demulcent. A paste of the leaves is applied to the head for the relief of headache in fevers. The leaf juice is used as a wash for foul ulcers. Flowers are given in blood diseases. Fruits are bitter, cooling, tonic and overcome thirst, pitta, vatarakta and useful in pleural and lung diseases. It produces corpulency, promotes sexual power and is good for growth of hair. It is useful in difficult urination, vitiation of blood and rheumatism. In the form of infusion or decoction it is prescribed in indigestion, fever and anasarca. Bark is a bitter tonic and stomachic and is useful in fever and indigestion.

IMPORTANT FORMULATIONS– Dasamularista; Dasamulaharitaki, Dasamula Ghrita; Sreeparnadi kath, Sreeparni taila. Dasamula satpalaka ghrita.

DOSAGE : 20-30 g. dryfruit for decoction. (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION: Badana/Darimba

ALTERNATIVES: Drakha.

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

Gamar (*Gmelina arborea* Roxb.)

Gulancha (*Tinospora cordifolia* Willd.)

GULANCHA

(Fam : Menispermaceae)

Synonyms:

Beng - Gulancha

Sansk - Amrtavalli, Amrta, Madhuparni, Guducika, Chinnodbhava

Eng - Moon Creeper/Bile killer

Urdu - Gilo

Botanical - *Tinospora cordifolia* Willd.

Description:

Gulancha is a large extensively spreading glabrous, perennial deciduous twiner with succulent stems and papery bark; leaves simple, altemate, cordate, enhtire, glabrous, 7-9 nerved; flowers yellow in lax racemes, flowers usually solitary; fruits drupes, red when ripe. The surface of the stems appears to be closely studded with warty tubercles and the surface skin is longitudinally fissured. On removal of the surface skin the dark greenish mucilaginous stem is seen.

a) **Macroscopic :** Drug occurs in pieces of varying thickness ranging from 0.6—5 cm in diameter; young stems green with smooth surface and swelling at nodes, older ones show a light brown surface marked with warty protuberances due to circular lenticels; transversely smoothened surface shows a radial structure with conspicuous medullary rays traversing porous tissues; taste bitter.

b) **Microscopic :** Transverse section of stem shows outer-most layer of cork, differentiating into outer zone of thick-walled brownish and compressed cells, inner zone of thin walled colourless, tangentially arranged 3—4 rows of cells; cork broken at some places due to opening of lanticels, followed by 5 or more rows of secondary cortex of which the cells of outer rows smaller than the inner one; just within the opening of lenticels, groups of sclereids consisting of 2—10 cells found in secondary cortex region, outer zone of cortex consists of 3—5 rows of irregularly arranged, tangentially elongated chlorenchymatous cells; cortical cells situated towards inner side, polygonal in shape and filled with plenty of starch grains, simple, ovoid, or irregularly ovoid-elliptical, occasionally compound of 2—4 components; several secretory cells; found scattered in the cortex; pericyclic fibres lignified with wide lumen and pointed ends associated with a large number of crystal fibres containing a single prism in each chamber; vascular zone composed of 10—12 or more wedge-shaped strips of xylem, externally surrounded by semi-circular strips of phloem, alternating, with wide medullary rays; phloem consists of sieve tube, companion cells and phloem parenchyma of polygonal or tangentially elongated cells, some of them contain crystels of calcium oxalate; cambium composed of one to two layers of tangentially elongated cells in each vascular bundle; xylem consists of vessels, tracheids, parenchyma and fibres; in primary xylem, vessels comparatively narrow devoid of tyloses; secondary xylem elements thick-walled, lignified, vessels cylindrical in shape bearing bordered pits on their walls some large vessels possess several tyloses and often contain transverse septa; meduallry rays 15—20 or more cells wide containing rounded, hemispherical, oblong, ovoid, with faintly marked concentric striations and central hilum appearing like a point, starch grains of 5-5—11.20 μ in diameter and 6—11.28μ in length; pith camposed of large, thin-walled cells mostly containing starch grains.

ACTIVE CONSTITUENTS: Furanoid bitter principle tinosporine and a furanoid diterpene tinosporide and tinosporidine, β-sitosterol from stems. Cordifol, heptacosanol and octacosanol from leaves.

HABITAT : Gulancha found all over Bangladesh. Throughout tropical India and Andamans.

IDENTITY, PURITY AND STRENGTH: (Powder of Stam)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	16	per cent,
Acid-insoluble ash	- Not more than	3	per cent,
Alcohol soluble extractive	- Not less than	3	per cent,
Water-soluble extractive	- Not less than	11	per cent,
Moisture content	-	75	per cent,

PROPERTIES AND ACTION :

Rasa : Tikta, Kasaya.

Guna : Laghu

Virya : Usna

Vipaka : Madhura

Karma : Tridosasamaka, Samgrahi, Balya, Dipana, Rasayana, Raktasodhaka, Jvaraghna.

PARTS USED: Stem and leaves.

THERAPEUTIC USES/INDICATIONS : Kustha; Vatarakta; Jvara; Kamala; Pandu; Prameha.

PHARMACOLOGICAL ACTIONS :

Guduci is tonic, antiperiodic and diuretic properties. It is valuable in general debility and fevers and other exhausting diseases. It is a remedy in secondary syphilitic affections, chronic rheumatism and mild forms of intermittents. Starch from roots and stems of Amrutaa is nutrient, used in chronic diarrhoea and chronic dysentery. Mature stem is acrid, bitter, hot, restorative and aphrodisiac. It alleviates all the three doshaas and is a digestive tonic. It cures fever, jundice, thirst, burning sensation, diabetes, piles, skin ailments. resperatory disorders, neurological diseases and improves intellect. Juice of fresh plant is diuretic and useful in gonorrhea. Plant is a constituent of several Ayurvedic preparations used in general debility, dyspepsia, fevers and urinary diseases. Powdered and made into an infusion, used as altereatived and aphrodisiac. Externally the drug is used against rheumatic complaints.

IMPORTANT FORMULATIONS: Amritarista; Amritadi kvatha/curna; Guducyadi lowha; Amiritarist; guduci taila; Guducyadi curna; Guduci sattva; Chinnodbhavadi kvatha/curna.

DOSAGE : 2-4 g. of the stam in powder form (In a day)

20-30ml of fresh stam for decoction.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS: Bitter in tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

HALUD

(Fam : Zingiberaceae)

Synonyms:

Beng - Halud, Haldi,

Sansk - Rajani, Nisa, Nisi, Ratri, Ksanada, Dosa,

Eng - Turmeric,

Urdu - Haldi,

Botanical - *Curcuma longa* Linn.

Description:

Haldi is a perennial herb about 1m high, leaves large, entire, long- sheathed, glabrous on both sides.

a) Macroscopic:

Rhizomes ovate, oblong or pyriform (round turmeric) or cylindrical, often short branched (long turmeric), former about half as broad as long, latter 2-5 cm long and about 1-1.8 cm thick, externally yellowish to yellowish-brown with root scars and annulations of leaf bases; fracture horny, fractured surface orange to reddish brown; central cylinder twice as broad as cortex; odour and taste characteristic.

b) Microscopic:

Transverse section of rhizome shows epidermis with thick-walled, cubical cells of various dimensions; cortex characterised by the presence of mostly thin walled, rounded parenchyma cells scattered collateral vascular bundles; a few layers of cork developed under epidermis and scattered oleo-resin cells with brownish contents; cork generally composed of 4-6 layers of thin-walled, brick-shaped parenchyma; cells of ground tissue contain starch grains of 4-15 μ in diameter; oil cell with suberised walls containing either orange-yellow globules of volatile oil or amorphous resinous matter, vessels maily spirally thickened, a few reticulate and annular.

ACTIVE CONSTITUENTS:

Campesterol, stigmasterol, β- sitosterol, cholesterol and fatty acids from rhizome. An essential oil, resin, an alkaloid, curcumin, turmeric oil, Aqueous extract suppressed carrageenin-induced oedema and showed very potent activity in granuloma pouch test.

HABITAT : Cultivated throughout Bangladesh & India.

IDENTITY, PURITY AND STRENGTH: (Powder of rhizomes)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	9	per cent,
Acid-insoluble ash	-	Not more than	1	per cent,
Alcohol soluble extractive	-	Not less than	8	per cent,
Water-soluble extractive	-	Not less than	12	per cent,
Volatile oil	-	Not less than	4	per cent, v/w,

Halud (*Curcuma longa* Linn.)

Powder of Rhizomes :

Identification:

(1) On the addition of Concentrated Sulphuric acid or a mixture of Concentrated Sulphuric acid and alcohol to the powdered drug, a deep crimson colour is produced.

(2) A piece of filter paper is impregnated with an alcoholic extract of the powder, dried, and then moistened with a solution of Boric acid slightly acidified with Hydrochloric acid, dried again, the filter paper assumes a pink or brownish red colour which becomes deep blue or greenish-black on the addition of alkali.

PROPERTIES AND ACTION:

Rasa : Tikta, Katu,

Guna : Ruksa,

Virya : Usna,

Vipaka : Katu,

Karma : Kaphapittanut, Visaghna, Varnya, Kusthaghna, Krmighna, Pramehanasaka.

PARTS USED: Tubers and Rhizome.

THERAPEUTIC USES/INDICATIONS : Visavikara; Kustha; Vrana; Tvagroga; Prameha; Pandu; Sitapitta; Pinasa.

PHARMACOLOGICAL ACTIONS :

Due to strong antiseptic properties Halud is useful for all kinds of poisonous affections, ulcers and wounds. It purifies blood by destroying pathogenic organisms. It is useful in cold, cough, bronchitis, conjunctivitis and liver affections. Root of Halud is usefully administered in intermittent fevers. Rhizome is aromatic, pungent, bitter, laxative, anthelmintic, stimulant, tonic, emollient, maturant, diuretic and carminative. Oral admisnistration of powdered rhizome gives relief in cases of asthma and cough. Internally, juice is anthelmintic. Juice of fresh rhizome is applied to recent wounds and bruises.

IMPORTANT FORMULATIONS: Haridra Khanda, Brihal-Horidra Khanda, Haridradi curna.

DOSAGE: 1-3 g. of the rhizome in powder form (in a day)

10-20ml fresh juice (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause vomating.

PRECAUTIONS/WARNINGS: Bitter in tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

HARITAKI

(Fam : Combretaceae)

Synonyms:

Beng	-	Haritaki,
Sansk	-	Abhaya, Kayastha, Siva, Pathya, Vijaya,
Eng	-	Myrobalan,
Urdu	-	Halela,
Botanical	-	*Terminalia Chebula Retz.*

Description:

Haritaki is moderate sized to large deciduous tree with a cylindrical bole, rounded crown and spreading branches, leaves ovate, elliptic or obovate, glabrous to towny-villous beneath with a pair of large glands at the top of the petiole.

Fruits:

a) **Macrospic :** Intact fruit yellowish- brown, ovoid, 20-35mm long, 13-25 mm wide, wrinkled and ribbed longitudinally; pericarp fibrous, 3-4 mm thick, non- adherent to the seed; taste, astringent.

b) **Microscopic**: Transverse section of pericarp shows epicarp consisting of one layer of epidermal cells inner tangential and upper portions of radial wall thick; mesocarp, 2-3 layers of collenchyma, followed by a broad zone of parenchyma in which fibres and sclereids in group and vascular bundle scattered; fibres with peg like out growth and simple pitted walls; sclereids sof various shapes and sizes but mostly elongated, tannins and raphides in parenchyma; endocarp consists of thick-walled sclereids of various shapes and size, mostly elongated; epidermal surface view reveal polygonal cells, uniformly thick-walled, several of them divided into two by a thin septa; starch grains simple rounded or oval in shape, measuring 2-7 μ in diameter, found in plenty in almost all cells of mesocarp.

c) **Powder:** Brownish in colour; under microscope a few fibres, vessels with simple pits and groups of sclereids.

ACTIVE CONSTITUENTS: Chebulin from flowers, Palmitic, stearic, oleic, linoleic, arachidic and behenic acids from fruit kernels. Fruits contain about 30% of an astringent substance; astrigency is due to the characteristic principle chebunic acid. Also contain tannic acid 20-40%, gallic acid, resin etc. and a purgative glycoside of anthraquinone derivative. Chebulin exhibited antispasmodic action on smooth muscle similar to papaverine.

HABITAT : Haritaki Commonly found throughout Bangladesh, northern India.

IDENTITY, PURITY AND STRENGTH: (Fruit)

Foreign matter	-	Not more than	1	per cent,
Total ash	-	Not more than	5	per cent,
Acid-insoluble ash	-	Not more than	5	per cent,
Alcohol- soluble extractive	-	Not less than	40	per cent,
Water-soluble extractive	-	Not less than	60	per cent,

Haritaki (*Terminalia Chebula* Retz.)

PROPERTIES AND ACTION-

Rasa : Kasaya, Katu, Tikta, Amla, Madhura,

Guna : Laghu, Ruksa,

Virya : Usna

Vipaka : Madhura

Karma : Sarvadosaprasamana, Rasayana, Caksusya, Dipana, Anulomana, Hrdya, Medhya

PARTS USED: Fruits.

THERAPEUTIC USES/INDICATIONS: Vibandha; Aruci; Udavarta; Gulma; Udararoga; Arsa; Pandu; Sotha; Jirnajvara; visamajvara; prameha; Siroroga; Kasa; Tamaka svasa; Hrdroga.

PHARMACOLOGICAL ACTIONS :

Haritaki fruit is astringent, light, digestive, antiseptic, alterative, laxative, diuretic and carminative. It is a safe and effective purgative. It promotes digestive power and heals wounds and ulcers; cures local swellings, skin and eye diseases, chronic and recurrent fever, anaemia, cardiac disorders, diarrhoea and dysentery, diabetes, cough and dyspnoea. It is useful in spleen enlargment, ascites, piles, hoarseness of voice, vomiting and blood pressure, Unripe fruits are more purgative and ripe ones more astringent. They are used externally as a local application to chronic ulcers and wounds and as a gargle in stomatitis. Finely powdered, used as a dentrifrice and considered useful in cardiotonic, Bal- harade is highly useful in chronic diarrhoea and dysentery, flatulence, vomiting, hiccup, colic and enlarged spleen and liver.

IMPORTANT FORMULATIONS: Abhayarista; Agastya haritaki rasayana; Citraka haritaki; Danti haritaki; Dasamula haritaki; Brahma rasayana; Triphala curna; Triphaladi taila; Abhaya lavana; Pathyadi lepa. Pathyadi kvath, Pathyadi, curna, Haritaki,-khanda.

DOSAGE : 3-6 g. fruit pulp in powder form (in a dose).

SIDE EFFECTS: Not yet known

ADVERSE REACTION- Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Not use child age and old age, pregnant mother and ill health person

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

HURHURIA
(Ajagandha)
(Fam : Cappardaceae)

Synonyms :

Beng	-	Hurhuria, Shulte
Sansk	-	Pasugandha
Eng	-	Dog Mustard
Urdu	-	Hulhol/Kanphoti
Botanical	-	*Cleome gynandra* (Linn) / *Gynandropsis gynandra* (Linn)

Description :

Seed :

(a) Macroscopic:

Seeds, small, 1-2 mm in diameter, kidney shaped, surface rough, dark brown or black,

b) **Microscopic:**

Dark brown, oily; under microscope shows a number of fragments of epidermis or testa consisting of thin-walled, polygonal cells; groups of cells, resembling like stone cells, reddish-brown with non-lignified walls; a large number of oval, rounded or irregularly shaped protein bodies starch and crystals absent.

ACTIVE CONSTITUENTS : Seeds contain cleomin, glucocapparin and hexcosanol, β-sitosterol-B-D-glucoside and kaempferol. Seeds contain an unsaturated viscosic acid, a flavone, viscosin. Herb and seed yield an essential oil similar to garlic or mustard oil.

Habitate : Commonly grown throughout Bangladesh. India.

IDENTITY, PURITY AND STRENGTH :

Foreign matter	-	Not more than 2 per cent,
Total ash	-	Not more than 7 per cent,
Acid-insoluble ash	-	Not more than 0.4 per cent,
Alcohol soluble extractive	-	Not less than 16 per cent,
Water-soluble extractive	-	Not less than 7 per cent,

Hurhuria (Ajagandha) *Cleome gynandra* Linn./*Gynandropsis gynandra* Linn.

PROPERTIES AND ACTION :

Rasa : Katu

Guna : Laghu, Ruksa

Virya : Sita

Vipaka : Katu

Karma : Hrdya, Dipana, Vatahara, Pittala, Sulaghni

PARTS USED : Seeds, Leaves & roots.

THERAPEUTIC USES/INDICATIONS :

Gulma; Asthila; Krmi roga; Kandu, Karnaroga.

PHARMACOLOGICAL ATIONS :

Tilaparni or Suryavarta is used in scorpion sting and snake bite. Ether extract of plant is anticancer and spasmolytic. Decoction of roots is used in fever. Juice of leaves is used for otalgia. Juice of leaves and seed oil used to cure skin diseases. Bruised leaves are rubifacient and vesicant in rheumatism; remedy for muscular pain, headache and intestinal wounds. Seeds are antispasmodic, sudorific, anthelmintic and carminative. They are applied as poultice to sores having maggots and given as infusion for cough. Powder of seeds is a good remedy for piles.

IMPORTANT FORMULATIONS : Narayana curna.

DOSAGE: 1-3 g of the drug in powder form (in a dose)

SIDE EFFECTS: May cause beleary deases.

ADVERSE REACTION: Over dose may cause beleary disorder.

PRECAUTIONS/WARNINGS: Use should be avoid in pregnency.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

INDRAYVA

(Fam : Apocynaceae)

Synonyms:

Beng	-	Kurchi,
Sansk	-	Bhadra Yava, Kalinga, Sakra, Vatsaka,
Eng	-	Ester Tree, Conessi Seeds,
Urdu	-	Tukhm-e-Kurchi, Indarjao Talkh,
Botanical	-	*Holarrhena antidysenterica* Wall.

Descriptions:

A tree reaching about 10m. in height or more. Bark pale- brown, lenticellate, Yong twigs tomentose. Leaves opposite, oval, subsessile, flowers white in axillary or terminal corymbiferous cyme. Follicles cylindrical in pairs, Long, narrow, incurved, Seeds numerous, brownish, crowned with a tuft of long haris one end.

Seed:

a) Macroscopic:

Seeds compressed, linear, or oblong, elongated, margins curved inside, one side convex and other side concave with a longitudinal striation; 1-2 cm long 0.2-0.3 cm thick, surface light yellowish-brown; odour, not distinct; taste, bitter.

b) Microscopic:

Seed shows 2-3 layered integument consisting of single layered, rounded, oval or radially elongated, thick-walled, reddish-brown parenchymatous cells, some of them elongate outwards forming small papillose structure, covered by a few unicellular, and uniseriate, multicellular types of trichomes; below this layer, 1 or 2 layers of small rounded or irregular cells, a few having single prismatic crystals of calcium oxalate, followed by a few layers of collapsed, brown coloured cells, endosperm 4-6 layered consisting of rounded, oval or polygonal, thin-walled, parenchymatous cells, containing aleurone grains; most of the cells also contain oil globules; embryo having conical radicle and two foliaceous, convoluted cotyledons consisting of single layered tabular epidermal cells towards dorsal side and rectangular cells towards ventral side, and externally covered with cuticle; rest of the cotyledon cells composed of rounded, oval or rectangular parenchymatous cells containing rosette crystals of calcium oxalate and oil globules.

Powder: Light yellowish-brown; shows fragments of endosperm, pigment cells, oil globules, prismatic and rosette crystals of calcium oxalate.

ACTIVE CONSTITUENTS: Alkaloids-Steroidal Alkaloid, Consessine etc., Fats, Tannin and Resin.

HABITAT : Found all over Bangladesh & India.

IDENTITY, PURITY AND STRENGTH: (Seed)

Foreign matter - Not more than 2 per cent,

Total ash - Not more than 8 per cent,

Acid- insoluble ash - Not more than 3 per cent,

Alcohol soluble extractive - Not less than 12 per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using chloroform: Methanol (1:1) shows under U.V. (366 nm) four fluorescent zones at Rf. 0.67, 0.72, 0.76 and 0.93 (all blue). On spraying with Dragendorff reagent followed by 5% Methanolic-Sulphuric acid reagent five spots appear at Rf. 0.15, 0.28, 0.43, 0.59 and 0.67 (all orange).

PROPERTIES AND ACTION:

Rasa : Katu, Tikta,

Guna : Laghu, Ruksa,

Virya : Sita,

Vipaka : Katu,

Karma : Dipana, Tridosasamaka, Sangrahi,

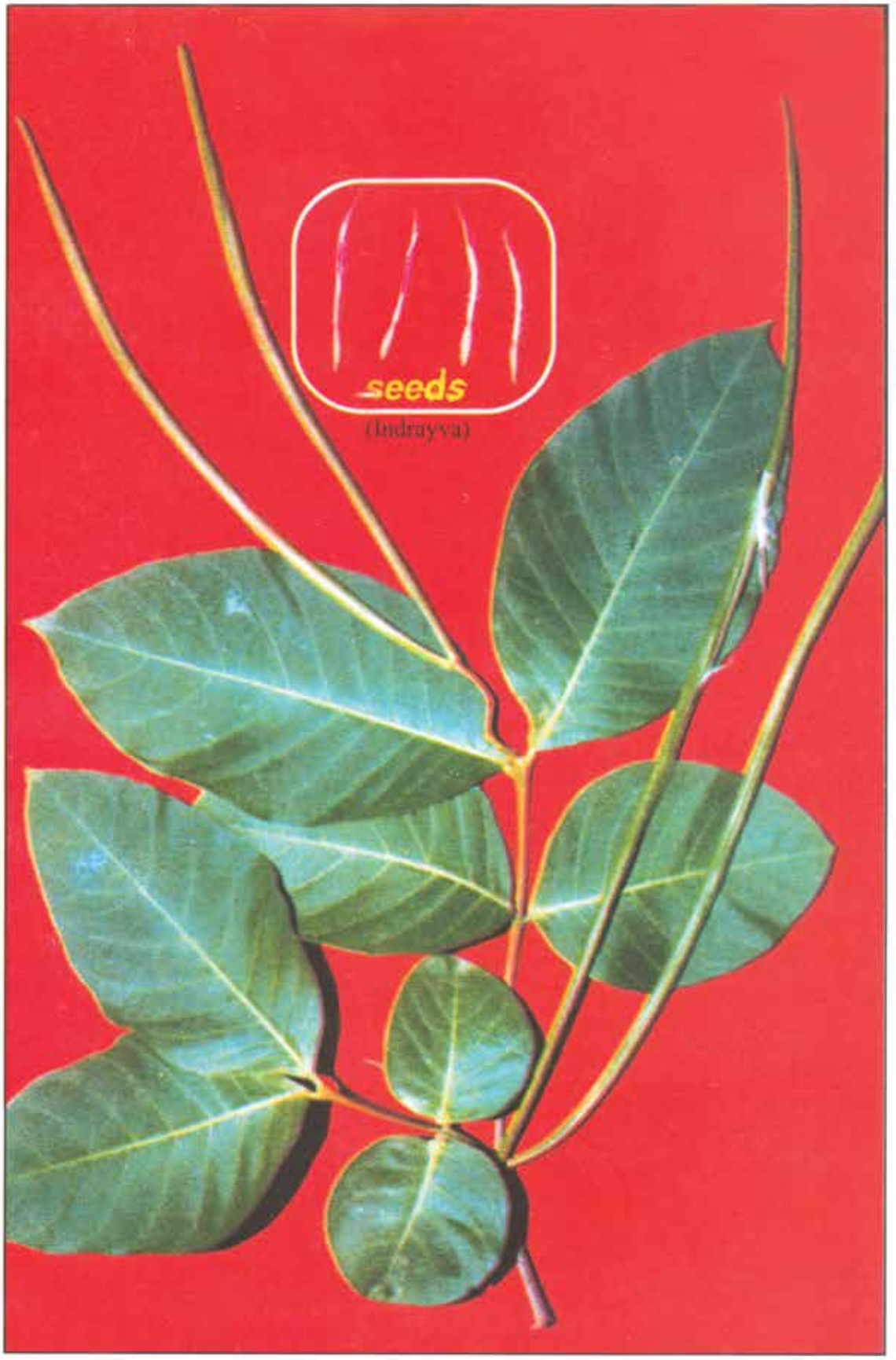
PARTS USED : Seed.

THERAPEUTIC USES/INDICATIONS: Atisara, Kustha, Jwaratisara, Krmi, Visarpa, Grahani, Raktatisara, Sula, Chardi, Twakroga, Daha.

PHARMACOLOGICAL ACTIONS :

Various parts of Indrayava are used for cold, colic, anaemia, constipation, spleen complaints, epilepsy, spermatorrhoea, labor complaints and dog-bita. Root-bark is very useful for dysentery with bloody stools. Fresh bark as paste in sour butter-milk reduces fever and frequency of stools as well as blood in stools. Bark-paste is applied for rheumatic inflammation. Bark is used in dropsy and dysentery. Pounded bark is used in stomach disorders, in abdominal and glandular tumors. Gargling with decoction of bark reduces tooth-ache. Fruit extract is antiprotozoal, anticancer and hypoglycaemic. Seeds are astringent febrifuge, useful in diarrhoea and intenstinal worms and for eczema. They are useful in regulating menstruation. Bleeding of gums and pus formation and bad breath are treated by applying powder of seeds. Paste is applied to head in headache. Decoction is taken internally in dysentery and fevers. It is an ingredient of compositions for giardiasis. Their extract is hypotensive. Vegetable of tender pods is useful to eradicate worms. Powder of pod is applied on affected part in snake bite to reduce burning pain and swelling.

IMPORTANT FORMULATIONS: Panca Nimba Curna, Palasa Bijadi Curna, Laghu Gangadhara Curna, Krmi Kuthara Rasa, Piyusavalli Rasa, Jwaraghni Gutika, Siddha Praneswara Rasa, Ahiphenasava.



Indrayva (*Holarrhena antidysenterica* Wall.)

DOSAGE: 3-6 g. Curna. (in a day)

20-30 ml. Decoction. (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause vomating.

PRECAUTIONS/WARNINGS: Bitter in tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

KALAJIRA

(Fam : Ranunculaceae)

Synonyms:

Beng	-	Kalajira, Mota Kalajira,
Sansk	-	Sthulajiraka, Upakunci, Susavi,
Eng	-	Small Fennel, Nigella Seed,
Urdu	-	Kalongi,
Botanical	-	*Nigella sativa* Linn.

Descriptions:

Kalajira is a pretty small herb, 30—60 cm in height; leaves compound 2-3 pinnatisect cut into linear or linear-lanceolate segments; flowers pale blue, solitary, long peduncles without an involucre seeds trigonous, balck, rugulose-tubercular.

Seed:

a) Macroscopic:

Seeds, flattened, oblong, angular, rugulose tubercular, small, funnel shaped, 0.2 cm. long and 0.1 cm. wide, black; odour, slightly aromatic; taste, bitter.

b) Microscopic:

Transverse section of seeds shows single layer of epidermis consisting of elliptical, thick-walled cells covered externally by a papillose cuticle, filled with reddish-brown content; epidermis followed by2—4 layers of thick-walled, tangentially elongated, parenchymatous cells, followed by a pigmented layer composed of tangentially elongated, cylindrical thick-walled cells filled with reddish-brown pigment; below pigmented layer, parenchyma composed of thick-walled rectangular, radially elongated cells, present in a layer; endosperm consists of moderately thick-walled, rectangular to polygonal cells, a few filled with oil globules; embryo embedded in endosperm.

Powder: Black, oily to touch; under microscope shows groups of parenchyma, endosperm cells and oil globules.

ACTIVE CONSTITUENTS: The fatty acids of the oil are as follows: myristic, plmitic, stearic, oleic, and linoleic. The component glycerides of the oil are the following: trilinolein, oleodilinolein, dioleolinolein, palmito-oleo-linolein, and stearo-oleolinolein, glycerides of some volatile acids are also present in the oil in small quantities tannins, resins, proteins, reducing sugars, cystine, lysine, aspartic, acid, leucine; asparagines is not present.

GEOGRAPHICAL DISTRIBUTION – Cultiveted all over Bangladesh & parts of India.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than 2 per cent,
Total ash	-	Not more than 6 per cent,
Acid- insoluble ash	-	Not more than 0.2 per cent,

Alcohol soluble extractive - Not less than 20 per cent,

Water-soluble extractive - Not less than 15 per cent,

PROPERTIES AND ACTION:

Rasa : Katu, Tikta

Guna : Laghu, Ruksa

Virya : Usna

Vipaka : Katu

Karma : Rucya, Samgrahi, Caksusya, Garbhasayavisodhana, Pittala, Dipana, Pacana, Medhya, Hrdya, Vatakaphapaha, Krmighna

PARTS USED : Seed.

THERAPEUTIC USES/INDICATIONS : Gulma; Adhmana; Atisara; Krmiroga.

PHARMACOLOGICAL ACTIONS :

The seeds are acrid, bitter, thermogenic, aromatic, carminative, diuretic, emmenagogue, anodyne, antibacterial, anti-inflammatory, deodorant, appetyzing, digestive, anthelmintic, constipating, sudorific, febrifuge, stimulant, galactagogue and expectorant. They are useful in skin diseases, haemorrhoids, cephalalgia, jaundice inflammation, fever, paralysis, ophthalmia, halitosis, anorexia, dyspepsia, flatulency diarrhoea, dysentery, cough, amenorrhoea, dysmenorrhoea, helminithiasis especially tapeworm, strangury, intermittent fevers, agalactia and vitiated conditions of vata and kapha.

IMPORTANT FORMULATIONS: Kankayana gutika, Narayana curna;

DOSAGE: 1-3 g of the seed powder (in a day)

0.2-0.5 ml of seed oil (in a dya)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

KANCHANA

(Fam : Leguminosae)

Synonyms:

Beng	-	Kanchana, Rakta Kanchana,
Sansk	-	Kancanaraka,
Eng	-	Mountain Ebony,
Urdu	-	Kachnal/Kachnar
Botanical	-	*Bauhinia variegata* Blume.

Description:

Kanchan is a moderate sized deciduous tree with vertically cracked Grey bark, wood moderately hard, greyish brown with irregular darker patches; leaves of 2 leaflets, connate for about two-thirds up, leaflets ovate, rounded at apex, 10-15cm long, pubescent beneath when young, coriaceous; flowers white or pink, the upper most petal darker and variegated, usually appearing before the leaves in short axillary or terminal racemes, stamens 5, staminodes absent, fruits flat dehiscent pods, seed 10-15.

Stem bark:

a) Macroscopic:

Bark, dark brown, sometimes with silvery patches, rough, compact, exfoliating in woody strips and scales, outer surface with small transverse and longitudinal cracks, internal surface white; taste, astringent.

b) Microscopic:

Transverse section of mature stem bark shows a wide stratified cork; outer cork composed of thin-walled, slightly compressed, yellow brown cells followed by a number of layers of brown coloured ceils, inner cork composed of transversely elongated orange brown cells; cork interrupted at certain places due to formation of rhytidoma; some secondary cortex composed of 15 or more rows of transversely elongated to circular, thin-walled, parenchymatous cells; some secondary cortex cells contain orange brown contents; groups of stone cells found scattered in this region, occasionally arranged in 1-7 or more tangential rows; pericyclic fibres, thick-walled with narrow lumen, scattered in secondary cortex in singles or in groups; secondary phloem consists of sieve tubes, companion cells, phloem parenchyma and fibres traversed by funnel shaped medullary rays; phloem fibres arranged in radial rows throughout phloem region; prismatic and rhomboidal crystals of calcium oxalte abundantly found in phloem and secondary cortex regions, very rarely found in cork cells, cluster crystals also present in secondary cortex and secondary phloem, crystal fibres also found in secondary phloem.

c) Powder– Powder pinkish; under microscope showing abundant crystals of calcium oxalate, sclereids in singles or in groups with wide lumen, bits of fibres, cork and secondary cortex cells, containing coloured content, and numerous crystal fibres.

ACTIVE CONSTITUENTS:

β-sitosterol, lupeol, kaempferol-3/glucoside and 5,7-dehydroxy and 5,7-dimethoxyflavanone-4-0-a-L-rhamnopyranosyl- β-D glucopyranosides.

HABITAT : All over Bangladesh; throughout India.

Kanchana (*Bauhinia variegata* Blume.)

IDENTITY, PURITY AND STRENGTH: (Bark powder)

Foreign matter	-	Not more than	2 per cent,
Total ash	-	Not more than	11 per cent,
Acid-insoluble ash	-	Not more than	0.2 per cent,
Alcohol soluble extractive	-	Not less than	2 per cent,
Water-soluble extractive	-	Not less than	6 per cent,

PROPERTIES AND ACTION:

Rasa : Kasaya

Guna : Laghu, Ruksa

Virya

Vipaka : Sita

Karma : Katu

Karma : Tridosahara, Grahi, Dipana, Gandavrddhihara

PARTS USED: Roots, Bark & Flowers.

THERAPEUTIC USES/INDICATIONS: Krmiroga; Gandamala; Apahci; Gudabhramsa; Vrana.

PHARMACOLOGICAL ACTIONS :

The roots and bark are astringent, acrid, cooling, constipating, depurative, anthelmintic, vulnerary, anti-inflammatory and styptic, They are useful in vitiated conditions of pitta and kapha, diarrhoea, dysentery, skin diseases, leprosy, intestinal worms, tumours, wounds, ulcers, inflammations, scrofula, proctoptosis, haemorrhoids, haemoptysis, cough, menorrhagia and diabetes.

IMPORTANT FORMULATIONS: Kanchanaraguggulu.

DOSAGE : 20-30 g. of the bark for decoction. (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

KANTAKARI

(Fam : Solanaceae)

Synonyms:

Beng	-	Kantakari,
Sansk	-	Vyaghri, Nidigdhika. Ksudra, Kantakarika, Dhavani, Nidigdha, Dusparsa,
Eng	-	Febrifuge plant,
Urdu	-	Katali khurd/Katai khurd
Botanical	-	*Solanum xanthocarpum* Schrad & Wendl.

Description:

a) Macroscopic:

Root-10-45 cm long, few mm to two cm in diameter, almost cylindrical and tapering, bearing a number of fine longitudinal and few transverse wrinkles with occasional scars or a few lenticels and small rootlets, transversely smoothened surface shows a thin bark and wide compact cylinder of wood; fracture, short; taste, bitter.

Stem– herbaceous, prickly with prominent nodes and internodes, green when fresh, young branches, covered with numerous hairs, mature ones glabrous, furrows more prominent in young stem appearing almost circular towards basal region, stem pieces 8-10 mm thick of variable length, external surface light green, when dry, surface yellowish green and smooth, transversely smoothened surface shows a very thin bark and prominent wood, centre shows a large and distinct, pith, mature and dry stem opften with hollow pith; fracture short to slightly fibrous.

Leaves- petiolate, exstipulate, ovate-oblong or elliptic, sinuate or sub-pinnatified, sub-acute hairy; 4-12.5 cm long and 2-7.5 cm wide; green; veins and midrib full with sharp prickles; odour and taste not distinct.

Flower- ebracteate, pedicellate, bisexual, pentamerous, regular, complete, bright blue or bluish purple; calyx- persistent, g mosepalous, tube short, globose, linear- lanceolate, acute, hairy, 0.5-1.3 cm long and densely prickly; corolla-gamopetalous, lobes deltoid, acute, hairy, 1-2 cm long and purple in colour ; stamens 5, epipetalous, basifixed, filament short 1-1.5 mm long; anther, oblong lanceolate, 0.7-0.8 cm long; ovary superior, ovoid, glabrous, bilocular with axile placentation having numerous ovules.

Fruit- berry, globular, measuring 0.8-1 cm in diameter, surrounded by persistent calyx at base unripe fruits variegated with green and white strips; ripe fruit shows different yellow and white shades.

Seeds- circular, flat, numerous, embedded in a fleshy mesocarp, about 0.2 cm in diameter, glabrous taste, bitter and acrid.

b) Microscopic:

Root- transverse section of mature root shows cork composing of 3-6 layers of thin walled, rectangular and tangentially elongated cells; cork cambium single layered followed by 6-15 layers of thin-walled, tangentially elongated to oval or circular parenchymatous cells; stone cells either single or in groups of 2-20 or even more present in this region; secondary phloem composed of sieve

elements and phloem parenchyma traversed by medullary rays; stone cells present in singles or in groups of 2-20 or more in outer, and middle phloem regions; phloem rays 1-4 cells wide and 2-22 cells high; cambium 3-5 layered of thin- walled rectangular cells; xylem composed of vessels, tracheids, fibre trachieds, parenchyma and transversed by medullary rays all elements being lignified; vessels and tracheids with bordered pit; fibres with a few simple pits; xylem parenchyama rectangular or lightly elongated with simple pits and rarely with reticulate thickening; xylem rays 1-3 cells wide and 1-20 cells high; microsphenoidal crystals of calcium oxalate as sandy masses and simple starch grains present in secondary cortex, phloem and medullary rays.

Stem- transverse section of mature stem, 1.5-2 cm thick consists of 6-12 layers of cork of thin-walled somewhat rectangular cells; epidermis remains intact for a long time; secondary cortex consists of 7-11 layers of parenchymatous cells, some cells thickened and lignified forming stone cells; primary cortex remains intact even in quite mature stage but later gets crushed; pericyclic fibre occur singly or in small groups of 2-3; secondary phloem consist of sieve elements, parenchyama, a few fibres stone cells and traversed by phloem rays; fibres found scattered in singles or in small groups in outer and middle phloem region; inner phloem devoid of fibres; stone cells present in singles or in small groups of 2-4; phloem rays, 1-2 rarely 3 cells wide; cambium composed of 2-3 layers; xylem consists of vessels, tracheids, parenchyma, fibres and traversed by xylem rays; vessels vary greatly in shape and size and show bordered pits; tracheids elongated with irregular walls and bordered pits; fibres much elongated thick-walled and lignified with tapering and pointed ends, some having truncated ends or bifurcated at one or both ends with a few simple pits; trancheids fibres smaller than fibres, with both ends tapering and have reticulate thickening; xylem parenchyma cubical to rectangular with simple or bordered pits or reticulate thickening; xylem rays conspicuous by their pitted thickenings, longer size and radial elongation of cells, 1-2 or rarely 3 cells wide and 2-25 cells hight; internal phloem composed of sieve elements and parenchyma, forming more or less continuous band and embedded in perimedullary zone; a few phloem fibres similar to those of outer phloem region also present central region occupied by a large pith; micro sphenoidal crystals of calcium exalate as sandy masses and simple starch grains present in cortex, secondary cortex, phloem, medullary rays and pith cells.

Leaves—

Petiole- transverse section of petiole shows circular to wavy outlines; epidermis single layered, covered externally by a thick cuticle; hypodermis consists of 3-4 layers of collenchymatous cells; one large crescent- shaped, bicollateral, central vascular bundle and two small lateral bundle present, rest of tissue of petiole composed of polygonal, angular, thin-walled, parentchymatous cells; epidermis shows mostly stellate and rarely uni to tricellular hairs.

Midrib- transverse section of midrib shows a biconvex structure; epidermis on either side covered externally by a thick cuticle; below epidermis 3-4 layers of collenchyma present; stele composed of crescent-shaped, bicollateral, central vacscular bundle and two small lateral vascular bundles; rest of tissue composed of thin walled, parenchyma, some stellate hair present on epidermis.

Lamina- transverse section shows dorsiventral structure; epidermis on either side, wavy in outline, covered externally by a thick cuticle; on upper side mesophyll composed of a single layered palisade and 4-6 layers of loosely arranged spongy parenchyma; some stellate hairs (4-8) armed) present on both sides of epidermis; anisocytic stomata present on both surfaces; vein-islet number 46-80 on lower epidermis (mean 63), 61-80 on upper epidermis (mean 70) stomatal index 20-25 (mean 22.5) on lower epidermis, 14-24 (mean 19) on pupper epidermis, palisade ration 1.7-4 (mean 2.85).

Kantakari (*Solanum xanthocarpum Schrad.* & Wendl.)

Fruit- transverse section of mature fruit shows single layered epidermis, covered externally by a thin cuticle; 1-2 layers of collanchyma present below epidermis; mesocarp composed of thin-walled oval to polygonal cells; some fibre vascular bundle present scattered; seed consists of thick walled radially elongated testa, narrow endosperm with embryo; some cells of endosperm contain oil globules.

Powder- Greenish; under microscope shows single or groups of stone cells, groups of aseptate fibres with tapering ends, pitted vessels, groups of spongy parenchyma, fragments of palisade tissue, anisocytic stomata, stellate hairs and simple, rounded to oval starch grains measuring 2.75-11 μ in i.

ACTIVE CONSTITUENTS: Fruits yield carpesteral and gluco-alkaloid, solasadine, solasomine and solanocarpine, solanine-on hydrolysis yields alkaloid, solanidine.

HABITAT : Common is waste places, road sides throughout Bangladesh, India, Nepal, Mayanmar, Sreelanka, Thailand.

IDENTITY, PURITY AND STRENGTH: (Whole plant)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	9	per cent,
Acid-insoluble ash	-	Not more than	3	per cent,
Alcohol soluble extractive	-	Not less than	6	per cent,
Water-soluble extractive	-	Not less than	16	per cent,

PROPERTIES AND ACTION:

Rasa : Katu, Tikta,

Guna : Laghu, Ruksa,

Virya : Usna,

Vipaka : Katu,

Karma : Dipana, Pacana, Amadosanasaka, Kanthya, Sothahara.

PARTS USED: Whole plant, Root, leaves, stem, flowers, fruit & seeds.

THERAPEUTIC USES/INDICATIONS: Svasa; Kasa; Jvara; Aruci; Pinasa; Parsvasula; Svarabheda..

PHARMACOLOGICAL ACTIONS :

Kantakari plant is astringent, stimulant, aperient, diuretic, pungent, bitter, digestive, expectorant, febrifuge, laxative, and cardiotonic. It is used in fever cough, asthma and costiveness. It is an important therapeutic agent for dislodging tenacious phlegum and is extensively used in asthma, cough, and bronchitis. It is useful in cases of influenza, enteric fever and allied conditions, used against difficult urination, bladder stones, rheumatism, sore throat, enlargement of liver and spleen. A decoction of plant is used in gonorrhoea. It promotes conception in females. Root is pungent, bitter, heating, appetiser, laxative, stomachic, anthelmintic and aphrodisiac, useful in asthma, bronchitis, fever, lumbago, pains, piles, urinary concretions and diseases of heart. It is an effective diuretic, expectorant and febrifuge. Roots are one of the constituents of "Sashamula Asava". Leaves are anodyne. Their juice in combination with black pepper is prescribed in rheumatism. Stems, flowers and fruit are bitter and carminative and are prescribed in burning of feet in cases associated with a vesicular and watery eruption. Juice of fruits is beneficial in sore throat. Fine powder of berries mixed with honey is given to children in chronic

cough. Vapour of burning seeds is beneficial as an expectorant in asthma and cough and cures toothache.

IMPORTANT FORMULATIONS: Kantakaryavaleha; Panchatikta ghrita; Vyaghriharitaki,

DOSAGE : 20-30- g. plant for decoction. (In a day)

500 mg. - 1000 mg root bark powder (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

KARBEE

(Fam : Apocynaceae)

Synonyms:

Beng	-	Karbee, Karbbe,
Sansk	-	Divyapuspa, Satakumbha, Asvamaraka, Hayamara,
Eng	-	Sweet-Scented Oleander,
Urdu	-	Kaner,
Botanical	-	*Nerium indicum* Mill, Syn. *N. odorum* Soland.

Descriptions:

Karbee is a large glabrous evergreen shrub with milky latex; leaves three in a whort, shortly stalked, linear, dark green and shiny above; flowers red, rose-coloured or white fragrant; fruits follicles, at length separating.

Root:

a) Macroscopic:

Drug available in cut pieces, 0.5-2.6 cm thick, branched, cylindrical, external surface greyish with long irregular streaks caused by rupture of bark, internal surfacer cream coloured; fracture, short; taste, bitter.

b) Microscopic:

Root shows cork consisting of 5-12 layered, thin-walled, rectangular, compactly arranged, parenchymatous cells, with a few outer layers occasionally exfoliacted; secondary cortex consisting of 6-10 layers of oval, tangentially elongated, thin-walled, parenchymatous cells, a few thick-walled laticiferous cells present in this region; secondary phloem composed of oval to polygonal, thin-walled, parenchymatus cells; secondary xylem consisting of usual elements, having pitted vessels, fibres with pointed tips; zylem rays usually uniseriate and rarely biseriate; prismatic crystals of calcium oxalate and simple starch grains scattered in secondary cortex, secondary phloem and phloem rays; simple, oval to round, elliptical starch grains meassuring 3-11 μ in dia., found-scattered in cortical cells, phloem and xylem rays.

Powder- Greyish-brown; shows thin-walled, parenchymatous cells, fragments of cor cells, pitted xylem fibres and vessels, a few prismatic crystals of calcium oxalte, simple, round to oval, elliptical starch grains meassuring 3-11 μ in diameter.

ACTIVE CONSTITUENTS: Dambonitol from leaves and stems, Ursolinic acid, oleandrin and neriodorin, plumericin and ordorin. Root, bark and seeds contain loxic principles neriodorin, nerioderin and karabin. They are a powerful cardiac poison and act on the heart in a somewhat similar manner as digitalis. Leaves, flowers and bark show carditonic potency and diuretic activity. Leaves contain a compound giving reactions described for rutin.

HABITAT : Karbbe is grow all over Bangladesh & India. Also cultivated in public parks & home gardens.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	- Not more than	1	per cent,
Total ash	- Not more than	7.5	per cent,
Acid- insoluble ash	- Not more than	3.5	per cent,
Alcohol -soluble extractive	- Not less than	8	per cent,
Water- soluble extractives	- Not less than	8	per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform: Methanol (8:2) shows under U.V. (366 nm) ten fluorescent zones at Rf. 0.11,0.15 (both yellow) 0.19 (blue), 0.26 (yellow), 0.49 (pink), 0.60, 064, 0.72, 0.88 (all blue) and 0.95 (yellow). On exposure to Iodine vapour ten spots appear at Rf. 0.11, 0.22, 0.30, 0.49, 0.53, 0.64, 0.68, 0.72, 0.90 and 0.95 (all yellow). On spraying with 5% Methanolic- Sulphuric acid reagent and heating the plate at 105°C for about ten minutes eleven spots appear at Rf. 0.05, 0.11, 0.22, 0.30, 0.49, 0.53 (all grey), 0.64 (yellow), 0.68, 0.72 (both grey), 0.90 (violet) and 0.95 (brown).

PROPERTIES AND ACTION:

Rasa : Katu, Tikta, Kasaya.

Guna : Laghu, Ruksa, Tiksna

Virya : Usna

Vipaka : Katu

Karma : Sothaghna, Krmighna, Kandughna, Kusthhara, Sirovirecana, Caksusya.

PARTS USED : leaves, Root, bark.

THERAPEUTIC USES/INDICATIONS : Vrana,Upadansa, Kustha, Jalodara, Kandu.

PHARMACOLOGICAL ACTIONS :

Karbbe is a poisonous plant. Leaves and root bark are used as medicine. Root is a powerpul resolvent and attenuant, and used externally; beaten into a paste with water and applied to chancres and ulcers on penis. It is also employed as abortifacient. Decoction of roots is used to reduce swellings. Oil prepared from root-bark is used in skin dieases of a scaly nature and in leprosy. It acts like digitalis on heart and has similarity with strophanthus. It is useful in heart diseases where it acts as a diuretic. It is useful in skin diseases. There is much similarity in the action of this remedy and Thevetia peruviana.

IMPORTANT FORMULATIONS: Brhanmaricadya Taila, Karaviradya Tail

DOSAGE: 30-125 mg. in powder form (In a dose)

Karbee (*Nerium indicum* Mill)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause tiresome, feebic, short of heart & respiration causes death.

PRECAUTIONS/WARNINGS: A very poisonus plant.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.-

KATPHAL

(Fam : Myricaceae)

Synonyms:

Beng	-	Katphal, Kaychhal, Kayphal,
Sansk	-	Mahavalkala,
Eng	-	Box Myrtle, Bay Berry,
Urdu	-	Kaiphal,
Botanical	-	*Myrica esculenta* Buch. / *M. Nagi* Hook f.

Description:

It is a small or moderate-sized evergreen, dioecious tree, 3-15 m high.

a) Macroscopic:

Fruit : A drupe, ellipsoid or ovoid, 0.7-1.0 cm long, 0.5-0.7 cm wide, dark brown, surface tubercled, very hard; taste, sourish sweet.

Seed : Ovoid, 0.6 cm long, 0.3 cm wide, surface very smooth, light brown; taste, oily.

b) Microscopic:

Fruit : Shows epicarp cells isodiametric in surface view, mass of reddish-brown, thin-walled, parenchymatous cells, a few elongated tuberchled cells with smooth walls; endocarp hard and stony consisting of sclerenchymatous cells.

Seed : Seed coat shows single layered, thick, brown coloured cells; cotyledons composed of single layered, thin-walled epidermal cells containing oil gloubles and aleurone grains; mesophyll cells thin-walled, isodiametric, fully packed with oil gloubles and aleurone grains.

Powder – Yellowish-brown; shows rectangular to hexagonal, thin-walled seed coat and polygonal epidermal cells in surface view; tubercled parenchymatous cells, oil globules and aleurone grains.

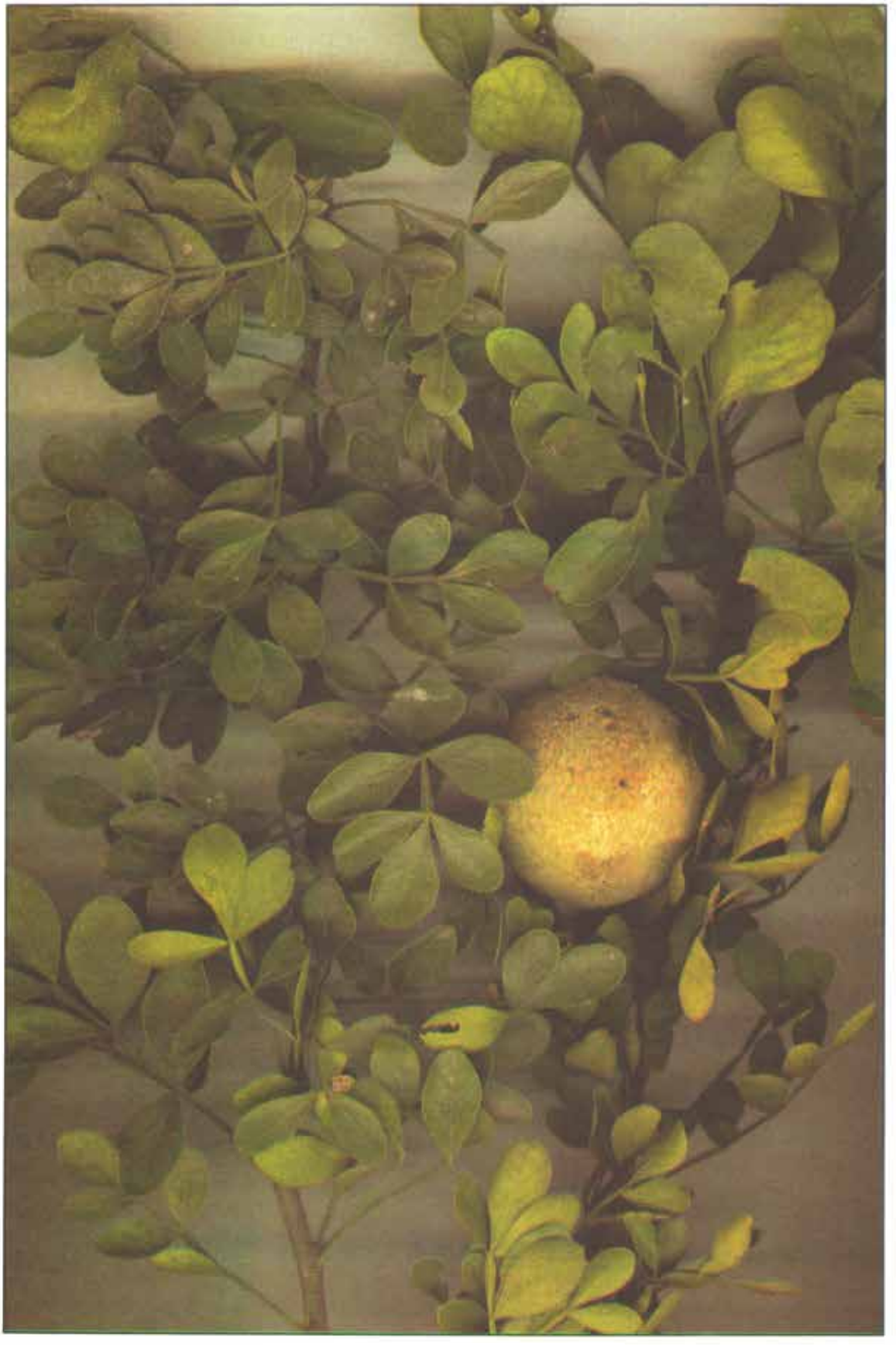
ACTIVE CONSTITUENTS:

Plant contains myriconol, proanthocyandin, β-sitisterol, friedelin, taraxerol, myricadiol, myricetin. Also contains glycoside myricitrin.

HABITAT: Throughout Bangladesh, Sub-tropical region of India.

IDENTITY, PURITY AND STRENGTH: (Fruit)

Foreign matter	-	Not more than	1	per cent,
Total ash	-	Not more than	5	per cent,
Acid-insoluble ash	-	Not more than	2.5	per cent,
Alcohol soluble extractive	-	Not less than	15	per cent,
Water-soluble extractive	-	Not less than	17	per cent,



Katphal (*Myrica esculenta* Buch.)

T.L.C.—

T.L.C. of the alcoholic extract on Silica gel 'GF 254' plate using n-Butanol: Acetic acid : Water (4:1:5) shows in visible light five spots at Rf. 0.25, 0.43, 0.57, 0.75 (all grey) and 0.88 (yellowish green). Under U.V. (366 nm) seven fluorescent zones are visible at Rf. 0.09, 0.18 and 0.30 (all light blue), 0.43 (green), 0.49 (blue), 0.65 (blue) and 0.71 (pink). On exposure to Iodine vapour eleven spots appear at Rf. 0.07, 0.09, 0.12, 0.25, 0.30, 0.35, 0.43, 0.52, 0.57, 0.75 and 0.88 (all yellow). On spraying with 5% Methanolic—Sulphuric acid reagent and heating the plate for ten minutes at 110°C six spots appear at Rf. 0.09 (black), 0.30 (black), 0.57 (light brown), 0.71 (lgiht pink), 0.82 (light pink) and 0.88 (yellowish green).

PROPERTIES AND ACTION:

Rasa : Katu, Tikta, Kasaya,

Guna : Laghu, Tiksna,

Virya : Usna,

Vipaka : Katu,

Karma : Kaphavatahara, Dahahara, Mukharogasamaka, Dhatuvikarajit, Rucya.

PARTS USED: Fruits, root & stam bark.

THERAPEUTIC USES/INDICATIONS: Gulma, Meha, Jwara, Arsa, Grahani, Pandu Roga, Hrllasa, Mukha Roga, Kasa, Swasa.

PHARMACOLOGICAL ACTIONS :

Katphala is aromatic and astringent, heating and stimulant. Bark is resolvent, astringent, carminative, tonic and antiseptic, useful in fever, asthma, cough; powdered and used as snuff in catarrh with headache; maxed with ginger used as a rubifacient application in cholera; fish poison. A decoction of the bark is useful in asthma, diarrhoea, fevers lung affections, chronic bronchitis, dysentery and diuresis, Bark is chewed to relieve toothache and a lotion from it is used for washing putrid sores. Fruits yield a wax which is used externally for healing ulcers.

IMPORTANT FORMULATIONS: Brihatphala Ghrta, Pusyanuga Curna, Arimedadi Taila, Bala Taila, Mahavisagarbha Taila, Khadiradi Gutika (Mukha Roga), Khadiradi Gutika (Kasa), Maha Vatagajan Kusa Rasa.

DOSAGE: 3-5 g. (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

KHAYER

(Fam : Leguminosae/Mimosaceae)

Synonyms:

Beng	-	Khayera, Khera,
Sansk	-	Gayatri,
Eng	-	Black catechu, Cutch tree,
Urdu	-	Chanbe Kaath,
Botanical	-	*Acacia Catechu* Linn.

Description:

Khayer is a maderate sized deciduous tree, 9—12 m in height with dark grayish or brown rough bark and hooked short spines, leaves bipinnately compound, leaflets 30-50 Pairs, main rachis pubescent with a large conspicuous near the middle of the rachi; flowers pale yellow, sessile in peduncled spikes; fruits flat brown pods, shiny and with a triangular beak at the apex and narrowed at the base; seeds 3-10 per pod.

a) Macroscopic:

Heart-wood, light red, turning brownish-red to nearly black with age, attached with whitish sapwood; fracture hard; taste, astringent;

b) Microscopic:

Transverse section of heart-wood shows, numerous, uni-to bi-seriate medullary rays; vessels occuring isolated or in small groups of two to four; xylem fibres with narrow lumen occupying major portion of wood; xylem parenchyma usually predominantly paratracheal, forming a sheath around vessels; wood consists of crystal fibres with 14—28 segments, each having one prismatic crystal of calcium oxalate; a few tracheids with scalarform thickening; some of cells, including vessels, filled with brown content; prismatic crystals of calcium oxalate present in a number of cells throughout the wood.

Powder – Brown coloured; under microscope shows a number of xylem fibres, vessels crystal fibres, prismatic crystals of calcium oxalate.

ACTIVE CONSTITUENTS:

Catechin, catechutannic acid, tannin. Wood contains α, β and γ catechin. l-epicatechin. Heartwood contains eight flavons. Quercetin and its derivatives. Seeds exhibited hypoglycemic activity in normal rats but not in diabetic rats.

HABITAT: Drier parts of Bangladesh and India, North Africa.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	2	per cent,
Acid-insoluble ash	-	Not more than	0.2	per cent,
Alcohol soluble extractive	-	Not less than	1	per cent,
Water-soluble extractive	-	Not less than	3	per cent,

Khayer (*Acacia Cateclu* Linn. f.)

PROPERTIES AND ACTION:

Rasa : Tikta, Kasaya,

Guna : Laghu, Ruksa,

Virya : Sita,

Vipaka : Katu,

Karma : Kaphapittahara, Raktasodhaka, Kusthaghna, Medohara, Krmighna, Dantya.

PARTS USED: Bark, Pods, gum and heard wood.

THERAPEUTIC USES/INDICATIONS: Kustha, Vrana; Sotha; Prameha.

PHARMACOLOGICAL ACTIONS :

Khayer bark is bitter, astringent, cooling, anthelmintic, antidysenteric and antipyretic; useful in melancholia, conjuctivitis, haemoptysis and skin diseases. Various plant parts are used in sore mouth, pain in chest, asthma, colicky pain, cancer, gravel, dysentery, phthisis, bronchitis, consumption and strangulation of intestines. Juice of bark along with asafoetida is used in heamoptysis. Mixture of flower tops, cumins, is given in gonorrhoea. Katha from heart-wood is astringent, cooling and digestive and is used in relaxed conditions of throat, mouth, gums and for cough and diarrhoea. Gum resin used in masticatories.

IMPORTANT FORMULATIONS: Khadirarista; Arimedadi taila; Khadiradi gutika.

DOSAGE: 20-30 g. of the drug for dicoction.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause drying up of sperm & ruduce sex-urge.

PRECAUTIONS/WARNINGS: Use should be aboid in fartility age (male & female)

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

KURCHI

(Fam : Apocynaceae)

Synonyms:

Beng	-	Kurchi,
Sansk	-	Kalinga, Sakra, Vatsaka,
Eng	-	Ester tree, Conessi bark,
Urdu	-	Kurchi,
Botanical	-	*Holarrhena antidysenterica* Roth.

Description:

Kurchi tree reaching about 10m. in height or more. Bark pale-brown, lenticellate. Yong twigs tomentose. Leaves opposite, oval, subsessile. Flowers white in axillary or terminal corymbiferous cyme. Follicles cylindrical in pairs. Long, narrow, incurved. Seeds numerous, brownish, crowned with a tuft of long haris one end.

Stem bark :

a) Macroscopic:

Small recurved pieces of varying sizes and thickness, outer surface buff to brownish longitudinally wrinkled and bearing horizontal lenticels, inner surface brownish, rough and scaly fracture short and granular; taste, acrid and bitter.

b) Microscopic:

Transverse section of dried stem bark shows cork consisting of 4—12 rows of tangentially elongated cells, radial 15—45 μ. tangential 30—60 μ; cork cambium consists of a row of thinwalled tangentially elongated cells; secondary cortex usually wide, parenchymatous, interspersed with strands of stone cells; stone cell rectangular to oval, with numerous pits often containing prismatic crystals of calcium oxalate, non-lignified pericyclic fibres upto 52 mm thick, present in bark; secondary phloem wide consisting of sieve-tubes, companion cells, phloem parenchyma and stone cells; stone cells arranged in tangential rows in concentric manner associated with crystal sheath containing prisms of calcium oxalate; medullary rays mostly bi or triseriate rarely uniseriate becoming wide towards outer part and consist of thin-walled, radially elongated, parenchymatous cells; medullary ray cells near stone cells become sclerosed.

ACTIVE CONSTITUENTS:

Bark contains a large number of alkaloids, the chief amongst them are conessine, nor-conessine, conesimine, iso-conessimine, kurchine, conimine, conamine, conarrhimine, conessidine, conkurchine, holarrhenine, holarrhimine, holarrhine, kurchicine and lettocine. In addition to the alkaloids it contains gum, resin and tannin. A triterpene alcohol, lupeol and β-sitosterol from the bark. Seeds contain a drying oil Latex contains caoutchouc and two resinols. It is useful in the synthesis of steroid hormones.

HABITAT : Kurchi Found highland of all over Bangladesh. Common in tropical parts of India.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	7	per cent,
Acid-insoluble ash	- Not more than	1	per cent,
Alcohol (60%) soluble extractive	- Not less than	18	per cent,
Water-soluble extractive	- Not less than	10	per cent,

Assay : Kutaja contains not less than 2 per cent of total alk loids when assayed by the following method:— weigh accurately about 5 g in powder (No. 85 seive) and moisten with 10 ml of an Alcohol-chloroform mixture (1:3) containing 2 per cent of Ammonia solution for 15 minutes. Pack the mixture in a small glass percolator surrounded by a jacket of hot wtaer kept at 50°. Macerate with more of the alkaline Alcohol-chloroform mixture for an hour and collect 25 ml of percolate in a receiver containing 1 g of *Oxalic acid* dissolved in 5 ml of alcohol. Stop the percolation add 10 ml of the alcohol-chloroform mixture containing 1 per cent w/v of *Sodium Hydroxide* and macerate for fifteen minutes. Continue the percolation adding further quantities of the alcohol-chloroform mixture until the alkaloids are completely extracted. Mix the percolate well and extract by shaking with five 20 ml portions of 2 *N Hydrochloric acid.* Combine the acid extracts and make alkaline with *Sodium Hydroxide*, and extract again with *Chloroform.* Wash each *Chloroform* extract with the same two 10 ml portions of water contained in different separators. Combine the *Chloroform* extracts, add 20 ml of 0.1 *N Sulphuric Acid* and shake well for 5 Minutes. Transfer the acid Liquid to a conical flask, wash the *Chloroform* extract with two 20 ml portions of water and add the washing to the acid liquid in the conical flask. Titrate the excess of acid with 0.1*N Sodium Hydroxide* using the mixed 3 indicator. Each ml of 0.1 *N Sulphuri Acid* is equivalent to 0.01657g of total alkaloids of Kutaja.

PROPERTIES AND ACTION:

Rasa	:	Tikta, Kasaya
Guna	:	Laghu, Ruksa
Virya	:	Sita
Vipaka	:	Katu
Karma	:	Dipana, Sangrahi, Kaphapittasamaka.

PARTS USED: Bark, Seeds & leaves.

THERAPEUTIC USES/INDICATIONS: Pravahika; Atisara; Jvaratisara; Arsa; Kustha, Tisna.

PHARMACOLOGICAL ACTIONS :

Various parts of Indrayava are used for cold, colic, anaemia, constipation, spleen complaints, epilepsy, spermatorryhoea, labor complaints and dog-bite. Root-bark is very useful for dysentery with bloody stools. Fresh bark as paste in sour butter-milk reduces fever and frequency of stools as well as blood in stools. Bark-paste is applied for rheumatic inflammation. Bark is used in dropsy and dysentery. Pounded bark is used in stomach disorders, in abdominal and glandular tumors. Gargling with decoction of bark reduces tooth-ache. Fruit extract is antiprotozoal, anticancer and hypoglycaemic. Seeds are astringent, febrifuge, useful in diarrhoea and intenstinal worms and for eczema. They are useful in regulating menstruation. Bleeding of gums and pus formation and bad breath are treated by applying powder of seeds. Paste is applied to head in headache. Decoction is taken internally in dysentery and fevers. It is an ingredient of compositions for giardiasis. Their extract is hypotensive. Vegetable of tender pods is useful

to eradicate worms. Powder of pod is applied on affected part in snake-bite to reduce burning pain and swelling.

IMPORTANT FORMULATIONS: Kutajarista; Kutajavaleha; Kutajaghana vati.

DOSAGE: 20-30 g. of dry bark decoction.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause vomating.

PRECAUTIONS/WARNINGS: Bitter in tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

Kurchi (*Holarrhena antidysenterica* Roth)

METHI

(Fam : Fabaceae)

Synonyms:

Beng - Methe,

Sansk - Methini,

Eng - Fenugreek,

Urdu - Methi,

Botanical - *Trigonella foenum-graecum* Linn.

Description:

Methi is an aromatic, erect annual, 30-60 cm in height; leaves pinnte, 3- foliate, leaflets toothed; flowers white or yellowish white, axillay; fruits pods, 5-7.5 cm long with long persistent beak; seeds 10-20 per pod, greenish brown along with a deep groove across one corner.

a) Macroscopic:

Seed: Seed oblong, rhomboidal with deep furrow running obliquely from one side, dividing seed into a larger and smaller part-0.2-0.5 cm long, 0.15-0.35 cm broad, smooth, very hard; dull yellow; seed becomes mucilaginous when soaked in water; odour, pleasant; taste, bitter.

b) Microscopic:

Seed– Seed shows a layer of thick- walled, columnar palisade, covered externally with thick cuticle; cells flat at base, mostly pointed but a few flattened at apex, supported internally by a tangentially wide bearer cells having radial rib-like thickenings; followed by 4-5 layers of tangentially elongated, thin-walled, parenchymatous cells; endosperm consists of a layer of thick-walled cells containing aleurone grains, several layers of thin walled, mucilaginous cells, varying in size, long axis radially elongated in outer region and tangentially elongated in inner region; cotyledons consists of 3-4 layers of palisade cells varying in size with long axis and a few layers of rudimentary spongy tissue; rudimentary vascular tissue situated in spongy mesophyll; cells of cotyledon contain aleurone grains and oil globules.

Powder– Yellow; shows groups of palisade parenchymatous cells, aleurone grains, oil globules, endosperm and epidermal cells of testa.

ACTIVE CONSTITUENTS:

The endosperm of the seed is rich in galactomannan, young seeds mainly contain carbohydrates and sugar; mature seeds content amino acid, fatty acid, vitamins, saponins etc. It also content diosgenin, gitogenin, neogitogenin, homoorientin, saponaretin, neogigogenin and tigogenin.

HABITAT : Cultivated area of Bangladesh & India Kashmir.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	4	per cent,
Acid-insoluble ash	-	Not more than	0.5	per cent,
Alcohol soluble extractive	-	Not less than	5	per cent,

PROPERTIES AND ACTION:

Rasa : Tikta,

Guna : Snigdha,

Virya : Usna,

Vipaka : Katu,

Karma : Vatahara, Kaphahara, Dipana, Rucya.

PARTS USED: Seed, leaf.

THERAPEUTIC USES/INDICATIONS: Aruci, Jvara, Grahani, Pandu, Prameha Manasavikara.

PHARMACOLOGICAL ACTIONS :

Methi plant and seeds are suppurative, aperient, diuretic, emanogogue, aphrodisiac; useful in dropsy, chronic cough, enlargerment of spleen and liver. They are recommended for use in dyspepsia with loss of appetite, in diarrhoea of puerperal women and in rheumatism. Leaves are used both internally and externally for their cooling properties. Seeds, carminative, tonic, antipyretic, anthelmintic; astringent; increase appetite; cure leprosy, vaata, vomiting, bronchitis, piles; an infusion given to small-pox patients as a colling drink; toasted and then infused, used for dysentery.

IMPORTANT FORMULATIONS: Mathi modak, Mustakarista, Mritasanjivani Sura

DOSAGE: 3-6 g. of drug in powder form (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Not use Rakta pitta patient & pregnant mother

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

MUTHA

(Fam : Cyperaceae)

Synonyms:

Beng	-	Mutha, Musta,
Sansk	-	Mustaka, Varida,
Eng	-	Nut Grass,
Urdu	-	Sad Kufi,
Botanical	-	*Cyperus rotundus* Linn.

Description:

Glabrous perennial grass, 20-30 cm. High. Rhizome tuberous, reddish-brown, aromatic, leaves long, very narrow, sheathed and one-nerved, inflorescence consisting of 4-6 spikes radiating from a slender, tringular stalk, purplish. Fruit angular, greyish.

Rhizome :

a) Macroscopic:

Drug Consists of rhizome and stolon having a number of wiry roots, stolon 10-20 cm long having a number of rhizomes, crowded together on the stolons, rhizomes bluntly conical and vary in size and thickness, crowned with the remains of stem and leaves forming a scaly covering, dark brown or black externally, creamish-yellow internally; odour, pleasant.

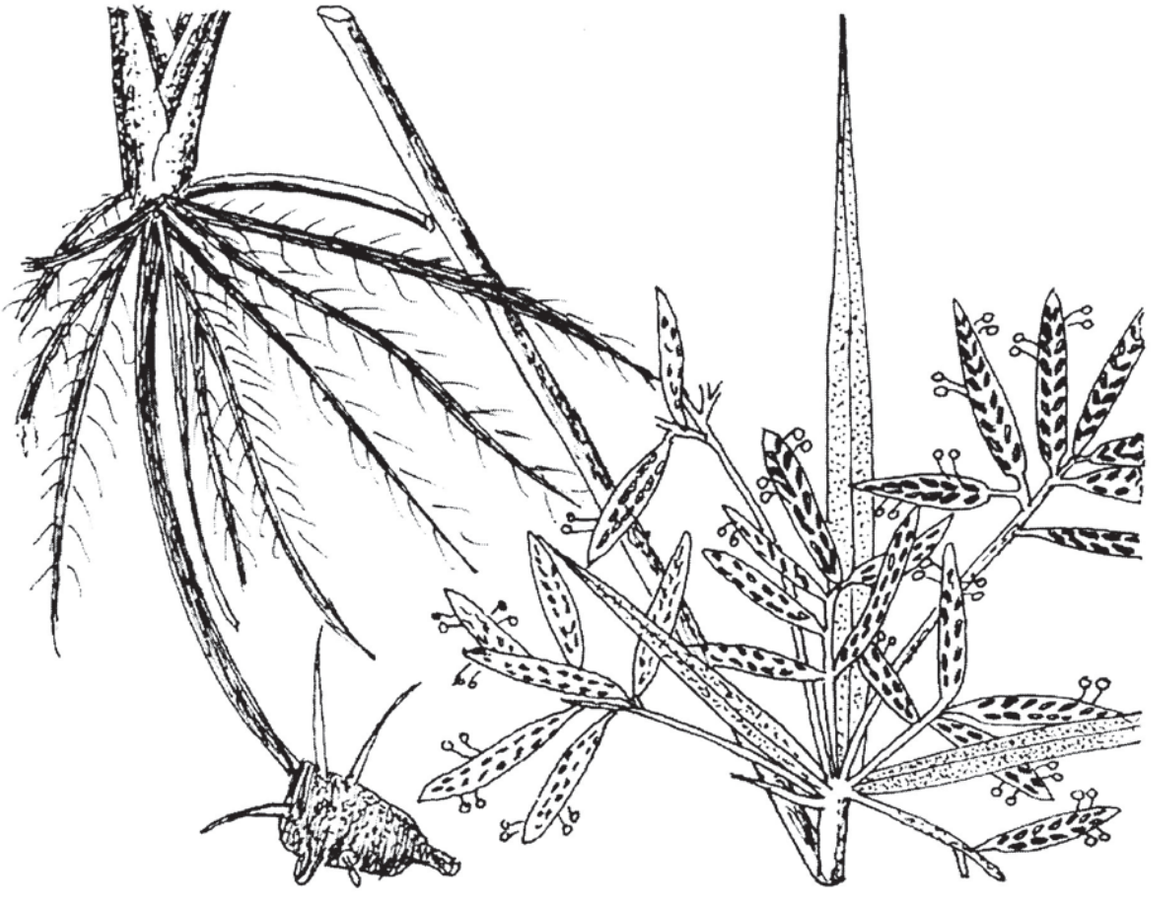
b) Microscopic:

Rhizome shows single layered epidermis, followed by 2-6 layers, suberised sclerenchymatous cells; epidermis and outer sclerenchymatous layers filled with dark brown content; ground tissue of cortex consists of circular to oval, thin-walled, parenchymatous cells with small intercellular spaces; a few fibro-vascular bundles present in this region; endodermis distinct and surrounding the stele; wide central zone beneath endodermis, composed of circular to oval, thin-walled, parenchymatous cells with intercellular spaces, numerous collateral, closed, vascular bundles surrounded by bundle sheath, scattered in this region; vessels narrow having simple reticulate, and scalariform thickening and oblique pore; simple round to oval starch grains measuring 6-28 μ in dia., number of pigmented cells filled with reddish-brown content, present throughout the cortex and stele.

Powder– Creamish-brown; shows reddish-brown cells, reticulate and simple pitted vessels; fibre-like, closely packed sclerified cells, narrow vessels with scalariform thickness and oblique pore from the remnants of leaves simple, round to oval, starch grains, measuring 6-28 μ in diameter.

ACTIVE CONSTITUENTS: Cyperene-1 and cyperene-2, cyperotundone, from tubers. Cyperene, β-selinene, cyperenone and α-cyperone from rhizomes. Essential oil contains mustakone. Root extract possessed tranquilising activity. It showed significant antipyretic and anti-inflamatory activities.

HABITAT : This wead grow all over Bangladesh and India.



Mutha (*Cyperus rotundus* Linn.)

IDENTITY, PURITY AND STRENGTH:

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	8	per cent,
Acid-insoluble ash	- Not more than	4	per cent,
Alcohol soluble extractive	- Not less than	5	per cent,
Water-soluble extractive	- Not less than	11	per cent,
Volatile oil	- Not less than	1	per cent,

T.L.C—

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene : Ethylacetate (9:1) shows under UV (366 nm) a fluorescent zone at Rf. 0.88 (blue). On exposure to lodine vapour three spots appear at Rf. 0.44, 0.55 and 0.73 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 105°C three spots appear at Rf. 0.44, 0.55 and 0.73 (all violet).

PROPERTIES AND ACTION-

Rasa : Tikta, Katu, Kasaya,

Guna : Laghu, Ruksa,

Virya : Sita,

Vipaka : Katu,

Karma : Pittakaphahara, Sthouliahara, Sothahara, Dipana, Pacana, Grahi, Trsnanigrahana, Krmighna, Tvakadosahara, Jwaraghna, Visaghna.

PARTS USED: Rhizome

THERAPEUTIC USES/INDICATIONS: Agnimandya, Ajerna, Tresna, Jwara, Sangrahani, Swasa, Kasa, Mutrakrcchra, Vamana, Stanyavikara, Sutikaroga, Atisara, Amavata, Krimiroga.

PHARMACOLOGICAL ACTIONS :

Mustaka tuber is a home remedy for indigestion, sprue, diarrhoea and other intestinal problems of children. It is light, bitter, aromatic, astringent, demulcent, carminative, diuretic, anthelmintic, vermifuge, diaphoretic, galactagogue, emmenagogue and nervine tonic. Useful in disorders of stomach and irritation of bowels. An infusion or soup of tubers is useful in diarrhoea, dysentery, dyspepsia, vomiting, cholera, and fever. Root paste is applied to wounds, sores etc. and used in intestinal diseases.

IMPORTANT FORMULATIONS: Mustakarista, Mustakadi Kwatha, Asokarista, Raja prabartani vati, Mustakadi Curna, Mustakadi Lehya, Dhanya-pancaka Kvatha Curna, Piyusavalli rasa, Gulmakatanala Rasa, Mahalaksadi Taila, Sadangapaneeya.

DOSAGE: 3-6 g. powder (in a day)

20-30 ml. Kwatha (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Not-yet known.

PRECAUTIONS/WARNINGS: Not use at pregnant condition.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

NIM

(Fam : Meliaceae)

Synonyms:

Beng	-	Nim, Nimgacha,
Sansk	-	Arista, Picumarda,
Eng	-	Margosa Tree,
Urdu	-	Neem,
Botanical	-	*Azadirachta Indica* A Juss.

Description:

A medium to large sized tree, 15-20m in height with a clear bole of 7.0 m having grayish to dark Grey tubercled bark. Leaves compound, imparipinnate, leaflets, subopposite, serrate, very oblique at base; flowers cream or yellowish white is axillary panicles, staminal tubes conspicuous, cylindric, widening above 9-10 lobed at the apex; fruits or seeded drupes with woody endocarp greenish yellow when ripe, seeds ellipsoid, cotyledons thick, fleshy and oily.

Bark:

a) Macroscopic:

Bark varies much in thickness according to age and part of tree from where it is taken; external surface rough, fissured and rusty-Grey; laminated inner surface yellowish and foliaceous, fracture, fibrous; odour characteristic; taste bitter.

b) Microscopic:

Stem bark- Shows outer exfoliating pieces hard, woody, considerably thick in older barks; almost entirely dead elements of secondary phloem, alternating with discontinuous tangential bands of compressed cork tissue, former composed of several layers of stone cells occurring in regularly arranged groups together with collapsed phloem elements filled with brown contents; in between the successive zones of cork tissue 3-5 layers of fibre groups with intervening thin-walled and often collapsed phloem elements present; each zone of cork tissue consists of several layers of regular, thin-walled cells occasionally with a few compressed rows of thick- walled cells towards outer surface; within exfoliating portion a number of layers of newly formed cork composed of thin-walled, rectangular cells and one or two layers of cork cambium, below which a wide zone of secondary phloem present; secondary cortex absent in most cases; secondary phloem commonly composed of well-developed fibre bundles traversed by 2-4 seriate phloem rays and transversely separated by bands of parenchymatous tissue of phloem; phloem elements of outer bark mostly collapsed; a few fairly large secretory cavities also occur in phloem; most of phloem parenchyma contain starch grains and prismatic crystals of calcium oxalate; starch grains, simple, round with central hilum, measuring 2.75-5 μ; structure of bark varies considerably according to gradual formation of secondary cork bands.

Powder—Reddish brown; shows numerous prismatic crystals of calcium oxalate, phloem fibres with narrow lumen and pointed ends; cork cells, stone cells mostly in groups, lignified rectangular to polygonal, having wide lumen and distinct striations, simple starch grains, measuring 2.75-5 μ in diameter.

ACTIVE CONSTITUENTS: Nimbin, nimbidin and nimidol from margosa nim oil; a paraffin alcohol-sugiol and oxyphenol nimbiol, nimbosterol nimbolin **A** and nimbolin **B** from trunk bark. Epoxyazadiradione, azadiradione and azadirone also meliantriol and meldenin from seed oil. Nimbolide, quer-cetin and B- sitosterol from leaves. Deaetylnimbin from seed and bark. Nimbidinin from bitter principle.

HABITAT : Wild in all over Bangladesh, often planted all over Bangladesh.

IDENTITY, PURITY AND STRENGTH: (Stem bark powder)

Foreign matter	-	Not more than	2 per cent,
Total ash	-	Not more than	7 per cent,
Acid-insoluble ash	-	Not more than	1.5 per cent,
Alcohol- soluble extractive	-	Not less than	6 per cent,
Water-soluble extractive	-	Not less than	5 per cent,

T.L.C. –

T.L.C. of alcoholic extract of the drug on silica gel ' G' plate using Chloroform; Ethylacetate; Formic acid (5:4: 1: shows under U.V. (366nm) three fluorescent zones at Rf. 0.72 (blue), 0.86 (blue), and 0.90 (green). On spraying with 5% Methanolic-Phosphomolybdic acid reagent and heating the plate for about ten minutes at 105°C four spots appear at Rf. 0.20, 0.45,0.63 and 0.90 (all blue).

PROPERTIES AND ACTION:

Rasa	:	Tikta,
Guna	:	Laghu, Ruksa,
Virya	:	Sita,
Vipaka	:	Katu,
Karma	:	Kaphahara, Pittahara , Visaghna, Kandughna, Vranasodhanakara, Hrdayavidahasantikara.

PARTS USED: Leaves, Bark, Flowers, Seeds & Oil.

THERAPEUTIC USES/INDICATIONS: Vrana, Kustha, Prameha, Kandu, Krmiroga, Jvara,Daha, Rakta pitta.

PHARMACOLOGICAL ACTIONS :

Nim is used in Ayurvedic medicine for leprosy and skin disease, fever; for purification of blood, Leaves are applied as polutice to boils, Decoction of leaves is antiseptic, used in ulcers and eczema. Bark, root bark and young fruit are bitter tonic, alterative, astringent, anthelmintic and antiperiodic, Gum is demulcent, tonic, in catarrh affections. Dry flowers are tonic and stomachic; Oil is stimulant, antiseptic, alterative, useful in rheumatism and skin diseases. Bark, gum, leaf and seed are used in snakebite and scorpion sting. Flowers and berries are purgative, emollient and anthelmintic, Alcoholic extract of bark is anticancer, antiviral and spasmogenic.

IMPORTANT FORMULATIONS: Nimbarista, Nimbadi Kvatha, Curna, Nimbadi Curna, Panchanimba Curna, Nimba-haridra khanda, Pancatikta Guggulu Ghrta, Pathyadi Kwatha (Sadanga) Curna, Sudersana Curna.

DOSAGE : 2-4 g. of the bark in powder form (in a dose)

Decoction should be used externally.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion (seed), vomating (Leaf & bark)

PRECAUTIONS/WARNINGS: Longterm a large use should be aboid at calf-time.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

Nim (*Azadirachta Indica* A Juss.)

Nishinda (*Vitex negundo* Linn.)

NISHINDA

(Fam : Verbenaceae)

Synonyms:

Beng	-	Nirgundi, Nishinda,
Sansk	-	Sinduvara, Samphalika, Nila,
Eng	-	Five Leaved Chaste Tree,
Urdu	-	Sambhalu, Panjangusht,
Botanical	-	*Vitex negundo* Linn.

Descriptions:

Nishinda is an aromatic large shrub or small tree of about 3 m in height with quadrangular branches; leaves opposite, exstipulate, long petioled and digitately 3-5 foliolate, all leaflets with petiolules, the middle one longer, flowers bluish purple in panicles upto 30 cm long; fruits globose or oviod or obovoid, four-seeded drupe, black when ripe.

Leaf :

a) Macroscopic :

Leaves palmately compound, petiole 2.5- 3.8 cm long; mostly trifoliate occasionally pentafoliate; in trifoliate leaf, leaflet lanceolate or narrowly lanceolate, middle leaflet 5-10 cm long and 1.6-3.2 cm broad, with 1-1.3 cm long petiolule, remaining two sub- sessile; in pentafoliate leaf inner three leaflets have petiolule and remaining two sub sessile; surface glabrous above and tomentose beneath; texture leathery.

b) Microscopic:

Petiole- shows single layered epidermis having a number of unicellular bicellular and uniseriate multicellular covering trichomes and also glandular trichomes with uni to tricellular stalk and uni to bicellular head; cortex composed of outer collenchymatous tissue and inner 6-8 layers parenchymatous tissue; collenchyma well developed in basal region and gradually decreases in middle and apical regions; pericyclic fibres absent in basal region of petiole and present in the form of a discontinuous ring in apical region surrounding central horse shoe-shaped vascular bundle; a few smaller vascular bundle present ventrally between arms of central vascular bundle and two, or rarely three, bundles situated outside the arms.

Lamina- shows single layered epidermis having mostly unicellular hairs bi and multicellular and glandular trichomes being rare; hypodermis 1-3 layered interrupted at places by 4-8 palisade layers containing chlorophyll; a large number of veins enclosed by bundle sheath traverse mesophyll; stomata present only on the ventral surface, covered densely with trichomes; vein-islet and vein termination number of leaf are 23-25 and 5-7 respectively.

Powder- shows number of pieces or whole uni-bi and multicellular covering trichomes, glandular trichomes, palisade tissues with hypodermis, and upper and lower epidermis xylem vessels with pitted walls.

ACTIVE CONSTITUENTS: Leaves contain two alkaloid nishindine and hydrocotylene. Fresh leaves yield a pale greenish yellow oil.

HABITAT : Throughout Bangladesh, India in warm zone.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	8	per cent,
Acid- insoluble ash	-	Not more than	1	per cent,
Alcohol -soluble extractive	-	Not less than	10	per cent,
Water- soluble extractives	-	Not less than	20	per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate: (9:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.18 (blue) and 0.47 (red). On exposure to Iodine vapour four spots appear at Rf. 0.16, 0.47, 0.67 and 0.91 (all yellow). On spraying with Vanillin- Sulphuric acid reagent and on heating the plate for ten minutes at 105°C four spots appear at Rf. 0.07, 0.47, 0.58 and 0.67 (all blue).

PROPERTIES AND ACTION:

Rasa : Tikta, Katu, Kasaya.

Guna : Laghu

Virya : Usna

Vipaka : Katu

Karma : Kaphasamaka, Vatasamaka, Sophahara, Kesya, Caksusyam Visaghna, Smtriprada, Anulomna.

PARTS USED : Root, leaves, bark, flowers, fruits & seed.

THERAPEUTIC USES/INDICATIONS : Sula, Sopha, Vatavyadhi, Amavata, Kustha, Kandu, Kasa, Pradra, Adhmana, Piha roga, Gulma, Arrci, Krmi, Vrana, Nadi Vrana, Karnasula, Sutika, Jwara.

PHARMACOLOGICAL ACTIONS :

Nishinda plant is astringent, bitter, cephalic and stomachic. It has germicidal properties. It is easily digestible and cures cough, asthma, fever, eye diseases, inflammatory, glandular and rheumatic swellings, intestinal worms, ulcers, skin diseases, nervous disorders and leprosy. Root are tonic, anodyne, febrifuge, expectorant and diuretic. They are used in dyspepsia and rheumatism and also for boils. Powdered root is prescribed as an anthelmintic and as a demulcent in dyentery. Tincture of root-bark is useful in rheumatism and irritable bladder. Leaves are alterative, effective in gonorrhoeal epididymitis, orchitis and as vermifuge. Externally they are anodyne and antiparasitic. Rheumatic patients are benefited by bathing in water boiled with the laves. Smoke from burning dried leaves relieves catarrh and headache. Juice of leaves is used externally for foetid discharge and maggots in ulcers. Flowers are astringent and are used in fever, diarrhoea and liver complaints. Fruits are cephalic,

emmenagogue and nervine tonic. They are prescribed in headache, catarrh and watery eyes and dried fruit are veremifuge.

IMPORTANT FORMULATIONS: Vatagajankusa Rasa, Mahavata Vidhvansana Rasa, Ykrtptihara Lauha, Dasamula Taila, Trivikrama Rasa, Nirgundi Taila, Tribhuvan Kirti Rasa, Jarasani Rasa, Nagandra vati. Visa Tinduka Taila.

DOSAGE: 10-20 ml (Swarasa) (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause burning sansation.

PRECAUTIONS/WARNINGS: Not use child age and old age, pregnant mother and ill health person

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION: Babla or Katila God.

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

PATTEMADAR

(Fam : Fabaceae)

Synonyms:

Beng	-	Pattemadar,
Sansk	-	Paribhadraka, Kantakimsuka,
Eng	-	Coral tree,
Urdu	-	
Botanical	-	*Erythrina indica* Lam / *E. Variegata* L.

Description:

Tree reaching about 10m in height, Stems branched, smooth, sprasely covered with short prickles. Leaves alternate, trifoliate, the terminal largest; leaflet-stalk glandular, inflorescence in dense axillary and termianl raceme; flowers red, appearing before the leaves. Pod long, black, constricted between the seeds, seeds reniform red or brown.

Stem Bark-

a) Macroscopic:

Mature dried stem bark about 0.5-2.0 cm thick, smooth, exfoliating in narrow strips; outer surface yellowish to yellowish-grey, lenticels found at short intervals longitudinal lines on the outer surface, yellowish to cream coloured; whole bark differentiated into outer non-fibrous and inner fibrous zones, outer bark readily with a short fracture, inner bark fibrous.

b) Microscopic:

Mature bark shows stratified and lignified cork of about 2-9 or more alternating bands of narrow tangentially elongated compressed, yellowish coloured cells and of wider cells in 3-25 or more layers, tangentially elongated to squarish, radially arranged and thin-walled; a few cells contain prismatic crystals of calcium oxalate; secondary cortex consists of large, somewhat tangentially elongated to polygonal parenchymatous cells, a few cells contain prismatic crystals of calcium oxalate, stone cells occur in singles or in groups which are circular, elongated or rectangular in shape, parenchymatous cells surrounding stone cells groups, contain large crystals of calcium oxalate; secondary phloem consisting of sieve tubes with their companion cells, phloem fibres and phloem parenchyma traversed by phloem rays; phloem fibres, mostly arranged in tangential strips alternating with the regular thin-walled phloem elements, sieve elements in outer and middle regions of phloem mostly get collapsed and crushed and form many tangential strips of ceratenchyma between the tangential groups of phloem fibres, fibres large, thick-walled with narrow lumen; crystal fibres numerous, septate and each chamber contains a single prismatic crystals of calcium oxalate; phloem parenchyma thin-walled, a few of them contains crystals of calcium oxalate similar to those found in the secondary cortex and crystal fibres; phloem rays numerous and mostly multiseriate running almost straight in the inner phloem region but bent towards left or right in the outer phloem region; ray cells thin-walled, radially elongated in the inner region and slightly tangentially elongated towards outer region in transverse section.

Patte-Madar (*Erythrina indica* Lam)

Powder- Creamish-yellow; shows stratified cork, pieces of phloem fibres, stone cells and prismatic crystals of calcium oxalate.

ACTIVE CONSTITUENTS:

Docosyl alcohol, β-sitosterol, y- sitosterol, d-sitosterol. Leaf alkaloids, erysotrine, erysodine, ethyralinehydrochloride and hypaphorine; erythrinine, erysodine and de- N-Me-orientaline. Trunk bark yields erysotrine, erysodine, erysovine, erysonine & hypaphorine stachydrine.

HABITAT : is found allover Bangladesh; wild in deciduous forest throughout India

IDENTITY, PURITY AND STRENGTH: (Stem Bark)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	13	per cent,
Acid-insoluble ash	-	Not more than	1	per cent,
Alcohol soluble extractive	-	Not less than	2.5	per cent,
Water-soluble extractive	-	Not less than	7	per cent,

PROPERTIES AND ACTION:

Rasa : Tikta, Katu,

Guna : Sara,

Virya : Usna,

Vipaka : Katu,

Karma : Vatahara, Kaphara, Medohara, Krmighna.

PARTS USED : Stem, Stem bark, leaf.

THERAPEUTIC USES/INDICATIONS: Krmiroga, Sotha, Karnaroga.

PHARMACOLOGICAL ACTIONS :

Pattemadar is acrid, hot, anthelmintic, carminative, galactagogue, expectorant and febrifuge, Leaves are laxative, diuretic anthelmintic, galactagogue, emmenagogue, applied externally for dispersing venereal buboses and for relieving pain in joints. Fresh juice of leaves, vermifuge and cathartic. It cures dysmenorrhoea, reduces excess fat and increases secretion of milk. Alcoholic extract of leaves and stem is spamogenic, used in convulsions, pimples, menorrhagia. Crushed leaves are applied to rheumatic joints to relieve pain. In konkan, juice of young leaves is used to kill worms in sores. Barks is astringent and febrifuge, used in anorexia, liver troubles, helminthic manifestations, inflammation, intestinal worms and obesity. Also as a collyrium in opththalmia, as antidote to snake bite. It promotes appetite, destroys pathogenic parasites, arrests excessive micturition and cures edema, flatulence, colic, arthritis. Decoction of bark is used in dysentery, ophthalmia and other eye diseases. Juice of bark and young leaves is used to kill worms in sores.

IMPORTANT FORMULATIONS: Nyagrodhadi Curna, Abhaya Lavana, Narayana Taila.

DOSAGE: 6-12 g. in powder form (In a dose)

12-24 g. of the drug for decoction.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

PIPUL

(Fam : Piperaceae)

Synonyms:

Beng	-	Pipulmul,
Sansk	-	Magadhi, Granthika, Pippalika,
Eng	-	Piper root,
Urdu	-	Filfil Daraz,
Botanical	-	*Piper longum* Linn.

Description:

Pipul is a slender sub scandent herb, branchlets erect straggling or sometimes climbing, hairless, with swollen nodes and those of creeping branches with roots at lower nodes. Leaves alternate, variable in shape, usually egg-shaped-heart-shaped, 7-15 x 4-6 cm, base heart-shaped and unequal, apex acute to acuminate, margin entire, hairless, lower leaves with long stalks and upper ones without stalk; lateral nerves 5-7 arising from the base. Male spikes erect, 2-7 cm long, greenish yellow, fleshy, cylindrical, with minute male flowers Female spikes erect, 1-3 cm long, yellow. Fruiting spikes cylindrically oblong, about 4 x 1 cm. Berries globose, about 2 mm across, partly sunken in the rachis, compactly arranged, red turning black when ripe.

Stem :

a) Macroscopic :

Drug available in cut pieces, having distinct internodes and swollen nodes with a number of small rootlets and root scars; stout, cylindrical, 0.2-0.6 cm thick, reddishbrown to grey; odour, aromatic; taste, pungent.

b) Microscopic:

Shows a single layered epidermis followed by a continuous ring of collenchymatous and round to oval thin-walled, parenchymatous cells; vascular bundles show peripheral and medullary arrangement, separated from each other by a wavy strip of sclerenchyma forming a ring, enclosing pith; bundles collateral and arranged in rings, having sclerenchymatous sheath of pericyclic cap over phloem; xylem wedge-shaped; starch grains simple and compound having 2-7 components, round to oval, measuring 3-14 μ in dia. present abundantly throughout the section.

Powder- Reddish- brown to creamish- grey; under microscope shows scalariform vessels, aseptate fibres, simple and compound starch grains measuring 3-14 μ in diameter.

ACTIVE CONSTITUENTS:

Plant contains essential oil consisting of long-chain hydrocarbons, mono-and sesquitertenses. Piperlongumine, piperlonguminine, seasamin, piperine, and methyl 3, 4, 5-trimethoxycinnamate from roots.

HABITAT : Moist deciduous to evergreen forest of Bangladesh & India.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than 2 per cent,
Total ash	-	Not more than 5.5 per cent,

Acid-insoluble ash - Not more than 0.2 per cent,

Alcohol soluble extractive - Not less than 4.0 per cent,

Water-soluble extractive - Not less than 12 per cent,

T. L.C-

T.L.C. of alcoholic extract of the drug on Silica gel 'G' plate using Toluene: Ethylacetate:(9:1) shows under U.V. light spot at Rf. 0.04 (yellow), 0.12 (light green) 0.25 (green), 0.31 (light green) 0.36 (light green), 0.53 (light green), 0.65 (green) and 0.97 (blue). On exposure to lodine vapour five spots appear at Rf. 0.13, 0.25, 0.40, 0.89, 0.93 (all yellow). On spraying with Dragendorff reagent two orange coloured spot appear at Rf. 0.13 & 0.25.

PROPERTIES AND ACTION:

Rasa : Katu,

Guna : Laghu, Ruksa,

Virya : Usna,

Vipaka : Katu,

Karma : Vatahara, Kaphahara, Dipana, Pacana, Vatanulomana, Vulaprasamana, Rucya.

PARTS USED: Roots, fruits,

THERAPEUTIC USES/INDICATIONS: Udararoga, Anaha, Gulma, Krmiroga, Vataroga.

PHARMACOLOGICAL ACTIONS :

Pipul is capable of improving intellect and memory power and also to regain health by dispelling disease. It is acrid, hot, light, digestive, appetiser, aphrodisiac and tonic. It cures cough, dyspnoea, ascities, leprosy, diabetes, piles, colic, anemia, indigestion, and dispels cardiac and spleenic disorders, chronic fever. Fruits as well as roots are attributed with numerous medicinal properties and are used for diseases of respiratory tract, viz. cough, bronchitis, asthma etc; as counterirritant and analgesic when applied locally on muscular pains and inflammation; as carminative; as sedative in insomnia and epilepsy; as general tonic and haematinic; as cholagogue in obstruction of bile duct and gall bladder; as an emmenagogus and abortifacient; and for miscellaneous purposes and anthelmintic and in dysentery and leprosy. Properties and uses of P. longum are similar to those of black pepper.

IMPORTANT FORMULATIONS: Panchakola Curna, Dasamula Taila, Dasamulapanchakoladi Kvatha and Curna, Dasamulasatpalaka Ghrita.

DOSAGE: 0.5-1 g. powder (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause burning sansation.

PRECAUTIONS/WARNINGS: Use should be aboid Hypertention and High blood pressure condition.

DRUG INTERACTION: No drug interaction as yet known.

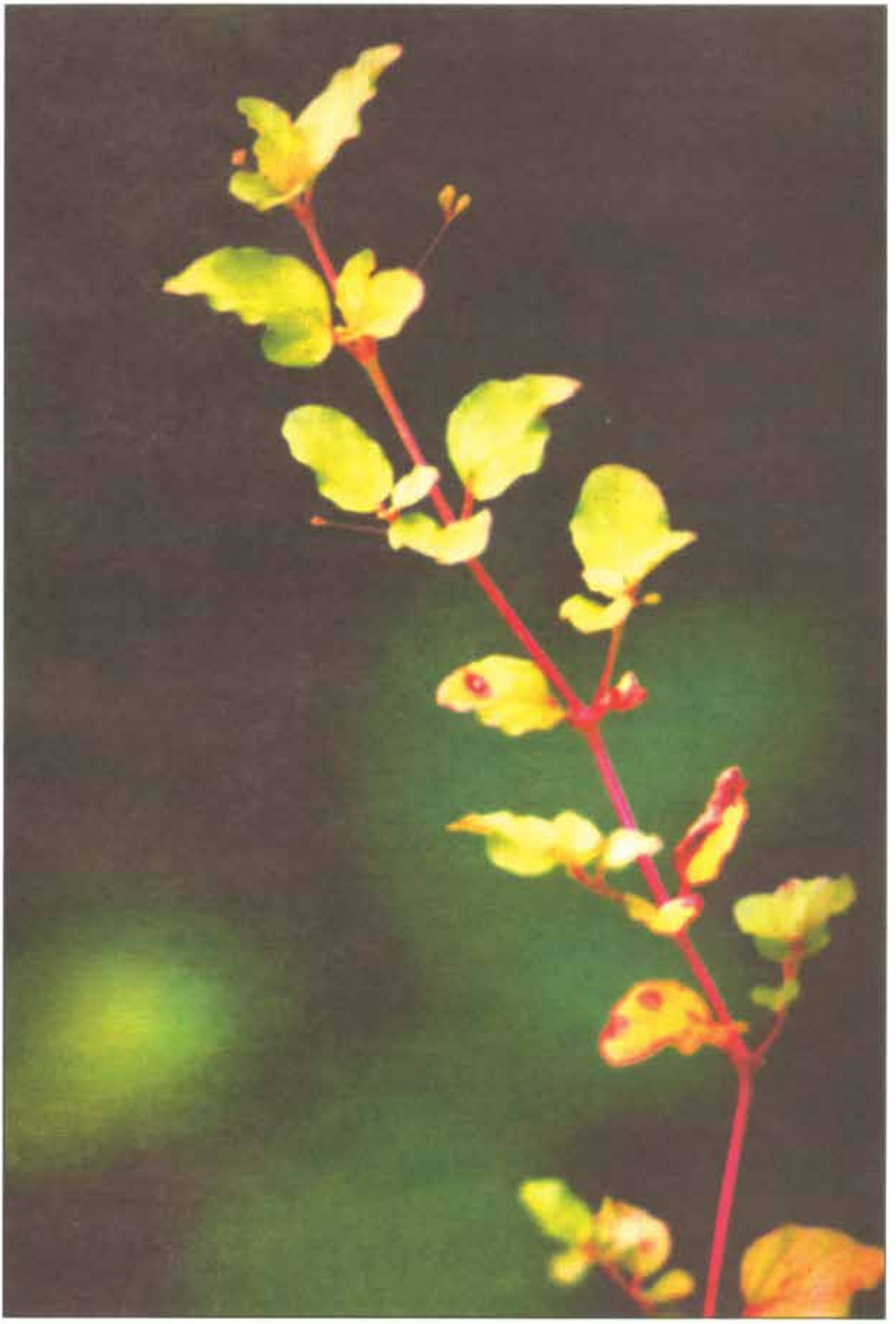
STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

Pipul (*Piper longum* Linn.)



Punarnava (*Boerhaavia diffusa* Linn.)

PUNARNAVA (Rakta)

(Fam : Nyctaginaceae)

Synonyms:

Beng	-	Rakta punarnava,
Sansk	-	Kathilla, Sophaghni, Sothaghni, Varsabhu,
Eng	-	Hourse Purslene, Hog Weed,
Urdu	-	Bishkhapra/Handkuka
Botanical	-	*Boerhaavia diffusa* Linn.

Description:

A very variable, diffusely branched, pu-bescent or glabrous, Prostrate herb.

a) Macroscopic:

Stem— greenish purple, stiff, slender, cylindrical, swollen at nodes, minutely pubescent or nearly glabrous, prostrate divericately branched, branches from common stalk, often more than a metre long.

Root—well developed, fairly long, somewhat tortuous, cylindrical, 0.2—1.5 cm in diameter; yellowish brown to brown coloured, surface soft to touch but rough due to minute longitudinal striations and root scars; fracture, short; no distinct odour; taste, slightly bitter.

Leaves—opposite in unequal pairs, larger ones 25—37 mm long and smaller ones 12—18 mm long ovate-oblong or suborbicular, apex rounded or slightly pointed, base subcordate or rounded, green and glabrous above, whitish below, margin entire or sub-undulate, dorsal side pinkish in certain cases, thick in texture, petioles nearly as long as the blade, slender.

Flowers—very small, pink coloured, nearly sessile or shortly stalked, 10—25 cm, in small umbells, arranged on slender long stalks, 4—10 corymb, axillary and in terminal panicles; bracteoles, small, acute, perianth tube constricted above the ovary, lower part greenish, ovoid, ribbed, upper part pink, funnel-shaped, 3 mm long, tube 5 lobed, stamen 2-3.

Fruit—one seeded nut, 6 mm long clavate, rounded, broadly and bluntly 5 ribbed, viscidly glandular.

b) Microscopic:

Stem—transverse section of stem shows epidermal layer containing multicellular, uni seriate glandular trichomes consisting of 9—12 stalked cells and an ellipsoidal head, 150—220 μ long; cortex consists of 1-2 layers of parenchyma; endodermis indistinct; percycle 1-2 layered, thick-walled often containing scattered is lated fibres; stele consisting of many smal vascular bundles often joined together in a ring and many big vascular bundles scattered in the ground tissue, intra fascicular cambium present.

Root—transverse section of mature root shows a cork composed of thin-walled tangentially elongated cells with brown walls in the outer few layers; cork cambium of 1-2 layers of thin-walled cells; 1 secondary cortex consists of 2-3 layers of parenchymatous cells followed by cortex composed of 5—12 layers of thin-walled, oval to polygonal cells; several concentric bands of xylem tissue alternating with wide zone of parenchymatous tissue present below cortical regions;

number of bands vary according to thickness of root and composed of vessels, trachieds and fibres; vessels mostly found in groups of 2—8, in radial rows, having simple pits and reticulate thickening; tracheids, small thick-walled with simple pits; fibres aseptate, elongated, thick-walled, spindle-shaped with pointed ends; phloem occurs as hemispherical or crescentic patches outside each group of xylem vessels and composed of sieve elements and parenchyma; broad zone of parenchymatous tissue, in between two successive rings of xylem elements composed of thin-walled more or less rectangular cells arranged in radial rows; central regions of root occupied by primary vascular bundles; numerous raphides of calcium oxalate, in single or in group presents in cortical region and parenchymatous tissue in between xylem tissue; starch grains simple and compound having 2—4 components found in abundence in most of cells of cortex, xylem elements in parenchymatous tissue between xylem elements; simple starch grains mostly rounded in shape and measure 2. 75—11 μ in diameter.

Leaves—Transverse section of leaf shows anomocytic stomata on both sides, numerous; a few short hairs, 3-4 celled, present on the margin and on veins; palisade one layered; spongy parenchyma 2—4 layered with small air spaces; idioblasts containing raphides; occasionally cluster crystal of calcium oxalate and orange-red resinous matter present in mesophyll.

Palisade ratio 3.5—6.5; stomatal index 11—16; vein islet number 9—15.

ACTIVE CONSTITUENTS:

Hentriacontane, β-sitosterol, ursolic acid, punarnavine-1 & -2, myricyl alcohol, myristic acid, oxalic acid and alkaloids. Polysaccharide consisting of glucose, xylose, glucuronic acid, galctose, L-arabinose and L-rhamnose; and a glycoprotein. An injection of alkaloids in cats produced a distinct and persistant rise of blood pressure and marked diuresis.

HABITAT : A weed throughout Bangladesh & India.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	15	per cent,
Acid-insoluble ash	-	Not more than	6	per cent,
Alcohol soluble extractive	-	Not less than	1	per cent,
Water-soluble extractive	-	Not less than	4	per cent,

Assay— Contains not less than 0.1 per cent of total alkaloids, when assayed by the following methods :

Take accurately about 100 g of the drug (60 mesh powder) and moisten with dilute solution of *Ammonia.* Extract continuously in a soxhlet apparatus for 18 hours with 95 *per cent Alcohol.* Remove the alcohol by distillation. Extract the residue with five 25 ml portions of I *N Hydrochloric acid till* complete extraction of the alkaloid is effected. Transfer the mixed acid solutions into a separating funnel and wash with 5 ml of *Chloroform,* run off the Chloroform layer. Make the acid solution distinctle alkaline with *Ammonia* and shake with five 25 ml portions of *Chloroform* or till complete extraction of alkaloids is effected. Wash the combined chloroform extracts with two portions each of 5 ml of water. Filter the chloroform layer in tared flask and evaporate to dryness. Add to the residue 5 ml Alcohol, evaporate to dryness, repeat the process once again and weight the residue to constant weight in a vacuum desiccator.

PROPERTIES AND ACTION:

Rasa : Madhura, Tikta, Kasaya,

Guna : Ruksa,

Virya : Usna,

Vipaka : Madhura,

Karma : Vataslesmahara, Mutrala, Sothahara, Anulomana.

PARTS USED: Whole herb & root.

THERAPEUTIC USES/INDICATIONS: Pandu; Sotha.

PHARMACOLOGICAL ACTIONS :

Punarnava is pungent, bitter astringent, hot and laxative. It is cooling, stomachic, diuretic, diaphoretic, expectorant, antipyretic and cardiotonic. It stimulates function of heart and kidney and is a specific for jundice, diabetes, general debility and oedema. It is a rejuvenative drug. It is used in epilepsy, pain in abdomen due to congestion of blood, prolapsus ani and fistula ani, dysentery, otitis media. The whole plant, fresh or dried is the source of drug Punarnava which is official in I.P. as a diuretic. Root is diuretic, laxative, anthelmintic and febrifuge. It is used as expectorant in asthma, stomachic, in oedema, anaemia, jaundice, ascites, ansarca, scanty urine and internal inflammation. Root is usuful for restoration of virility in man. Its polutic emixed with palm oil is applied to boils.

IMPORTANT FORMULATIONS: Punarnavastaka kvatha / curna; Punarnavasava; Punarnavadi mandura; Sukumara ghrita; Sothaghna lepa.

DOSAGE: 5—10ml of fresh juice in every dose.

20—30 g of the drug for decoction (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause vomating.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

RANDHUNI

(Ajamoda)

(Fam : Umbelliferae / Apiaceae)

Synonyms:

Beng	-	Randhuni, Banyamani
Sansk	-	Dipyaka
Eng	-	Black cumin
Urdu	-	Ajmod
Botanical	-	*Apium leptophyllum* (Pers) / *A. graveolens* (Linn)

Description:

Randhuni is 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, broad vittae.

Seed :

a) Macroscopic :

Drug consists of small, ovoid fruit; bulk colour yellowish brown, mainly occur as entire cremocarps with pedicel attached or detached and bild stylopod, free ends curved sometimes occurs as separate mericarps; cremocarps glabrous, ovoid to conical, about 1.5-3.0 mm long and 1.2-2.8 mm wide, yellow to yellowish green, separated mericarps broadly ovoid, more or less; curved, dorsal surface convex with five equally distinct, longitudinal primary ridges; at the summit curved stylopodium, commissural surface flat, showing darker and light colored longitudinal bands, former representing the position of vittae and vascular bundles, odour aromatic; taste, slightly bitter giving a sensation of warmth to tongue.

b) Microscopic :

Transverse section of fruit shows mericarps with four large vittae on dorsal surface, two on commissural surface and four primary ridges on dorsal surface; 3-5 secondary oil canals present under each primary ridge and also between ridges; carpophore present on commissural surface, epicarp cells with thin striated cuticle, outer walls drawn into papillae stomata, anomocytic type upto 35μ in diameter; mesocarp consists of polygonal paranchyma with thickened and lignified cells, measuring 30-62-95μ in diameter with oval to round pits; collateral vascular bundles lie beneath epicarp; tracheids 25-203-388μ in length with spiral scalariform or reticulate thickenings; xylem parenchyma lignified, elongated with elliptical pits, measuring 52-118-176 by 13-30-44μ, large secondary vittae towards endosperm measure unto 123μ in width and towards periphery the smallest vittae measuring 184μ in diameter.

Powder- Shows moderately thick-walled cell of epicarp exhibiting characteristic striations and occasional presence of stoma, fragments of trichomes and glandular hairs, reticulate parenchymatous cells of mesocarp, framents of yellowish-brown vittae; fragments of endosperm thick-walled polygonal calls containing aleurone grain and microrosette crystals of calcium oxalate.

ACTIVE CONSTITUENTS—Seeds yield 3% essential oil containing d-limonene; sedanenolide and 3-n-Buphthalide. Myristicic acid, 8-hydroxy-5-methoxypsoralen and umbelliferone from seeds. Fruits yield a number of furocoumarins. Glucoside apin in the essential oil contracts gravid and vaginal uterus.

HABITATE : Native to Europe and naturalized and cultivated at the foot of Himalayas and outlying hills in Punjab and U.P. also grow allover Bangladesh.

Note : Trachyspermum roxburghianum (DC) Sprague Syn. Carum roxburghianum Benth. Hook.f. is the common market substitute.

IDENTITY, PURITY AND STRENGTH :

Foreign matter - Not more than 5 per cent,

Total ash - Not more than 14 per cent,

Acid-insoluble ash - Not more than 4 per cent,

Alcohol soluble extractive - Not less than 14 per cent,

Water-soluble extractive - Not less than 3 per cent,

Volatile oil - Not less than 2 per cent,

PROPERTIES AND ACTION :

Rasa : Katu, Tikta

Guna : Laghu, Ruksa

Virya : Usna

Vipaka : Katu

Karma : Vidahi, Kaphavatajit, Dipana, Rucikrt, Krmijit, Sulaghna

PARTS USED : Fruits.

THERAPEUTIC USES/INDICATIONS :

Aruci; Adhmana; Gulma; Hikka; Chardi Krmi roga; Sula.

PHARMACOLOGICAL ACTIONS :

Ajamoda herb is antioxidant and is a known preventive of rheumatism and gout. It is used as tonic, carminative, diuretic and emmenagogue. Roots show antibacterial properties, and are used as alterative, diuretic and given in ansarca and colic. Seeds are stimulant, cordial, tonic, aphrodisiac carminative, diuretic and emmenagogue. They are used for flavouring food products and as antispasmodic in bronchitis and asthma and to some extent for liver and spleen complaints. Decoction of seeds is a popular household remedy for rheumatism. Essential oil from seeds called celery oil is tranquilizing and

anticonvulsions. It is deobstruent and resolvent and used internally as pectoral and tonic and carminative adjunct to purgatives; also as diuretic, emmenagogue, lithontriptic and alexipharmic.

IMPORTANT FORMULATIUONS : Ajamodarka; Ajamodadi curna.

DOSAGE : 1-3 g. of the drug in powder from. (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

RASNA

(Fam : Asteraceae)

Synonyms:

Beng	-	Rasna,
Sansk	-	Suvaha, Sugandha, Yukta,
Eng	-	
Urdu	-	Rauasan, Rasna,
Botanical	-	*Pluchea lanceolata* Oliver & Hiern.

Descriptions :

Erect undershrub, 30-60 cm. high, stem and branches terete, ashy and pubescent. *Leaves*-sessile, very coriaceous, 25-27 by 0.6-1.6 cm. oblong or lanceolate, obtuse apiculate narrowed at the base, finely ashy, pubescent on both sides, entire or toothed round the apex main nerves prominent, *Inflorescence*—heads in compound corymbs, involucre contracted at the mount. Outer bracts 2-3 seriate, oblong, very botuse, pubescent, usually tinged with purple, the innermost bracts linear, sub-acute, few pappus hairs distinctly connate at the base.

Leaf :

a) Macroscopic:

Leaves simple, 3-5 cm long, 0.6-2 cm broad; sessile, obtuse, lanceolate to ovate-lanceolate; margin entire or toothed around the apex, unequal at base; both surfaces pubescent, distinct small hairs more prominent near veins; texture, brittle, papery; odour, characteristic; taste, astringent and slightly bitter.

b) Microscopic:

Midrib- shows single layered epidermis covered by thick, striated cuticle; collenchyma 2-5 layered towards xylem, 1-3 layered towards phloem; beneath collenchyma 2-5 layers of parenchyma present on both sides; central portion occupied by a large vascular bundle, xylem facing towards upper and phloem towards lower epidermis; vascular bundle, surounded by sclerenchymatous sheath appearing as a cap above and below; vascular bundle consists of wide phloem, a thin cambium and xylem; phloem consists of phloem parenchyma and a few phloem fibres; xylem consists of tracheids, vessels and xylem parenchyma; vessels arranged radially; parenchyma and palisade cells of leaf contain oil globules, scattered rosette crystals of calcium oxalate are both in lamina and midrib.

Lamina- shows isobilateral structure with palisade occurring in upper and lower mesophyll regions; epidermal cells tangentially elongated, covered by thick, striated cuticle; uniseriate, unbranched covering trichomes 2-3 cells long, present on both surfaces, basal cell short and slightly swollen, apical cells long; stomata, anisocytic and anomocytic present on both surfaces but more on lower surface; palisade tissue 2 or 3 layered on both sides, composed of radially elongated, thin-walled cells; spongy parenchyma composed of thin-walled, circular to elliptical, parenchymatous cells containing abundant chloroplasts with prominent intercellular spaces; a number of small veins, surrounded by a sclerenchymatous sheath present in mesophyll; vascular tissue much reduced and represented by a few phloem and xylem elements; average value of stomatal index on upper surface 14-24 and on lower surface 20-24; palisade ratio not more than 5; average value of vein islet number 27.

Powder : Light green; shows fragments of parenchyma, palisade cells, pointed 2-5 celled trichomes, a few oil globules and rosette crystals of calcium oxalate.

ACTIVE CONSTITUENTS: The petroleum ether extract of the plant on saponification with strong alkali, ether treatment, chromatographic analysis on aluminium hydroxide by eolution with different solvents give different fractions compound-A Compound -B probably taraxosterol and Compound -C. The same author reported the isolation of tertiary bases and a large number of water soluble quartermary bases, incljuding pluchine, which has been identified with betaine hydrochloride. Quercetin and isorhamentin are present as aglacones in the leaves. Glycosides and tannins were absent.

HABITAT : Throughout Bangladesh, India, Pakistan, Afganistan & North-Africa.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	-	Not more than	2 per cent,
Total ash	-	Not more than	22 per cent,
Acid- insoluble ash	-	Not more than	7 per cent,
Alcohol soluble extractive	-	Not less than	8 per cent,
Water-soluble extractive	-	Not less than	23 per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n- Butanol: Acetic acid : Water (4:1:5) shows in visible light three spots at Rf. 0.37, 0.71 and 0.82 (all grey). Under U.V. (366 nm) three fluorescent zones are visible at Rf. 0.27, 0.71 and 0.82 (all dark brown). On exposure to Iodine vapour seven spots appear at Rf. 0.08, 0.37, 0.62, 0.67, 0.71, 0.82 and 0.92 (all yellow). On spraying with 5% Methanolic-Sulphuric acid reagent and heating the plate for about ten minutes at 110°C eight spots appear at Rf. 0.08 (greysh brown), 0.17 (violet), 0.37 (brown), 0.62 (violet), 0.67, 0.71, 0.82 (all greyish brown) and 0.92 (violet).

PROPERTIES AND ACTION:

Rasa	:	Tikta,
Guna	:	Guru,
Virya	:	Usna,
Vipaka	:	Katu,
Karma	:	Kaphavatahara, Amapacana.

PARTS USED: whole plants.

THERAPEUTIC USES/INDICATIONS : Sotha, Vatavyadhi, Swasa, Kasa, Jwara, Udararoga, Sidhma, Adhyavata, Amavata, Vatarakta.

PHARMACOLOGICAL ACTIONS :

Arthritis. Constipation. Respiratory diseases. The decoction of the plant has been used traditionally in arthritis. The leaves are aperient and used as a laxative, analgesic and antipyretic.

IMPORTANT FORMULATIONS: Maha-Rasnadi kvath, Rasnasab, Dasamularista, Devadarvadarista, Karpasasthyadi Taila, Rasnadi Kwatha curna, Rasnaairandadi Kwatha Curna, Rasnadi lowha.

DOSAGE: 25-50 g for decoction (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION:

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

RASUN

(Fam : Liliaceae)

Synonyms:

Beng	-	Lasun,
Sansk	-	Rasona, Yavanesta,
Eng	-	Garlic,
Urdu	-	Lahsan, Seer,
Botanical	-	*Allium sativum Linn.*

Descriptions:

Rasun is an annual glabrous, bulbous herb with pungent odour.

a) Macroscopic:

Drug occurs as entire bulb or isolated cloves (bulblets); bulb sub- globular, 4-6 cm in diameter, consisting of 8-20 cloves, surrounded by 3-5 whitish papery membranous scales attached to a short, disc- like woody stem having numerous, wiry rootlets on the under side; each clove is irregularly ovoid, tapering at upper end with dorsal convex surface, 2-3 cm long, 0.5- 0.8 cm wide, each surrounded by two very thin papery whitish and brittle scales having 2-3 yellowish green folded leaves contained within two white fleshy, modified leaf bases or scales; odour, peculiarly pungent and disagreeable; taste, acrid gives warmth to the tongue.

b) Microscopic:

A clove of bulb shows tri to tetrangular appearance in outline; outer scale consists of an outer epidermis, followed by hypodermal crystal layer, mesophyll made of parenchyma cells and an inner epidermis; both outer and inner epidermis consists of sub rectangular cells; hypodermis consists of compressed, irregular, tangentially elongated cells, each cell having large prismatic crystals of calcium oxalate, while many cells contain small prismatic crystals also, mesophyll several layers of parenchymatours cells having a few vascular tissues with spiral vessels; inner epidermis similar to outer one; inner scale similar to outer scale but outer epidermis composed of sclerenchymatous cells, prismatic crystals in hypodermis slightly smaller.

In surface view cells of outer epidermis elongated, narrow with thin porous wall while those of inner epidermis similar to outer one but non-porous; cells of hypodermal crystals layer ellipsoidal with thick porous walls, each cell having large prismatic crystals of calcium oxalate many cells also contain small prismatic crystals in addition to bigger ones; inner scale shows markedly sclerenchymatous cells with greatly thickened walls and very narrow lumen; cells of hypodermal crystal layer somewhat smaller with walls more frequently pitted, size of crystals also smaller.

ACTIVE CONSTITUENTS: The essential oil obtained from the bulbs contains allicin, diallyl disulfide, allyl propyl disulfide and other sulfur compounds.

HABITAT : All over Bangladesh, India, Nepal, Sri Lanka, Thailand. .

IDENTITY, PURITY AND STRENGTH:

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	4	per cent,
Acid- insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	2.5	per cent,
Loss on drying	- Not less than	60	per cent,
Volatile oil	- Not less than	0.1	per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n- Butanol: Isopropoanol: Acetic acid: Water (3:1:1:1) shows under U.V. (366 nm) two fluorescent zones at Rf. 0.58 and 0.72 (both light blue). On exposure to Iodine vapour nine spots appear at Rf. 0.18, 0.26, 0.34, 0.38, 0.46, 0.58, 0.72, 0.77 and 0.93 (all yellow). On spraying with Ninhydrin reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0.58, 0.67, 0.72, and 0.93 (all pink). On spraying with Vanillin-sulphuric acid reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.26, 0.38, 0.46, 0.58, 0.67, 0.72, and 0.93 (all grey).

PROPERTIES AND ACTION:

Rasa : Katu, Madhura,

Guna : Guru, Snigdha, Tiksna, Sara, Picchila,

Virya : Usna,

Vipaka : Katu,

Karma : Vatahara, Kaphahara, Pitta-dusanakara, Raktadosahara, Bhagnasandhanakara, Dipana, Rasayena, Balya, Hrdya, Vrsya, Varnya, Medhya, Jantughna, Kanthya, Asthi Mamsa Sandhankar, Caksusya.

PARTS USED: Bulb.

THERAPEUTIC USES/INDICATIONS : Jirna Jwara, Krmiroga, Gulma, Kustha, Arsa, Kasa, Swasa, Pinasa, Sula, Karnasula Vatavyadhi, Hikka, Medoroga, Yoni vyapata, Visucika, Pliha Vrddhi, Ksaya, Visama Jwara, Apasmara, Unmada, Sasa, Sopha, Hrdroga, Vatsula, Trikasula, Vrana Krmi.

PHARMACOLOGICAL ACTIONS :

The bulb constitutes an antibacterial, anti-inflammatory amoebiasis, oxyuriasis and colitis. It cures cough, bronchitis and pertussis. The aqueous solution of bulb juice in a nasal instillation and a gruel made with the bulbs are active on coryza and influenza. It is also hypocholesterolaemic and thus useful in hypercholesterolaemia and atherosclerosis. A poultice of pounded bulb is used to treat boils, abscesses, phlegmons and centipede hites.

IMPORTANT FORMULATIONS: Lasunadi Vati, Lasunadi Ghrta and Vaca Lasunadi Taila.

DOSAGE: 3- g of the drug. (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion & burning sansation.

PRECAUTIONS/WARNINGS: Not use child age, pregnant mother and pitta prakriti person.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION: Dhaney (coriander)

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

Rasun (*Allium sativum* Linn.)

Sajna (*Moringa oleifera* Linn.)

SAJNA

(Fam : Moringaceae)

Synonyms:

Beng	-	Sajna, Sajina, Sajne,
Sansk	-	Sobhanjana, Bahala, Tiksnagandha, Aksiva, Mocaka,
Eng	-	Horse Radish Tree, Drum Stick Tree,
Urdu	-	Sehjan,
Botanical	-	*Moringa oleifera* Lam. Syn. *Moringa Pterygosperma* Gaertn.

Description:

An unarmed middle sized graceful tree with corky grey bark and easily breakable branches; leaves usually tripinnate, rachis slender, thickened and articulated at the base, leaflets elliptic or obovate, rounded at the apex, nerves obscures; flowers white in large puberuous axillary panicles; fruits pods, upto 45 cm long, pendulous, greenish, triangular, 9-ribbed, seeds trigonous, the angles winged.

a) Macroscopic:

Leaves tripinnate compound, available in the form of leaflets and some broken pieces of rachis, slender, thickened, and articulated at the base; leaflet 1.2-2 cm long and 0.5-1 cm wide, entire, elliptic, ovate or obovate, rounded or narrowed at base and obtuse at apex; smooth and greenish-grey to pale green; odour and taste not distinct.

b) Microscopic:

Rachis— Rachis shows single layered epidermis, followed by single layer of pigmented collenchymatous hypodermis; cortex consistig of 5-10 layered, oval to elliptical, thin-walled, parenchymatous cells; pericycle forming a broken ring, consisting of pericyclic fibres; vascular bundle collaterial; pith composed of wide zone of thin-walled, paren-chymatous cells; rosette crystals of calcium oxalate present in cortex, pith and phloem parenchyma.

Leaflet— Leaflet shows dorsiventral structure; epidermis and unicellular hairs present on both the surfaces; palisade single layered; spongy parenchyma 2-3 layers; central region occupied by a crescent-shaped, collateral vascular bundle surrounded by 2-4 layers of collenchymatous cells; rosette crystals of calcium oxalate present in mesophyll and collenchymatous cells; stomata anomocytic, present on both surface but more on lower surface; palisade ratio 6-11; stomatal index 10-13-15 stomatal number 100-137 upper surface and 290-350 lower surface per mm square; vein islets number 50-65.

Powder— Greyish-green; shows groups of spongy parenchyma, palisade cells; spiral vessels, unicellular hairs with blunt tip; pieces of polyhedral epidermal cells in surface view, stomata and rosette crystals of calcium oxalate.

ACTIVE CONSTITUENTS:

Alanine, arginine, glycine, threonine, serine, valine, glutamic and aspartic acids in flowers and fruits. Lysine, sucrose and glucose in flowers. 4-hydroxymellein, vanillin, octacosanoic acid, β-sitosterol and β-sitostenone from. Stems. Aldotriouronic acid from gum. Bark yields a base moringine. Pterygospermin, an antibiotic principle. Clinical studies have shown that stem bark produces significant

relief in patients suffering from difficult micturition or mutrakruchcha. Abortifacient activity of leaves has been demostrated.

HABITAT: It is found allover Bangladesh, Indiginous to North-west-India. cultivated throughout India.

IDENTITY, PURITY AND STRENGTH :

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	16	per cent,
Acid-insoluble ash	- Not more than	4	per cent,
Alcohol soluble extractive	- Not less than	8	per cent,
Water-soluble extractive	- Not less than	22	per cent,

T.L.C.—

T.L.C. of alcoholic extract of the drug on Silica gel `G' plate usining Toluene: Ethylacetate (9:1) shows six spots at Rf. 0.05, 0.18, 0.26 (all green), 0.36 (yellowish green), 0.46 (dark green) & 0.94 (yellow) in visible light. Under U.V. (366 nm) six fluorescent zones are visible at Rf. 0.05, 0.18, 0.26, 0.36, 0.46 (all red) & 9.94 (bkue). On spraying with 5% Methanolic Phosphomolybdic acid reagent six spots appear on heating the plate for ten minutes at 105° C at Rf. 0.38, 0.46 (both blue), 0.52 (green), 0.59 (blue), 0.69 (blue) and 0.87 (blue). On spraying with Anisaldehyde-Sulphuric acid reagent ten spots appear on heating the plate for ten minutes at 105°C at Rf. 0.05, 0.20, 0.26, (all green), 0.30 (pink), 0.36 (green), 0.46 (green) 0.53 (yellow), 0.69 (yellow), 0.82 (yellow) and 0.94 (violet).

PROPERTIES AND ACTION:

Rasa	:	Madhura,
Guna	:	Guru, Ruksa, Tiksna,
Virya	:	Sita,
Vipaka	:	Madhura,
Karma	:	Vatahara, Pittahara, Medohara, Sukra nasaka, Krmihara, Brmhana, Caksusya, Sirovirecaka,

PARTS USED: Root, Root-bark, Flowers, fruits & seeds.

THERAPEUTIC USES/INDICATIONS: Sopha, Krmiroga, Medoroga, Pliharoga, Vidradhi, Gulma, Galaganda.

PHARMACOLOGICAL ACTIONS :

Sajina is hot, sweet and light. It improves appetite and digestion, promotes semen and is good for heart and eye problems. Plant is antispasmodic, stimulant, expectorant and diureic; is used as stimulant in paralytic affections and intermittent fever; used in epilepsy; rubifacient in palsy and chronic rheumatism; carminative, stomachic, abortifacient, as cardiac and circulatory tonic; in a form of a compound spirit useful in fainting, giddiness, nervous debility, spasmodic affections of bowels, hysteria and flatulence. Fresh root is acrid and vesicant, internally stimulant, diuretic and antilithic. Root bark is used as fomentation to relieve spasm. Polutice of leaves is beneficial in glandular sweellign. Leaf-juice is useful in hiccough, emetic in higher doses. Mixed with honey it is applied to eyelids in eye diseases. Bark is emmenagogue and abortifacient. Fruit is used in diseases of liver and spleen, articular pains, tenesmus and paralysis. Flowers are stimulant, tonic, diuretic and useful to increase flow of bile and are also aphrodisiac. Oil from seeds is used as external application in rheumatism. Gum is used for dental

caries; mixed with sesamum oil and poured into ears for relief of otalgia. Seeds are used in venereal affections. Root, bark and gum are abortifacient.

IMPORTANT FORMULATIONS: Visatinduka Taila, Ekangavira Rasa, Ratnagiri Rasa, Nagandra vati.

DOSAGE: 10-20 ml of the fresh drug in juice form. (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause perspiration.

PRECAUTIONS/WARNINGS: Use should be aboid at the conditions of hamorrhagea, biliousness & Pregnant.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION: Cow milk

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

SAL-PARNI

(Fam : Fabaceae)

Synonyms:

Beng - Salparni,

Sansk - Sthira, Vidarigandha, Amsumati,

Eng -

Urdu - Salaparni

Botanical - *Desmodium gangeticum* DC.

Descriptions:

An erect, diffusely branched undershrub, 90-120 cm in height with a short woody stem and numerous prostrate branches provided with soft grey hairs; leaves unifoliate, ovate to ovate-lanceolate, membranous and mottled with grey patches; flowers white, purple or lilac in elongate lax, terminal or axillary racemes; fruits moniliform, 6-8 jointed glabrescent pods, joints of pods sparsely pubescent with hooked hairs, joints separating when ripe into indehiscent one-seeded segments; seeds compressed reniform.

Root :

a) Macroscopic:

Tap root, poorly developed, but lateral roots 15-30 cm long, and 0.1—0.8 cm thick, uniformly cylindrical with a number of branches; surface smooth bearing a number of transverse, light brown lenticels, bacterial nodules frequently present; light yellow; fracture fibrous; odour not characteristic; taste, sweetish and mucilaginous.

b) Microscopic:

Mature root shows cork, 3-7 layers of thin-walled, tangentially elongated cells, having a few prismatic crystals of calcium oxalate; cork cambium single layered; secondary cortex 4-10 layers of thin-walled, tangentially elongated cells having a few isolated cortical fibres; secondary phloem composed of parenchyma, sieve tubes, companion cells and fibres, traversed by phloem rays; sieve tubes collapsed in outer region, but intact in inner region; phloem fibres slightly elongated, lignified; phloem rays uni to multiseriate, 1-4 cells wideand 4-5 cells high; outer phloem region having occasionally prismatic crystals of calcium oxalate; cambium 2-3 layers; secondary xylem having 1-2 growth rings, consisting of vessels, tracheids, xylem parenchyma, and xylem fibres, traversed by xylem rays; vessels, lignified, large, narrow, with both reticulate thickening or bordered pits; xylem parenchyma with rectangular or slightly elongated cells, resembling those of phloem parenchyma in shape but larger in size and xylem fibres resemble those of phloem fibres in shape but larger in size; xylem rays thick-walled possessing simple pits, 1-5 cells wide and 4-12 cells high; simple, round to oval starch grains measuring 7-25 μ in dia. and prismatic crystals of calcium oxalate present in secondary phloem and secondary xylem.

Powder : Light brown; shows fragments of rectangular cork cells, vessels having reticulate thickening and bordered pits, xylem fibres, ray cells, prismatic crystals of calcium oxalate and simple round to oval starch grains, measuring 7-25 μ in dia.

ACTIVE CONSTITUENTS: 5-Methoxy-N, N-dimethyltriptamine, N, N—dimethyltetra-hydroharman, 6-methoxy-2-methyl-β-carbolinium cation from aerial parts. Seeds contain β-carboline alkaloids. Gangetinin and desmodin.

HABITAT : Throughout Bangladesh, plains of India and lower regions of Himalaya.

IDENTITY, PURITY AND STRENGTH: (Root powder)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	6	per cent,
Acid- insoluble ash	-	Not more than	2	per cent,
Alcohol soluble extractive	-	Not less than	1	per cent,
Water-soluble extractive	-	Not less than	6	per cent,

T.L.C:

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Chloroform : Methanol (9:1) shows under UV (366 nm) three fluorescent zones at Rf. 0.40, 0.85 and 0.96 (all blue). On exposure to Iodine vapour three spots appear at Rf. 0.40, 0.85 and 0.96 (all yellow).

PROPERTIES AND ACTION:

Rasa	:	Tikta, Madhura,
Guna	:	Guru,
Virya	:	Usna,
Vipaka	:	Madhura,
Karma	:	Tridosahara, Balya, Angamardaprasamana, Vrsya, Sukhaprasawakara Sarvadosahara, Vatadosajit, Rasayani, Bhramhara, Visahara, Santapanasini.

PARTS USED : whole plants, root and bark.

THERAPEUTIC USES/INDICATIONS : Jwara, Meha, Arsa, Chardi, Sopha, Swasa, Kasahara, Krmi, Rajayaksma, Netra roga Hrdaya roga, Rakta Gata Vata, Vata, Ardhvabhedaka, Mudha Garbha.

PHARMACOLOGICAL ACTIONS :

Saliparni root is a constituent of Dashamoola kwaatha used in post-natal care to avoid secondary complication. Plant is considered antipyretic and anticatarrhal and used for hazy vision and dysentery. It is a good cardiotonic. It is hot, sweet, diuretic, laxative and nervous tonic. It overcomes burning sensation, fever, thirst, cough, difficult breathing, dysentery and vomiting. Root is hot and bitter, astringent in diarrhoea, tonic, diuretic, alterative, aphrodisiac, anthelmintic; used in chronic fever, biliousness, cough, vomiting, asthma, snake-bite, scorpion sting.

IMPORTANT FORMULATIONS: Dasamularista, Salaparnadi kvath, Indukanta Ghrita, Amritaprasa Ghrita, Dasamulasatapalaka Ghrita, Dhanwantara Taila, Narayana Taila, Mahavisagarbha Taila, Mahanarayana Taila.

DOSAGE: 5—10 g powder form (in a day)

10—20 g for decoction (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not-yet known.

PRECAUTIONS/WARNINGS:

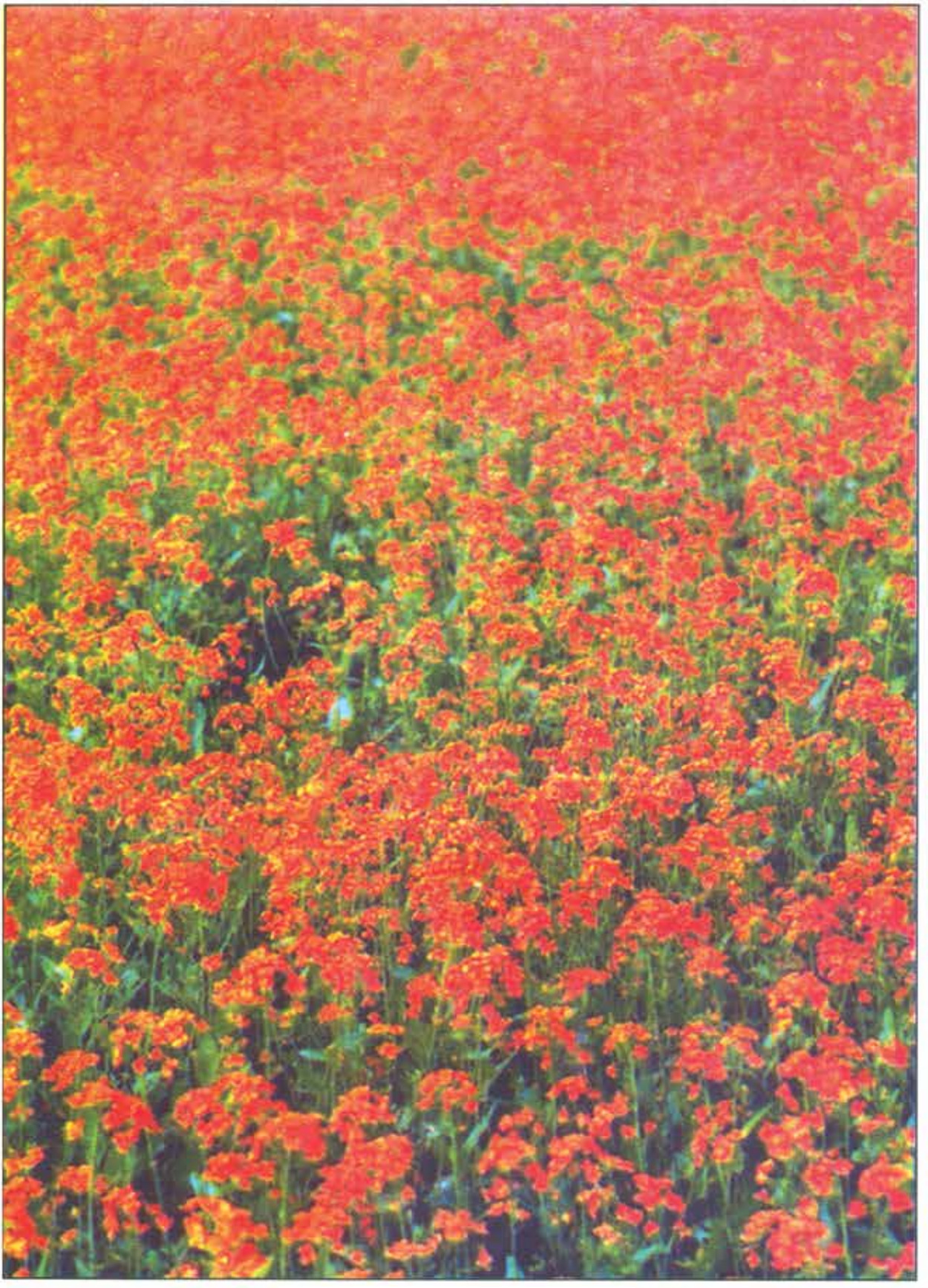
DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.



Sarisa (*Brassica compestris* Linn.)

SARISA

(Fam : Brassicaceae)

Synonyms:

Beng	-	Sarisa,
Sansk	-	Katusneha, Siddhartha,
Eng	-	Mustard,
Urdu	-	Sarson,
Botanical	-	*Brassica campestris* Linn. / *B. nigra* (Linn.)

Descriptions:

Sarisa is an stout, erect, simple or branched glaucous, annual herb, 50-60 cm long with amplexicaul leaves.

Seed :

a) Macroscopic:

Seeds small, slightly oblong, pale or reddish-brown, bright, smooth, 1.2-1.5 mm in dia; under magnifying glass it is seen to be minutely reticulated; taste, bitter and sharp.

b) Microscopic:

Seed shows single layered colourless testa followed by 3-5 layered, non-lignified, hexagonal, thick-walled cells filled with yellowish-brown contents; embryo and endosperm consists of hexagonal, thin-walled parenchymatous cells containing oil globules.

Powder : Yellow in colour with brown particles and oily, slightly bitter and sharp in taste; shows frequently thick-walled, fragments of reddish-brown cells of hypodermis, yellowish hyaline masses.

ACTIVE CONSTITUENTS: Seed contains glucoside Sinigrin, sinapine and a volatile isothiocyanate and essential oil. The black mustard and white mustard differ in containing a crystalline substance known as sulpho-sinapisin. The myrosine of white mustard yields with water a pungent oil of a different character from the volatile oil of black mustard.

HABITAT : Commonly cultivated all over Bangladesh & India; widely distributed in Europe, Asia & Great-Britain.

IDENTITY, PURITY AND STRENGTH: (Seed)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	5	per cent,
Acid- insoluble ash	-	Not more than	0.5	per cent,
Alcohol soluble extractive	-	Not less than	8	per cent,
Water-soluble extractive	-	Not less than	16	per cent,
Fixed oil	-	Not less than	35	per cent,

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) two fluorescent zones at Rf. 0.12, and 0.59 (both blue). On exposure to Iodine vapour three spots appear at Rf. 0.12, 0.59 and 0.70 (all yellow). On spraying with Anisaldehyde-Sulphuric acid reagent and heating the plate for ten minutes at 105° C three spots appear at Rf. 0.12, 0.59 and 0.70 (all violet).

PROPERTIES AND ACTION:

Rasa : Katu, Tikta,

Guna : Tiksna, Snigdha,

Virya : Usna,

Vipaka : Katu,

Karma : Kaphahara, Vatahara, Pittakara, Dipana, Vidaha, Hrdya.

PARTS USED: Seed and leaf

THERAPEUTIC USES/INDICATIONS : Kandu, Kustha, Kosthakrmi, Grahabadha.

PHARMACOLOGICAL ACTIONS :

Both varieties of Sarisa are irritant, stimulant, diuretic and emetic. Leaves are used as a vegetable which serves as a laxative. Seeds are a powerful stimulant and rarely employed in pure powerful stimulant and rarely employed in pure state. They are stomachic and used in neuralgic and rheumatic affections. Oil when applied to skin produces almost instant vesication. It is very useful application for chilblains, chronic rheumatism etc. Used chiefly as a poultice in acute local pains, pneumonia, bronchitis. and other diseases of respiratory organs. The volatile oil is a powerful irritant, rubefacient and vesicant and combined with other remedies is an excellent application in rheumatic pains and colic etc. It is used promote growth of hair & maintaing its color.

IMPORTANT FORMULATIONS: Maha Yogaraja Guggulu, Karpasasthyadi Taila, Kumkumadi Taila, Prabhanjana Vimardana Taila, Vajraka Taila.

DOSAGE: 0.5—1 g in paste form (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Punjant tast.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration

Simul (*Bombax ceiba* Linn.)

SIMUL

(Fam : Bombacaceae)

Synonyms:

Beng	-	Simul, Shimul,
Sansk	-	Moca, Picchila, Raktapuspa, Kantakadhya, Tulini,
Eng	-	Silk-Cotton Tree,
Urdu	-	Sembhal,
Botanical	-	*Bombax ceiba* Linn./ *Salmalia malabarica* schott & Endl.

Descriptions:

A tall deciduous tree with a straight buttressed trunk having a clear bole of 24-30 m and spreading branches, bark grey or brown covered with hard, sharp, conical prickles; leaves large spreading, glabrous, digitate, leaflets lanceolate, 3-7, entire; flowers red,, numerous, appearing when the tree is bare of leaves, stamens many arranged in five bundles of 9-12 each and an inner bundle of 15; fruits capsules; dehiscing by 5 leathery or woody valves; seeds smoth, black or grey embedded in long white wool. A gummy exudate obtained from the bark is dried and sold as semul-gum or mocharas. The dried gum is light brown in colour resembling the galls, and gradually becomes opaque and dark brown.

Stem Bark :

a) Macroscopic:

Bark 0.5-1 cm thick, pale-ashy to silvery-grey externally, brownish internally, external surface rough with vertical and transverse cracks, mucilaginous on chewing; fracture, fibrous.

b) Microscopic:

Stem bark shows 10-15 layered, transversely elongated, radially arranged, thin-walled, cork cells with a few outer layers having brown coloured contents; rhytidoma present at certain places interrupting the cork; secondary cortex con-sists of moderately thick-walled, parenchymatous cells containing orange brown contents; stone cells in singles or in groups, thick-walled, oval to irregular, and tangential bands of stone cells having striations with narrow lumen, measuring 13-33 μ in dia, occur throughout the secondary cortex, secondary phloem consists of usual elements traversed by phloem rays, elements in the outer region form tangential bands of ceraten-chyma; a number of concentric bands of fibres alternating with groups of sieve elements also present; fibres lignified having narrow lumen and pointed tips; phloem rays numerous and wavy, 1-6 seriate, cells being radially elongated and moderately thick-walled; rosette crystals of calcium oxalate scattered throughout the secondary cortex, phloem parenchyma and ray cells; mucilage canals and tannin cells present in the parenchymatous cells of cortex.

Powder : Reddish-brown; shows fragments of cork cells, parenchymatous cells, single or groups of thick-walled, oval to irregular, stone cells having striations with narrow lumen, measuring 13-33 μ in dia, rosette crystals of calcium oxalate, phloem fibres and numerous reddish-brown coloured masses and tannin cells.

ACTIVE CONSTITUENTS: Seed contains hexacosanol, tocopherol, tannins etc, Bark contains mucilage which is used for haemoptysis in pulmonary T.B and in influenza. Lupeol and β-sitosterol and a napththoquinone compound are present in stem bark and root bark. Roots yield triacontanol, β-sitosterol and a new glycoside. An essential oil and hentriacontane, hentriacotanol, quercetin, kaempferol, B-sitosterol and its glucosides are present in fresh petals of flowers.

HABITAT : All over Bangladesh, Throught the hotter parts of India.

IDENTITY, PURITY AND STRENGTH: (Stem bark)

Foreign matter - Not more than 1 per cent,

Total ash - Not more than 13 per cent,

Acid- insoluble ash - Not more than 2 per cent,

Alcohol soluble extractive - Not less than 2 per cent,

Water-soluble extractive - Not less than 7 per cent,

T.L.C.

T.L.C. of the alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9:1) shows under UV (366 nm) one fluorescent zones at Rf.0.59 (blue). On exposure to Iodine vapour four spots appear at Rf. 0.11, 0.44, 0.59 and 0.92 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110°C three spots appear at Rf. 0.44, 0.59 and 0.92 (all violet).

PROPERTIES AND ACTION:

Rasa : Madhura, Kasaya,

Guna : Laghu, Singdha, Picchila,

Virya : Sita,

Vipaka : Madhura,

Karma : Sothahara, Dahaprasamana, Pittahara, Vatahara, Kaphavardhaka.

PARTS USED: Root, stem, bark, leaf, fruit, flowers and gum.

THERAPEUTIC USES/INDICATIONS : Raktapitta, Vrana, Daha, Yuvanapidika

PHARMACOLOGICAL ACTIONS :

Various parts of Simul are used in smallpox, bleeding gums, toothache and carries, sores in mouth, pain in leg, fever, enlarged spleen, atrophy, emaciation, rheumatism, spermatorrhoea, haematuria, cholera, pneumonia, pleurisy, intercosal neuralgia, leprosy and rinderpest. The plants is used in enteritis, dysentery menorrhagia, lymphoadenoma, hepatitis etc. Young tap roots are astringent and used in dysentery. Infussion of bark is used as demulcent and tonic. Externally it is used as styptic and for fomenting wounds. Paste of bark applied in skin eruptions, applied on boils, acne and pimples. Aq. extract with curd given in blood dysentery. Used in syphilis and gonorrhoea. Flowers are astringent and cooling. Paste of flowers as also of leaves applied in cutaneous troubles. Young fruits used as expectorant, stimulant and diuretic, beneficial in calculous affections, chronic inflammation of bladder and kidneys. Seeds are used in gonorhoea, chronic cystitis and other catarrhal affections.

IMPORTANT FORMULATIONS: Sukrasudha, Salmoli ghrit.

DOSAGE: 5—10 g stem Root/bark powder (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose (Root & bark) may cause vomitic tendincy.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

SONDAL

(Fam : Leguminosae/Caesalpiniaceae)

Synonyms:

Beng	-	Sondala,
Sansk	-	Krtamala, Vyadhighata, Sampaka, Nrpadruma,
Eng	-	Indian Laburnum, Purging cassia,
Urdu	-	Amaltas
Botanical	-	*Cassia fistula* Linn.

Descriptions:

Sondal is a moderate sized handsome deciduous tree, 8-15m in heigh with greenish grey smooth bark when young, and rough when old, exfoliating in hard scales; leaves pinnately compound, leaflets 4-8 pairs, ovate, acute, bright green, glabrous above, paler and silvery-pubescent beneath when young, main nerves numerous; flowers bright yellow in lax pendulous racemes; fruits cylindric pods, 30-60cm long, shortly stipitate, nearly straight, smooth, shiny, brownish black; seeds broadly ovate, horinzontally immersed in dark coloured sweetish puls.

Macroscopic:

Fruit, a many celled, indehiscent pod, 35-60 cm long and 18-25 mm in diameter, nearly straight and subcylindrical, chocolate-brown to almost black in colour; pod surface smooth to naked eye, but under lens showing minute transverse fissures; both dorsal and ventral sutures evident, but no prominent; short stalk attached to base of fruit and rounded distal end mucronate; pericarp thin, hard and woody; fruit initially divided by transverse septa about 5 mm, apart, each containing a single seed attached to ventral suture by a long dark, thred-like funicle about 8-12 by 6-8 mm, circular to oval, flattened, reddish-brown, smooth, extremely hard and with a distinct dark brown line extending from micropyle to base; seed initially embedded in a black viscid pulp consisting of biack, thin, shining, circular disc like masses having central depression of seed on both surfaces or as broken pieces adhered with each other; when dipped in water, makes yellow soultion which darkness to brownish-yellow to dark brown, on keeping; pulp fills the cell but shrinks on drying and adheres to both sides of testa; seeds often lye loose in their segments; odour faint, sickly; taste, sweet.

ACTIVE CONSTITUENTS: Sugar, mucilage, pectin and anthraquinone.

The contains sennosides A and B, rhein and its glucoside, barbaloin aloin, formic acid, butyric acid, their ethyl esters and oxalic acid, sap, acetyl acid, iod, thiocyanogen and unsapon matter, tannins, phlobaphenes, reducing sugars and oxyanthraquinones.

HABITAT : All over Bangladesh, common in tropical parts of India.

IDENTITY, PURITY AND STRENGTH: (Fruits pulp)

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	6	per cent,
Acid- insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	15	per cent,
Water-soluble extractive	- Not less than	46	per cent,

Sondal (*Cassia fistula* Linn.)

PROPERTIES AND ACTION:

Rasa : Madhura, Tikta,

Guna : Guru,

Virya : Usna,

Vipaka : Madhura,

Karma : Recana,

PARTS USED: Fruits pulp

THERAPEUTIC USES/INDICATIONS : Vibandha; Udavartta; Gulma; Sula; Udararoga; Hrdroga; Prameha.

PHARMACOLOGICAL ACTIONS :

The roots are astringent, cooling, prugative, febrifuge and tonic, and are useful in skin diseases, tuberculous glands, syphilis and burning senation. The bark is laxative, anthelmintic, emetic, febrifuge, diuretic and depurative, and is useful in boils, pustules, leprosy, ringworm, colic, dyspepsia, constipation, fever, diabetes, strangury and cardiopathy. The leaves are laxative, antiperiodic and depurative, and are useful in vitiated conditions of vata, skin diseases, leprosy, ulcers and intermittent fevers. The flowers are are bitter, acrid, cooling, emollient, expectorant and demulcent, and are useful in vitiated conditions of *pitta,* skin diseases, pruritus, burning sensation, dry cough and bronchitis. The fruits are sweet, cooling, emollient, purgative, anodyne, anti-inflammatory, depurative, antipyretic, abortifacient, diuretic and ophthalmic, and are useful in vitiated conditions of *pitta,* burning sensation, leprosy, skin diseases, pruritus, flatulence, colic, inflammations, rheumatism, gout, anorexia, hepatomegaly, jaundice, cardiac disorders, intermittent fever, strangury, opthalmopathy and general debility.

IMPORTANT FORMULATIONS: Aragvadhadi kvatha / curna.

DOSAGE: 5—10g of pulp in powder form (In a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: By heating loos the efficasy.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

SUPARI

(Fam : Palmae)

Synonyms:

Beng	-	supari,
Sansk	-	Karmuka, Ghonta,
Eng	-	Areca nut, Betal nut,
Urdu	-	Fufal, Choalia,
Botanical	-	*Araca catechu* Linn.

Description:

Slender palm about 10m tell. Stem erect, surmounted by a crown of painnate leaves; petiole broadly expanded at the base. Inflorescence in spadix encased on a spathe; flowers yellowish-white in much-branched raceme, Which bears both male and female flowers. Fruit ovoid; pericarp hard and fibrous; kernel (seed) brown.

Fruit :

(a) **Macroscopic**:

Ovoid, externally pale, reddish-brown to light yellowish-brown, marked with a net work of paler lines, frequently with adhering portions of silvery brittle endocarp and adhering fibres of mesocarp at base of seed, seed hard with pruminate endosperm of brownish tissuse alternating with whitish tissue; odour, characteristic; taste, astringent.

(b) **Microscopic**:

Transverse section of seed shows a seed coat consisting of several rows of cells, tangentially elongated, with inner walls more or less thickened; whitish cells of endosperm tissue with thick porous walls containing oil globules and aleurone grains; brown perisperm tissue with thick-walled cells and delicate tracheae.

Powder— Reddish brown to light brown; under microscope shows fragments of endosperm tissue with porous walls, irregularly thickened and small stone cells of seed coat, a few aleurione grains and oil globules and a few delicate tracheac; starch absent.

ACTIVE CONSTITUENTS:

The kernels yield tannin, catechin (70% in the young fruit, 15-20% in the over-ripe fruit) lipids consisting of laurin, olein and myristin; glucides 50-60%; alkaloids: arecoline, areacaidine, areacine, guvacine and guvacoline.

HABITAT : All Over Bangladesh, south and parts of northeast India, Srilanka.

IDENTITY, PURITY AND STRENGTH: (Fruits powder)

Foreign matter	-	Not more than	1	per cent,
Total ash	-	Not more than	3	per cent,
Acid-insoluble ash	-	Not more than	0.4	per cent,
Alcohol soluble extractive	-	Not less than	19	per cent,
Water-soluble extractive	-	Not less than	10	per cent,

PROPERTIES AND ACTION:

Rasa : Kasaya,

Guna : Ruksa, Guru,

Virya : Sita,

Vipaka : Katu,

Prabhava : Mohakrt,

Karma : Dipana, kaphapittajit, Kledanasana, Malabhedi, Mukhasodhana, Vikasi.

PARTS USED: Fruit.

THERAPEUTIC USES/INDICATIONS: Mukhavikra; Aruci; Yonisaithillya; Svetapradara.

PHARMACOLOGICAL ACTIONS :

The pericarp is effective in the treatment of flatulence, oedema, dysuria and hyperaemesis of pregnancy. The kernel is used to treat diarrhoea and dysentery. It is also a taenifuge. It is also said to cure malaria. Arecoline induces papillary contraction and decreases ocular tension in glaucoma.

IMPORTANT FORMULATIONS: Pugakhanda.

DOSAGE : 1-2 g. of power form (in a day)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause intoxicating, dizzyness.

PRECAUTIONS/WARNINGS: Aboid the Green Fruits.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE: Should be stored in cool & dry place.

CORRECTION: Cold water or milk.

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration. But Long term a large quantity use may cause some harmful effects.

TEJPATA

(Fam : Lauraceae)

Synonyms:

Beng	-	Tejpata, Tejpatra,
Sansk	-	Patra, Varanga, Coca,
Eng	-	Indian Cinnamon,
Urdu	-	Tezpat,
Botanical	-	*Cinnamonum tamala* Buch. Ham.

Description:

A moderate sized evergreen tree 7.5 m in height with dark brown or blackish rough bark and pinkish or reddish brown blaze; leaves simple, opposite, sub-opposite or alternate, ovate-lanceolate or ovate-oblong, acuminate, coriaceous, glabrous, 3-nerved from base to apex; flowers pale yellowish in axillary and terminal, lax puberulous panicles. Fruits ovoid, fleshy, black drupe, supported by enlarged perianth tube.

a) Macroscopic:

Leaves – 12.5-20 cm long, 5-7.5 cm wide at the centre, 3 converging nerves from base to apex young leaves pink; petiole 7.5-13 mm long; margin entire, apex acute or accuminate, both surfaces smooth; stomata paracytic; odour, aromatic; taste slightly sweet, mucilaginous and aromatic.

b) Microscopic:

Petiole and midrib- Transverse section of petiole and midrib shows epidermis externally covered with cuticle, uniseriate, multicellular (1 to 3 cells), trichomes present, oil cells single or in group, isolated large stone cells, much lignified showing striations found scattered, most of the parenchymatous cells of cortex with reddish-brown contents; pericycle represented by a few layers of sclerenchymatous cells, stele more or less planoconvex as in the midrib of leaf; xylem on upper and phloem on lower side consisting of usual elements, present.

Lamina- transverse section of lamina shows dorsiventral structure, represented by palisade tissue on upper and spongy parenchyma on lower side; epidermis same as in midrib, externally covered with cuticle; below upper epidermis single row of closely packed palisade layer followed by multilayered, irregular, thin-walled cells of spongy parenchyma without intercellular spaces; idioblasts containing oil globules present in mesophyll and also in palisade; lower epidermis covered externally with cuticle; lamina intervened by several small veinlets; vascular bundles covered with thick-walled fibres on both side.

ACTIVE CONSTITUENTS:

Cinnamic aldehyde, linalool, eugenol, eugenol acetate, β- caryophyllene, benzaldehyde, camphor, cardinene, α- terpineol, α- and β- pinene, p-cymene, limonene, geraniol, ocimene, y-terpinene, β-phellandrene, benzyl cinnamate, benzyl acetate.

Tajpata (*Cinnamonun tamala* Buch. Ham.)

HABITAT : Hilly regions of Bangladesh; India, in areas of 900-2400m elevation.

IDENTITY, PURITY AND STRENGTH: (Bark powder)

Foreign matter	-	Not more than	2	per cent,
Total ash	-	Not more than	5	per cent,
Acid-insoluble ash	-	Not more than	1	per cent,
Alcohol soluble extractive	-	Not less than	6	per cent,
Water-soluble extractive	-	Not less than	9	per cent,
Volatile oil	-	Not less than	1	per cent, v/w.

PROPERTIES AND ACTION:

Rasa : Katu, Madhura,

Guna : Laghu, Picchila, Tiksna,

Virya : Usna,

Vipaka : Katu,

Karma : Rucya, Kaphavatahara, Arsoghna.

PARTS USED: leaves.

THERAPEUTIC USES/INDICATIONS: Aruci; Hrllasa; Arsa; Pinasa..

PHARMACOLOGICAL ACTIONS :

The leaves are bitter, sweet, aromatic thermogenic, alexeteric, anthelmintic, diuretic, stimulant, carminative and tonic. They are useful in cardiac disorders, inflamations, helminthiasis dyspepsia, strangury, colic, hyperptyalism, ophthalmia, vitiated conditions of vata, diarrhoea, proctitis, proctalgia, hepatopathy and splenopathy.

IMPORTANT FORMULATIONS: Drakharista, Drakhasab, Citrakadi taila; kasisadi taila; Vajraka taila.

DOSAGE : 1-3 g. of leaf in powder form (In a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any trouble not yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

TULASI

(Fam : Lamiaceae)

Synonyms:

Beng	-	Tulasi
Sansk	-	Surasa, Krsnatulasi, Bana Tulasi
Eng	-	Holy Basil
Urdu	-	Raihan, Tulsi
Botanical	-	*Ocimum sanctum* Linn.

Description:

An erect much branched softly pubescent undershrub, 30-60 cm high with red or purple subquadrangular branches; leaves simple, opposite, elliptic, oblong, obtuse or acute, entire, serrate or dentate, pubescent on both sides, minutely gland dotted, petioles slender, hairy; flowers purplish in elongate racemes in close whorls, stamens exserted, upper pair with a small bearded appendage at the base; fruits nutlets, smooth, not mucilaginous when wetted.

a) Macroscopic:

Root – Thin, wiry, branched, hairy, soft, blackish-brown externally and pale violet internally.

Stem- Erect, herbaceous, woody, branched, hairy, subquadrangular, externally purplishbrown to black, internally cream coloured; fracture, fibrous in bark and short in xylem; odour, faintly aromatic.

Leaf- 2.5-5 cm long 1.6-3.2 cm wide, elliptic oblog, obtuse or acute, entire or serrate, pubescent on both sides; petiole thin, about 1.5-3 cm long hairy; odour, aromatic; taste, characteristic.

Flower- Purplish or crimson coloured, small in close whorls; bracts about 3 mm long and broad, pedicels longer than calyx, slender, pubescent; calyx ovoid or campanulate, 3-4 mm bilipped, upper lip broadly obovate or suborbicular, shortly apiculate, lower lip longer than upper having four mucronate teeth, lateral two short and central two largest; corolla about 4 mm long, pubescent; odour, aromatic; taste, pungent.

Fruit- A group of 4 nutlets, each with one seed, enclosed in an enlarged, membranous, veined calyx, nutlets sub-globose or broadly elliptic, slightly compressed, nearly smooth; pale brown or reddish with small black marking at the place of attachment to the thalamus; odour, aromatic; taste, pungent.

Seed - Rounded to oval; brown, mucilaginous when soaked in water, 0.1 cm long, slightly notched at the base; no odour; taste, pungent, slightly mucilaginous.

b) Microscopic:

Root - Shows a single layered epidermis followed by cortex, consisting of seven or more layers of rectangular, round to oval polygonal, thin-walled, parenchymatous cells, filled with brown content, inner layers of cortex devoid of contents; phloem consisting of sieve elements, thin-walled, rectangular parenchyma cells and scattered groups of fibres, found scattered in phloem; xylem consists of vessels, tracheids, fibres and parenchyma; vessels pitted; fibre tracheides, long, pitted with pointed ends; fibres thick walled and with point- ed ends.

Tulsi (*Ocimum sanctun* Linn.)

Stem- Shows a single layered epidermis with uniseriate, multicellular covering trich- omes having 5-6 cells, occasionally a few cells collapsed; cortex consists of 10 or more layers of thin-walled, rectangular, parenchymatous cells; phloem consists of sieve ele- ments, thin-walled,rectangular parenchyma cells and fibres; fibres found scattered mostly throughout phloem, in groups and rarely in singles; xylem occupies major portion of stem consisting of vessels, tracheids fibres and parenchyma; vessels pitted; fibres with pointed ends; centre occupied by narrow pith consisting of round to oval, thin-walled, paren- chymatous cells.

Leaf- *Petiole* - shows somewhat cordate outline, consisting of single layered epidermis composed of thin-walled, oval cells having a number of covering and glandular trichomes; covering trichomes multicellular 1-8 celled long,rarely slightly reflexed at tip; glandular trichomes short, sessile with 1-2 celled stalk and 2-8 celled balloon-shaped head, meas- uring 22-27 in dia; epidermis followed by 1 or 2 layers and 2 or 3 layers of thin-walled, elongated, parenchyma cells towards upper and lower surfaces respectively; three vascu- lar bundles situated centrally, middle one larger than other two; xylem surrounded by phloem.

Midrib - epidermis, trichomes and vascular bundles similar to those of petiole except cortical layers reduced towards apical region.

Lamina - epidermis and trichomes similar to those of petiole; both anomocytic and dia- cytic type of stomata present on both surfaces, slightly raised above the level of epidermis; palisade single layered followed by 4-6 layers of closely packed spongy parenchyma with chloroplast and oleo-resin; stomatal index 10-12-15 on upper surface and 14 - 15 - 16 on lower surface; palisade ratio 3.8; vein islet number 31 - 35.

Powder- Greenish; shows thin-walled, parenchymatous cells, a few containing reddish- brown contents, unicellular and multicellular trichomes either entire or in pieces; thin-walled fibres, xylem vessels with pitted thickenings, fragments of epidermal cells in sur- face view having irregular shape, oil globules, rounded to oval, simple as well as com- pound starch grains having 2-5 components, measuring 3-17 μ in diameter.

ACTIVE CONSTITUENTS:

Eugenol, its methyl ether, nerol, caryophyllene, terpeinen-4-ol, deccyladehyde, y-selinene, β- pinene, camphene and a-pinene from essential oil. plant contains citric, tartaric and malic acids.

HABITAT : Naturaly grow or cultivated throughout Bangladesh and India.

IDENTITY, PURITY AND STRENGTH:

Foreign matter	- Not more than	2	per cent,
Total ash	- Not more than	10	per cent,
Acid-insoluble ash	- Not more than	1.5	per cent,
Alcohol soluble extractive	- Not less than	4	per cent,
Water-soluble extractive	- Not less than	8	per cent,

T.L.C.

T.L.C. of Tulasi oil obtained by stem distillation is carried out on Silica gel 'g' plate using Toluene: Ethylacetate (93:7) Tulasi oil is diluted in chloroform-toluene (1:10). Eugenol to be applied as standard also diluted in 1:30 ratio and 10μ of each to be applied in band form. After running distance of 10 cm the plate is air drying for 15 minutes and than kept in the over for 2 to 5 minutes. On cooling spray, in thoroughly va- nillin - Sulphuric acid reagent and heat the plate at 110° C for 5 - 1- minutes. Under

observation. Record Rf. values of eugenol and caryophyllence. Eugenol (orange brown) approx. Rf. value 0.7, caryophyllence (reddish violet) runs to solvent front.

PROPERTIES AND ACTION:

Rasa : Katu, Tikta, Kasaya,

Guna : Tiksna, Ruksa, Laghu,

Virya : Usna,

Vipaka : Katu,

Karma : Pittavardhini, Vatahara, Kaphahara, Hrdya, Dipana, Rucya, Durgandhihara.

PARTS USED: Leaves, Seed and roots.

THERAPEUTIC USES/INDICATIONS: Svasa, Kasa, Hikka, Chardi, Krimiroga, Prasvasula, Kusta, Asmari, Netraroga.

PHARMACOLOGICAL ACTIONS :

Tulsi is aromatic, carminative, antipyretic, diaphoretic and expectorant. It has been found to be very effective in treatment of viral encephalitis and tropical pulmonary eosinophilia in children. Plant is used in snake bite and scorpion sting. Fresh roots, stems and leaves are bruised and applied to the bites of mosquitoes. Decoction of roots is used as diaphoretic in malarial fevers. Leaves are expectorant. Juice of leaves is diaphoretic, antiperiodic and stimulating expectorant; used in catarrh and bronchitis; dropped into ear as remedy for earache. Infusion of leaves is given in malaria, used as stomachic, in gastric disorders of children and in hepatic affections. It improves appetite, afflictions of ear, destroys intestrinal worms and cures skin diseases. Dried leaves, powdered and used as snuff in ozaena. Seeds are deulcent, given in disorders of genito-urinary system.

IMPORTANT FORMULATIONS: Tribhuvanaklrti Rasa, Muktapancham rita Rasa; Muktadi Mahanjana, Manasamitra Vataka.

DOSAGE : 1-3 ml. of the drug in juice form (in a dose)

1-2 g. of the drug in powder form (seed) (in a dose)

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause any truble not yet known.

PRECAUTIONS/WARNINGS:

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

ULKUSHI

(Fam : Fabaceae)

Synonyms:

Beng	-	Ulkushi,
Sansk	-	Kapikacchu, Markati, Kandura,
Eng	-	Cowhage,
Urdu	-	Kanwach, Konch,
Botanical	-	*Mucuna prurita Hook/M. pruriens Baker.*

Description:

It is a slender climbing annual with hairy branches; leaves trifoliate, leaflets broadly ovate, eliptic or rhomboid ovate, membranous, unequal at hase, pubescent above and densely clothed with silvery grey hairs beneath; flowers purple, in axillary pendulous, 6-30 flowered racemes; fruits turgid pods, longitudinally ribbed, curved, densely clothed with persistent pale brown or grey irritant bristles, seeds black 4-6 per pod, ovoid.

Seed:

a) Macroscopic:

Seed ovoid, slightly laterally compressed, with a persistent oblong, funicular hilum, dark brown with spots; usually 1.2-1.8 cm long 0.8-1.2 cm wide, hard, smooth to touch, not easily breakable; odour, not distinct; taste, sweetish-bitter.

b) Microscopic:

Mature seed shows a thin seed-coat and two hard cotyledons; outer testa consists of single layered palisade-like cells; inner testa composed of 2 or 3 layer of tangentially elongated, ovoid, thin-walled cells, inner 1 or 2 layers of dumb-bell or beaker-shaped, thick-walled cells; tegmen composed of a wide zone of oval to elliptical, somewhat compressed, thin-walled, parenchymatous cells; some cells contain starch grains; cotyledons composed of polygonal, angular, thin-walled, compactly arranged, parenchymatous cells, containing aleurone and starch grains; Starch grains small, simple, rounded to oval measuring 6-41 μ in dia; but not over 45 μ in dia; a few vascular bundles with vessels showing reticulate thickening or pitted present.

Powder- Pale cream coloured; shows fragments of testa with palisade-like cells thin walled parenchyma, reticulate and pitted vessels, aleurone and starch grains small simple, rounded to oval measuring 6-41 μ in dia., but not over 45 μ in dia..

ACTIVE CONSTITUENTS:

Moisture protein ether extr fibre and mineral matter, calcium, phospohorus, and iron sulphur and manganese are present. The seeds contain dihydroxyphenylanine or dopa glutathione, lecithin, galic acid and a glucoside are present. They contain also a number of alkaloids including nicoting, prurieninine, pruienidine, and five other base designeated base.

HABITAT : Hedges and bushes of Bangladesh; throughout India; tropical America.

IDENTITY, PURITY AND STRENGTH: Seed

Foreign matter	- Not more than	1	per cent,
Total ash	- Not more than	5	per cent,
Acid-insoluble ash	- Not more than	1	per cent,
Alcohol soluble extractive	- Not less than	3	per cent,
Water-soluble extractive	- Not less than	23	per cent,
Fixed oil	- Not less than	3	per cent.

T.L.C.-

T.L.C. of alcoholic extract on Silica gel 'G' plate, using n-Butanol: Acetic acid: Water (4:1:5), shows in visible light four spots at Rf, 0.51, 0.59, 0.69 (all grey) and 0.92 (light yellow). Under UV (366 nm) six fluorescent zones are visible at Rf. 0.45 (blue), 0.51, 0.59, 0.69 (all grey), 0.79 (light blue) and 0.92 (blue). On spraying with Ninhydrin reagent and heating the plate for ten minutes at 110°C seven spots appear at Rf. 0.17, 0.28, 0.34 (all pink) 0.51 (orange), 0.59 (pink), 0.69 (grey) and 0.92 (pink).

PROPERTIES AND ACTION:

Rasa : Madhura, Tikta

Guna : Guru, Snigdha

Virya : Sita

Vipaka : Madhura

Karma : Vatasamana, Vrsya, Kaphanasaka, Pittanasaka, Raktadosanasaka, Brhana, Balya.

PARTS USED: Fruits, seeds & Roots.

THERAPEUTIC USES/INDICATIONS: Vatavyadhi, Kampavata, Klaivya, Raktapitta, Dustavrana, Daurbalya.

PHARMACOLOGICAL ACTIONS :

Ulkushi is a mechanical anthelmintic, it causes intestinal worms to writhe and become detached from intestines. An ointment prepared with the hairs acts externally as a local stimulant and mild vesicant. A decoction of plant or roots is diuretic. Roots are purgative, given in dysentery and in uterine troubles. It acts as emmenagogue; also prescribed as remedy for delirium in fever. Powdered and made into paste applied to body in dropsy. Strong infusion mixed with honey given in cholera. Leaves are aphrodisiac, tonic, anthelmintic. Seeds are aphrodisiac, nervine tonic and alexipharmic, cure scorpion sting. Pods most active anthelmintic against Tenia cannina and paraphistonum.

IMPORTANT FORMULATIONS: Sukra-sanjebani modak, Banaribati, Brehat Masa Taila.

DOSAGE: 3-6 g. in a day.

SIDE EFFECTS: Not yet known

ADVERSE REACTION: Over dose may cause loose motion.

PRECAUTIONS/WARNINGS: Not use child age.

DRUG INTERACTION: No drug interaction as yet known.

STORAGE : Should be stored in cool & dry place.

CORRECTION:

ALTERNATIVES:

TOXICITY: No known toxicity reported following the use of prescribed doses for recommended duration.

APPENDIX-I

Principal Forms of Ayurvedic (Vegetable) Medication and Methods of their Preparation and uses in brief:—

"Ayurvedic Vegetable Materia Medica includes not only crude drugs proper, but also a large number of preparations made from them:— e.g., as given in this Appendix."

"As different parts of plants contain different properties, only those parts which contain efficient properties are used in the below-mentioned forms of preparation. Whole plants are used in the case of herbs which are very small and possess one uniform *Rasa* in all their parts. Each variety of preparation has its own value in therapeutics. The *Churns* are rather bulky preparations and on account of their complex nature take more time to act. It is, therefore, desirable that only those drugs whose principles are easily soluble or separable should be chosen in the preparation of *Churnas*. Sugar, common salt, rock salt, etc., are generally mixed with these powders in order to make them more active and palatable. Water, milk, honey and ghee are some of the common vehicles. In some cases, the juices of fruits like the lemon or pomegranate are used, as the organic acids, which they contain, facilitate the actions of the *Churnas*. Before using the powders of the whole drugs, it is therefore necessary to ascertain which drugs are water-soluble and which are not. In modern Pharmacopoeia, alcohol, ether and the like are used as solvents to help the easy solution of the constituents, which are insoluble in water. (Tinctures are instances of such processes). This is because modern Pharmacologists are in favour of availing themselves of the important constituents only and not all the parts of the drugs. Ayurvedists, on the other hand, have attached more importance to the clinical findings and have based the pharmacological value of the whole drugs on the results of experience. In the place of tinctures, they have used decoctions and infusions. They have again used extract occasionally, evidently for the purpose of portability and adaptability and also for the facility of concentration, which they afford. Similarly methods of maceration, percolation and precipitation have been used to separate the soluble from the insoluble constituents of the drugs. *Satvas* are instances of such preparations.

Whole drugs were used by the Ayurvedists of the olden times for reasons not only pharmacological and economical but also social i.e. relating to the tastes, habits, customs and social conditions, obtaining then in the country. It must be admitted that strides of civilisation have always something to do with the turn of mind of particular generations; yet we cannot ignore the fact that the system had grown in Indian Subcontinant on account of both extraneous circumstances and intrinsic virtues. So far as the scientific methods are concerned, it may be said that the Pancha-bhautika character of dravyas prominently occupied the minds of the Ayurvedists, and not the analytic and synthetic methods of the West, as the latter, though practical could not satisfy the basic theories of the Orientals. "It is the character of the Western intelligence to analyse, separate and combine," but this process is sometimes too elaborate and the results obtained are sometimes time-serving. There is also a tendency to artificialise, which makes the subject more and more complex. The motto of the West is to find out drugs or remedies, which have a specific property capable of a sure and rapid action. These tendencies, though useful in serving one purpose, are not free from the faults of commission and omission." (Dr. H. V. Savnur's—"A Handbook of Ayurvedic Materia Medica, etc." (1950).

1. Arkas are distilled essences or liquors, made by soaking drugs in water for 24 to 48 hours and then extracting their essence by distillations; the essence or liquors thus obtained are Arkas. Araks are usually equivalent to aquae or `waters' of the British Pharmacopoeia, and they are prepared in the same way. They are used in fevers, dyspepsia and externally as cooling lotions.

2. Aristas (See also Asavas), are weak alcoholic preparations prepared by making a decoction of the drugs and then allowing them to undergo fermentation by the help of raw sugar or honeys. Fermentation is allowed to go on for a period of 7—10 days in hot weather, for 15 to 30 days in cold weather.

3. ***Asavas & Aristas*** (Asavarishtas) are medicated spirituous liquors. They are prepared with honey and treacle and various medicinal substances, such as roots, leaves, barks, etc., of plants cut into pieces and steeped in water and laid aside in air-tight earthen jars for vinous fermentation for at least one month. The proportion of the different ingredients, is generally as follows:— Water 32 Kg., treacle or jaggery 12.5 kg, and honey 6.25 Kg., medicinal substances 1.25 Kg., in powder or decoction. When raw vegetable juices are used for fermentation, the resulting fluid or liquid is called Asava. In other words, Asavas are weak alcoholic preparations prepared by infusing the drugs, in cold water and allowing to undergo fermentation with the help of raw sugar or Jaggery or honey. "The above difference in Arishtas and Asavas is not true in all cases. Some Asavas are prepared by decoction and some Arishtas from infusion."— Dr. J. R. Goyal. When the decoction of drugs only is used for fermentation, the fermented product is called Arishta. These preparations combine the virtues or properties of spirituous drinks and those of the drugs used in preparing them. Many of these are stomachics, stimulants, tonics, astringents. alteratives, febrifuges, etc.

4. Avalehas are Lehas, linctuses or confections or thickened extracts. These are equivalent to confections, electuaries or conserves of the B.P. To prepare them, decoction, after being strained, again boiled down to a thick soft consistency with sugar or honey. If sugar is to be used in this preparation, its quantity should be four times that of the drugs, and in the case of jaggery, it should be double that of the drugs. If water, or milk is to be added, the quantity to be added should be four times that of the drugs used. These extracts or confections, when properly made, should sink in water, do not readily dissolve in water, can be drawn out into threads or wires, and, if made thicker, will receive impressions of coins on their surface. They should show a good colour and emit sweet smell. Extracts are generally administered with the addition of milk, sugarcane juice, sugar or any other infusions or decoctions or powders, in 48 gm. desirable under the circumstances. Avalehas are used for digestive troubles, respiratory affections and for general tonic effect on the body.

5. Bati / Vatakas / Vatikas / Tablets / pills are usually prepared by reducing a decoction of vegetable substances to a thick consistency and then adding some powders, or drugs or articles such as, water, treacle, raw sugar, honey, gum, guggul, as the case may be, for making a pill mass. Water or honey are usually the only anupans for administering pills. where none else are mentioned.

6. Bhasmas or Bhasms: (See:—Sinduras). These are called alkaline ashes and are prepared from vegetable and mineral substances. Vegetable ashes:—In the case of Vegetable, the drugs containing more or less alkalies are at first made into a coarse powder or pieces, and then burnt till they are completely reduced to ashes. Mineral ashes:—In preparing these, metals are first subjected to a process of purification. The purified mass is then oxidised. The oxidised product is then subjected to a process of roasting. Finally, the roasted mass is reduced to a fine powder, when it is fit for use. Ashes are also prepared from various animal products, such as, Bons, horns, pearls, cowries, etc.

7. Bhavana is a process in which powders are soaked in various fluids, such as the expressed juice of herbs, decoctions etc., and then dried. For this purpose the quantity of juice added to the powder should be sufficient to cover it. The mixture is then allowed to dry in a shaded place. This process is repeated twice, thrice, seven or as many times, as is necessary.

8. Churnas or Choornas are powder-mixtures prepared by pounding dry vegetable, mineral or animal substances in a mortar with a pestle and passing the powder through cloth or linen, or fine sieve. "If jaggery is to be mixed with the powder, it should be equal to the Churna and in the case of sugar, it should be double the Churna. Usually powders are taken with milk or hot water etc., and are often used four times in quantity. Sometimes with ghee, oil, honey or sugar, their proportion is just sufficient to

mix the dose, or even double the Churna in quantity. Where no directions are given, hot water is the only 'Anupan' or vehicle. Churnas prepared without the aid of machinery are considered more effective. Choornas (Powders) are particularly useful in later stages of severe maladies after the well-known Bhasmas and Rasayanas, are used and the morbid process has been brought to the minimum. These are required to be given in bulk, and their action, though quick, is only temporary. These are the least toxic and dangerous, and their efficacy depends on timing their administration in relation to the disease and the hour of the day, meals, etc.

9. Dravas or Dravakas or distilled mineral acids,—several formulae are given in different works for their. preparation. A number of mineral substances or salts are heated in a retort and the distilled fluid collected in a glass receiver. The acids are tested and regarded as well-made by their property of dissolving a cowrie or shell thrown into them. There are two varieties of Dravaka, called Swalpa-Dravaka and Shanka-Dravaka.

10. Faanta or Phantas, is infusion prepared in hot water by steeping (for 12 hours) in an earthen vessel, pounded drugs 1 part, in 4 or 8 parts of fresh boiled water, till it becomes cold. The fluid decanted from this vessel after the stated period is called "phanta". It should be used in the same way as decoction. The dose is 96 ml in a day.

11. Gudikas or Gulikas (Pills):—(See also Vatikas—Tablets), are large pills or boluses. The method of preparation is just the same as in thecase of 'Vatikas' or 'Vataka'. these are intended to be swallowed whole by chewing or without. These including Guggulu, are very much milder than the Bhasmas and Rasayanas, with a very few exceptions. These are, as a general rule, less durable and deteriorate on exposure to the atmosphere, and hence require to be kept well-protected. These are useful to the run-down and weak patients suffering from chronic complaints and sensitive to any medicament hot in nature. Similarly these are required to be continued for days together, as action on the systematic tissues is very slow and mild in nature. But they have one very great advantage, viz., they can be administered to children and the aged, and during pregnancy, where Bhasmas and Rasayanas cannot be tolerated.

12. Himams are cold infusions prepared by steeping for one whole night 1 part of powdered drugs in 6 parts of cold water. The dose and the method of preparation are the same as in the case of *'phanta'* or *'Faanta'*.

13. Kalkas (pounded mass) is paste prepared by grinding dry or fresh whole vegetable substances, moistened with water, if necessary, on a flat stone or slab with a muller into thin paste, ball, or a vicious lump. When honey, ghee or oil is to be added to the mass, it should be double the quantity of the drug. But in the event of the addition of sugar or jaggery, the proportion should be equal, and when liquids are to be added, they should be four times the mass.

14. Kalpas— In these days, when it is very hard to procure genuine and fresh medicinal herbs, some Ayurvadic pharmacy in order to overcome this practical difficulty, have prepared different Kalpas from genuine and fresh herbs, which keep well fir a long time wutgiyt any deteruiratuib as to their therapeutic value; they are said to have been manufactured under expert supervision with scientific technique, and are guaranteed against adulteration or impurity. The great advantage of these Kalpas is the small dosage in which these can be therapeutically administered.

15. Kanjee or Kanjika is a sour liquid produced from the acetous fermentation of powdered paddy and other grains. 2 kg of powdered paddy (grown in rainy season) are steeped in 8 kg,' of water and laid aside in a covered earthen pot for 15 days and upwards, so that it may undergo acetous fermentation. The resulting fluid is' called *Kanjika* or *Dhanyalmla,* that is, the acid produced from paddy. *Kanjika* is a clear transparent fluid with an acid taste and vinous smell. It is cooling, refrigerant, and useful as a drink in fever. burning of the body, etc. Other grains besides paddy are some- times used for acetous fermentation. If mustard or the seeds of Raphanus sativus are used instead of baddy, the resulting fluid is

called *Sintaki.* If the husked grains of barley are boiled and steeped in water, the resulting acid liquor is called *Sauvira.* When the husks of fried seeds of Phaseolus rox burgh and barley are boiled together for acetous fermentation, the acid is called *Tushamvu. Arnala* is a soul gruel made from fermentation of boiled rice.

16. Khandapaka-means Confections. These are made by adding to syrup, medicines in fine powder and gently stirring them over a slow fire till intimately mixed and reduced to proper consistence, i.e., that of an extract. Honey is usually subsequently added to confections.

17. Ksharas (Alkalies) :— Medicinal plants or herbs, or specified parts of them, are wholly or completely burnt, and their ashes allowed to dissolve or mix in water allowed to stand, and which after filtration, is evaporated. The residue thus left is a white fine powder, which is called *Kshar,* is a very useful preparation, effectively acting on the complaints of liver and spleen. As a rule, *Ksharas* are very active, costic and corrosive, and *hence should be used with discretion and caution.* These are stimulating to digestive secretion, anti-fermentative, and useful in cases of ascites and abdominal tumours. *An overdose* or *indiscriminate use leads* to *decay* and falling of teeth, stomatitis and destruction of body tissues. *In cases* of *pregnant women tuberculous patients, the aged and Young children, ksharas should be prescribed very judiciously.*

18. Kshirapaka is decoction in milk. One part of medicine or drug is boiled in 8 parts of milk and thirty-two of water, till the water is evaporated and the milk alone remains; the decoction is then strained. '

19. Kvaths or ***Quaths*** or **decoctions** are generally prepared by boiling 1 part of vegetable substances or drugs, (roots, woods, barks and leaves of fresh plants), previously pounded into coarse powder or cut or sliced into small pieces, and then boiled over a slow fire with 8 or 16 parts of water, till the whole is reduced to one-fourth, or 1/8, or' 1/16 of the total water is left. The decoction is then strained through cloth. When decoctions are prepared with dry substances, 8 parts of water are used. *Quaths* or decoctions are administered with (anupans) vehicles like salt, honey, sugar, treacle, alkalies, (alkaline ashes) ghee, oil. or some medicinal powders, as the case may require. The principal drug should be taken or mixed with the *quaths.* Every day, the decoction should be prepared fresh, in several doses for the whole day, for administration; it *should under no circumstances* be *kept overnight.* Always prepare fresh *Quaths.* Decoctions are of different, strengths, as under:

I. "Paachan"—is a decoction in which the solution is reduced to one-half of the total quantity. It digests the "Aamadosha".

II. "Deepan"—is a decoction in which the solution is reduced to one-tenth. It stimulates excretion.

III. "Shodhana" is that type of decoction in which the solution is reduced to one-twelfth of the total quantity. It eliminates excretion.

IV. "Shamana" is a decoction in which the solution is reduced to one-eighth. It modifies the severity of the disease.

V. "Tarpana" is a decoction in which the solution is boiled till it reaches the boiling-point. In nourishes the Dhatus, (tissues).

VI. "Kledana" is a decoction in which the solution is reduced to one-fourth. It causes disquietude-distress to the heart.

VII. "Vishoshee" is also a decoction in which the solution is reduced to one-sixteenth. It causes thirst.

General instructions regarding the preparation of decoctions:—

A decoction should not be allowed to evaporate after the proper strength is reached, nor should it be boiled again after being once taken off the fire and placed on the ground.

A decoction should be rejected when (a) it assumes a dark, blue or red colour; (b) it becomes thick, slimy or weak; (c) it is over-boiled; & (d) it emits a raw or rotten fleshy smell.

The odour of the decoction should be of the nature of the drugs used, and its appearance pure or lustrous.— (A Hand-Book of Ayurvedic Materia Medica, etc., (1950).

"Famous Ayurvedic Ltd., concerns are preparing Quaths in concentrated liquor form, wherein all the properties of the crude Quaths have been fully preserved. These liquid Quaths, although free from alcohol remain well-preserved for a long time. Though rather slow in action, these have penetrating properties and are very useful in chronic cases.

20. Malamas (Ointments)— These are semi-solid or soft preparations acting chiefly as local anodynes and sedatives, for local application for various lesions, containing active drugs mixed with ghee, bees-wax, cocoanut or cocum oil, vaseline etc., either alone or in combination form, the bases of all ointments. Strict precaution should be taken to protect the eyes from these ointments as they cause irritation. Similarly contamination of the ointment with dirty and soiled fingers should be avoided during application. The lesion where one particular ointment is intended to be applied should first be cleaned with a soap or antiseptic lotion and the part dried with clean and sterilized linen. Ointment just sufficient for one application should be taken separately and carefully applied to the part. Strict cleanliness is in itself the first essential measure towards recovery.

21. Manda (decoction) is prepared 14 parts of water and one part of the cereal, —usually rice or *'Laj' (Khai), Manda* when ready, is completely free from the grain (rice).

22. Mantha is also a variety of cold infusion: all emulsion prepared in an earthen vessel; of one part of drugs in fine powder with four parts of cold water. The dose is 96 gm. in a day.

23. Modaka are boluses, larger than *gutika,* prepared by adding powders of medicinal substances to cold syrup and stirring them together till uniformly mixed. No *boiling is required in this preparation.* Syrups should be made with sugar and water, or with sugar and decoction of the prescribed drugs.

24. Muramba (Confections) are liquid preparations of drugs or fruits made by soaking them in syrup or honey.

25. Nasya—These are sternutatory preparations used in the treatment of cold, headaches or nervous diseases.

26. Paya or Yoosha or decoction is prepared in 14 parts of water, and 1 part of the cereal, and the preparation is allowed to boil till the consistency gets thicker than that of 'Manda'. Peya is a little mixed with the grain. Yoosha is a bit thicker than Peya.

27. Putapaka means roasting, or roasted mass *within a closed cover. In this process, vegetable drugs are reduced to a paste which is wrapped up in the leaves of either Eugenia jambolana of Ficus Bengalensis, or Gmelina arborea, firmly tied with thread, string or fibres of some sort, preferably vegetable, covered with a layer of clay from half to one inch in thickness and roasted in or over a fire made of dried cow-dung-cakes. When the layer of clay assumes a brick-red colour on the surface, roasting is known to be complete, the ball should be withdrawn from the fire and broken-open, and the juice of the roasted drug expressed. This juice is administered, with the addition of honey, sugar or such other adjuncts, as may be directed. Sometimes the roasted drug itself is given in the form of a powder or pills. Thus, 'Putapakas' contain some more principles of the drugs than 'Svarasas', owing to the action of fire. The dose is 1 to 4 tolas, and is generally recommended to be taken with milk.*

28. Rasayanas (Khalvee) are major mercurial preparations which form in Ayurved the chief part of the most important preparations. Every Rasayan contains mercury and sulphur in combination called "Kajjali", (or mercury in different forms, e.g., metallic, sulphide, subsulphide, black sulphate, oxide,. etc.). But, a few are exceptions, as they contain no mercury, and yet they have got action similar to mercury-containing *Rasayanas. Rasayanas* should be stored in glass bottles to keep them active and free from atmospheric contamination. Some *Rasayanas* are also known as *Matras,* Both the constituents are first purified by an elaborate process, and also are required to be imbibed with the properties of fresh juices of different indigenous plants, whereby the preparations become more potent. Different *Bhasmas,* which form the constituents of Rasayanas are first carefully prepared fully in accordance with the formulae and process of Ayurvedic Science. These preparations retain the therapeutic properties and potency for any length of time. A skilful and experienced practitioner may find various different marvellous results when used through different *Anupanas* or Vehicles. *Rasayanas* promote different secretary organs and endocrine glrolds, and build up all body *tissues,* and for fulfilling these objects, *Rasayanas* require to be thoroughly triturated. Trituration is a process by itself, which allows effective combination of different constituents of a particular preparation and divides it into finest particles, thus increasing its assimilative power and therapeutic effect.

Kupistha Rasayanas or *(Sindura Kalpa Rasayanas)* differ from simple *Rasayanas,* only in one respect, *viz.,* that they are required in addition to trituration to be heated with other suitable minerals in hard glass, in a red hot furnace, from 24 to 72 hours. These being stronger than simple *Rasayans* are more effective and useful in prolonging the life of the patient in the last stage, *even when injections fail* to *have the desired effect! But, being very active and powerful they demand a judicious and timely usage* in *medical practice. These are meant* for *momentary application and are contra-indicated for a prolonged usage. They should be always prescribed in combination with adjuncts and correctors, and greatest precaution should be taken* to *ascertain that they are genuine and prepared scientifically and correctly, so that mercury is well combined with other ingredients. Otherwise there is a great risk* of mercurial poisoning.

29. Satvas or Satwas— The fresh herb is crushed into a coarse mass and allowed to remain in a basin of water for about 12 hours. The whole thing is churned vigorously and starained through muslin. The strained fluid is allowed to stand for some hours, during which time, the active ingredients settle at the bottom. The upper column of the clear water is siphoned off and the sediment is dried into a fine powder, which contains all the properties of the respective medicinal herb in an altered form and taste. All such essences are cool in action and very handy for administration.

30. Sitakashaya is cold infusion prepared by steeping one part of the powdered drug in 6 of cold water for the night and straining the fluid in the morning.

31. Sneha is prepared with either water or some such fluid as decoction, expressed juice, milk, butter-milk. etc., the proportions being as under:

Kalka (Pasty mass)	Medicated oil or ghee	Fluid
1	4	16 water
1	6	24 Decoction
1	8	32 Meat juice
1	8	32 Milk, Curds etc.,

N. B. In the case of the last two, additional water to the extent of four times the *(Sneha)* may be added, if necessary.

When more than one variety of fluids are required, then up to four such sorts the usual proportion *of* four parts of fluid to one *of* Sneha should be taken, and the varieties should be boiled separately. But

when the number of fluids required exceeds four, each *of* the fluids should be equal in quantity to the Sneha, and all should be mixed and boiled together.

When the *Sneha* is intended to be prepared in decoction only, the pounded mass, left after the decoction is strained, may also be added to the mixture before it is boiled. But when it is expressly desired that the remains (kalka) of decoction are not wanted, they should be discarded.

32. Svarasas or swarasas—are fresh expressed juices (Succus) prepared by pounding green fresh medicinal plants in a mortar and expressed and strained through a clean cloth or linen. One should see beforehand that the plant is not infested with worms and/or injured by inclemency's of weather. The *Svarasas* contain only those principles, which are dissolved in the sap. (When fresh drugs are not available, and in the cases of plants like *"Guduchi"*, whose juice- cannot be extracted, water should be added to the pounded drug in the proportion of 2:1, and kept for a day and night; the mixture should then be strained and the solution used).

APPENDIX-II
TESTING OF DRUGS

1. Systematic study of Crude Drugs

In the Bangladeshi/Dashaya systems of Medicine (comprising of Ayurveda, Unani and Homeopathy), 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 the plant sources while about 10 per cent of the drugs are derived from animal and mineral source. The drugs of plant origin especially of herbaceous nature are frequently used as whole plant; otherwise their parts such as Root, Stem, Leaf, Flower, Seed, Fruit modifications of stem and Root, Bark of a Stem or Root Wood, and their exudes or gums etc. constitute single drugs in the Bangladeshi Systems of Medicine. These vegetable drugs are either used in dried forms or some times as whole fresh or their juice. The study of these crude drugs made with a view to recognise them is called Pharmacognosy (pharmaka=Drug; gignosco=to acquire knowledge of), meaning the knowledge or science of Drugs. 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 sourcc (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,

(vii) substitute and adulterants etc. Such systematic study of a drug as complete as possible, is claimed to be the scientific or pharmacognostical evaluation.

Each crude drug as mentioned above derived from the vegetable kingdom consists of a difinite part of plant e.g., leaf, stem, fruit, seed, wood, bark, root etc. Morphological or Macroscopical 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 ctc. 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 ctc. The microscopic examination of different parts of the drug provides several diagnostic characters. In case of leaves, surface preparation and transverse section, preferably through midrib, arc made and nature of epidermis, trichomes, stomata, arrangement of tissues like palisade cells, 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, fibres, vessels etc. as also from the study of the cell deposits like crystals, starch etc. the drugs are identified. The studies of diagnostic elements arc 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 thc 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, fibres and sclerieds gives 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 give with 5 % potassium hydroxide red colour because of anthraquinone derivatives, strychnine present in Nux-vomica gives purplish-red colour with ammonium vanadate and concentrated sulphuric acid.

Paper and Thin Layer Chromotography are now utilised in identification of drugs, their adulterant and their chemical constituents. Methods have been developed for quantitative estimation of the chemical constituents from paper and Thin Layer Chromatography (TLC).

2. Microscopical Methods of Examining Crude Vegetable Drugs

Methods of preparing specimens of crude materials of vegetable drugs for microscopical studies very, 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

(i) 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 or chloral hydrate.* Crush the material with scalpel and cover with cover slip before examining.

(ii) Cut materials—For examining cut leaves, herbs 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 chloral hydrate for several minutes until completely clarified and then examine them in chloral hydrate solution. After clarification, leaf pieces are divided into two parts with the help of a 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 solution of *caustic alkali* or in *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 Chloral-hydrate 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

Generally 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:

(i) Outer Coat.—For examining the outer coat boil 3 or 4 seeds or fruits in caustic alkali solution in 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 in glycerol solution.

(ii) 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 in moistening chamber or absorb in water and chloroform solution or soften them with steam and then cut the specimen for examining purpose. For cutting small, flat seeds (which are difficult to hold) place them in a pith or potato slit for section cutting. Small, round Or smooth seeds cannot be cut into section in the pith, then in such cases, they may be embedded in paraffin wax blocks for section cutting. For this, a block of paraffin (0,6 X 0 ' 5 X I .5 cms. 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, take two specimens, one in iodine solution and the other in water. With iodine solution starch turns blue. Shape and the structure of starch grains can be seen in water and their size is measured.

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

2. Fixed Oil.—For examining the presence 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 chloral-hydrate solution, and when examining objects containing large amount of fixed oil, then the powder is de-fatted and clarified as follows:

Place 0.5-1 g. of the powder in a porcelain dish, add 5-10 ml. of dilute nitric acid and boil for 1 minute, then strain off the liquid through 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 I minute and again strain it through 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.

3. Mucilage—Prepare al specimen in Ruthenium Red and examine it under a low power microscope or under dissecting microscope.1, Mucilage appears as pinkish-red or yellow coloured masses

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 a exact transverse or longitudinal direction. Cut the section with

razor, moisten the surface of the bark with glycerol solution. Remove the sections with a 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 *chloralhydrate 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. Starcb.—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 colour shows the presence of Tannin) or with *potassium-bi-chromate solution* (brown colour indicates the presence of Tannin).

4. Anthraquinone derivatives.—Anthraquinone darivatives 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 make pressed specimen and immerse then in *glycerol.*

Microchemical tests can be performed with scrapings for various chemicals as mentioned

C. *Powder:*

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 softened 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 thin, smaller sections. Stain the entire slices with *phloroglucinol* and *concentrated hydrochloric acid* or with *safranine,* examine the specimen under a dissecting microscope. For micro-chemical test the small and thin 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 strach with an occular 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 *safranine solution* as mentioned above for barks.

4. Fixed oil.—For fixed oil detection use Sudan IV, as mentioned above for fruits and seeds. If required for tannin, anthraquinone derivatives, test as mentioned above.

B. Cut material :

Make small pieces or scrapping of roots or 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 scrappings for various chemicals as 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.

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 form 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.

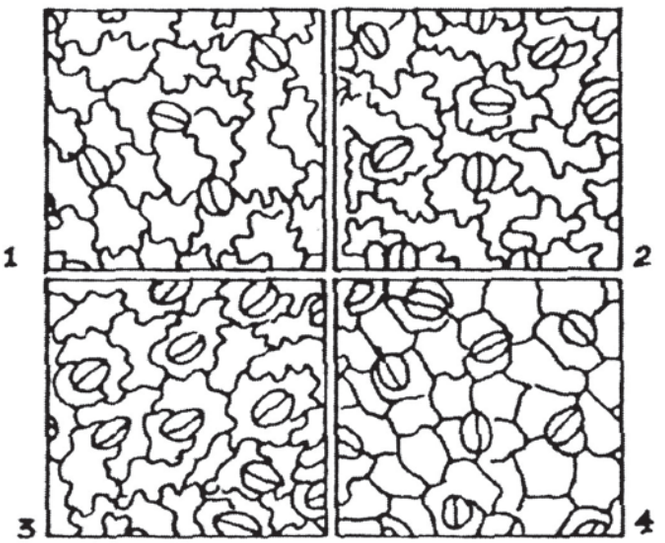


Fig. 1 Various types of stomata

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 5×5 mm in size in a test tube containing about 5 ml of *Choral hydrate solution* and heat in a 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:

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

Where S = the number of stomata in a given area of leaf; and

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.

5—Determination of Palisade Ratio

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

Place leaf fragments of about 5×5 mm in size in a test-tube containing about 5 ml of chloral hydrate solution and heat in a boiling water-bath for about 15 minutes or until the fragments become transparent. Transfer a fragment to a microscopical slide and prepare the mount of the upper epidermis, 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 to cover the area of the outlines of the four epidermal cells. Count the palisade cells under the four epidermal cells. Where a cell is intersected, include it in the count 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

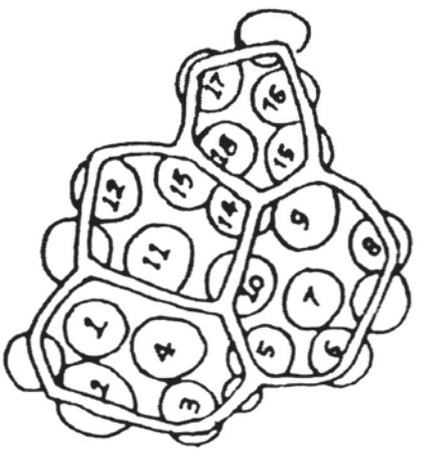


Fig 2 Palisade ratio

6—Determination of vein-Islet Number

The measophyll 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 "Vein-islets". 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 millimetres from of the central portion of the lamina and excluding the midrib and the 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 and minutes 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 a 6x eyepiece. Draw a line representing 2mm on a sheet of paper by means of a microscopical 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 outlines 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 Millimetres—Take fragments of leaf lamina each with an area of not less than 1 square millimetre, 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 1mm on a sheet of paper by means of a microscopical drawing apparatus and construct a square on this line representing an area of I square millimetre. Carry out the rest of the procedure as stated above. The result obtained is the number of veinislets in 1 square millimetre. For each sample of leaf make not less than 12 determinations and calculate the average number.

7 . Determination of Stomatal Number

Place leaf fragments of about 5×5 mm in size in a test tube containing about 5 ml of chloral hydrate solution and heat in a boiling water-bath for about 15 minutes or until the fragments become transparent. Transfer a fragments 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 40 x objective and a 6 x eye piece, to which a microscopical drawing apparatus is attached. Mark on the drawing paper a cross (x) for each stomata and calculate the average number of stomata per square millimeter for each surface of the leaf.

DETERMINATIONS OF QUANTATIVE DATA OF VEGETABLE DRUGS

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, at least 250g are withdrawn to constitute an original sample.

When the total weight of the drug to be sampled is more 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. a quartering process in the same manner until each of the quarters weigh at least 125 g; two such quarters then constitute an original sample.

(b) Samples of crude vegetable drugs in which the component parts are over I cm in any dimension may be taken by hand.

When the total weight of the drug to be sampled is less than 100 Kg, 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 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 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 10 Kg, the preceding 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 unground or unpowdered drugs, grind the sample so that it will pass through a No. 22 sieve. If the sample cannot be ground, 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—Foreign Matter and Determination of Foreign Matter

A—FOREIGN MATER

Drugs should be free from moulds, insects, animal fecal matter and other contamination's such as earth, stones and extraneous material.

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

(1) In particular, parts of the 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.

B. DETERMINATION OF FOREIGN MATTER

Weigh 100 - 500 g 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

3.—Determination of Total Ash

Incinerate about 2 to 3 g accurately weighed, of the ground drug in a tared platinum or silica dish at a temperature not exceeding 450°C 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 an ashless filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 450°C.

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

4.—Determination of Acid-Insoluble Ash

Boil the ash obtained in (3) for 5 minutes with 25 ml of *dilute hydrochloric acid;* collect the insoluble matter in a Gooch crucible, or on an ashless filter paper, wash with hot water and ignite to constant weight. Calculate the percentage of acid-insoluble ash with reference to the air dried drug.

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 temprature not exceeding 450°C. Substract 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.

6.—Determination of Alcohol Soluble Extractive

Macerate 5g of the air dried drug, coarsely powdered, with l00ml 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 rapidly, taking precautions against loss of solvent, evaporate 25ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105°C, to constant weight and weigh. Calculate the percentage of alcohol-soluble extract with reference to the air-dried drug.

7.—Determination of Water Soluble Extract

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

8.—Determination of Ether-Soluble Extractive (fixed Oil Content)

Transfer a suitably 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°C to 60°C) in a continuous extraction apparatus (soxhlet extractor) for 6 hours. Filter the extract quantitatively into a tared evaporating dish and evaporate off the solvent on a water bath. Dry the residue at 105°C to constant weight. Claculate the percentage of ether-soluble extractive with reference to the air-dried drug.

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

Seeds and fruits smaller than 3 mm 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 tarred 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 0.25 per cent. Constant weight is reached when two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in an desecrator, show not more than 0.01g difference.

10.—Determination of Volatile Oil in Drugs

The determination of volatile oil in a drug is made by distilling the drug with a mixture of water and glycerin, collecting the distillate in graduated tube in which the aqueous portion of the distillate is automatically separated and returned to the distilling flask, and measuring the volume of the oil. The content of the volatile oil is expressed as a percentage v/w.

The apparatus consists of the following parts (See Fig. 3). The apparatus described below is recommended but any similar apparatus may be used provided that it permits complete distillation of the volatile oil. All glass parts of the apparatus should be made of good quality resistance glass.

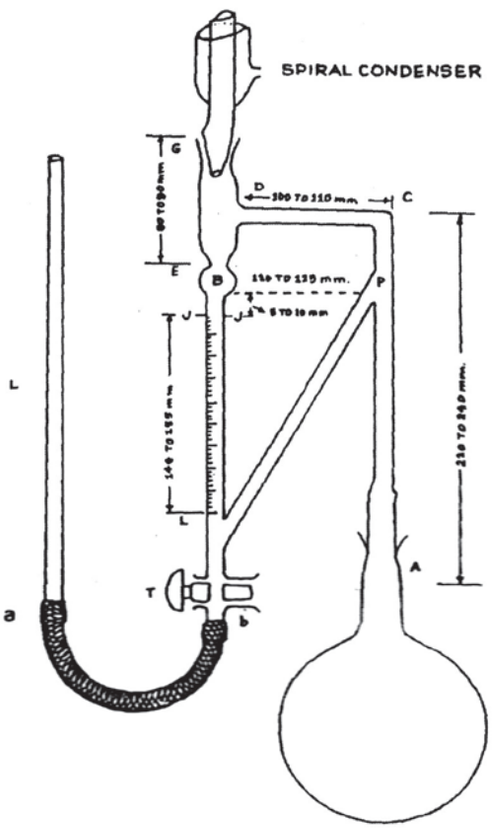


Fig. 3 Apparatus for volatile oil determination

a) **Distilling Flask-** A spherical flask 1,000 ml capacity with ground neck, taper of ground socket 1 in 10, internal diameter of larger end 34.35 to 34.65 mm.

b) **Still head-** graduated measuring tube and return flow tube made in one piece, in accordance with the following specifications. External diameter of the smaller end 31.0 to 31.2 mm. Minimum length of the ground zone –34 mm.

Tube AC, length-220 to 240 mm.

Internal diameter-13 to 15 mm.

Bulb CD, length-100 to 110 mm.

Internal diameter-13 to 15 mm.

Spiral condenser- ground joint accurately fitting in the ground neck of the tube EG, taper 1 in 10.

Tube EG, length-80 to 90 mm.

Internal Diameter-30 to 40 mm.

Bulb B- length 20 to 22 mm.

Internal diameter-15 to 20 mm.

The distance between B and P is 120 to 125 mm.

Junction P and the centre of the bulb B must be in the same horizontal plane.

Measuring tube JL- length of the graduated portion 144 to 155 mm. capacity 2 millilitres garduated into fifths and fiftieths of a millilitre.

Fube PL- return flow tube-Internal diameter-7 to 8 mm.

Levelling tube I, length-450 to 500 mm. Internal diameter 10 to 12 mm tapering at the lower end with a wide top (20 to 25 mm diameter).

Rubber tubing a—b length 450 to 500 mm. Internal diameter 5 to 8 mm.

c) **Burner-** A luminous Argand burner with chimney and sensitive regulative tap.

d) **Stand-** A retort stand with asbestos covered ring and clamp carrying a piece of metal tubing connected by a short length of rubber tubing with the water inlet tube of the condenser jacket.

The Whole of the apparatus is effectively screened from draught.

The apparatus is cleaned before each distillation by washing successively with *acetone* and *water,* then inverting it, filling it with *chromic sulphuric acid* mixture, after closing the open end at G, and allowing to stand, and finally rinsing with water.

Method of determination

A suitable quantity of the coarsely powdered drug together with 75 ml of glycerin and 175 ml of water in the one litre distilling flask, and a few pieces of porous earthen ware and one filter paper 15 cm cut into small strips, 7 to 12 mm wide, are also put in the distilling flask, which is then connected to the still head. Before attaching the condenser, water is run into the graduated receiver, keeping the tap T open until the water overflows, at P. Any air bubbles in the rubber tubing a-b are carefully removed by pressing the tube. The tap is then closed and the condenser attached. The contents of the flask are now heated and stirred by frequent agitation until ebullition commences. The distillation is continued at a rate which keeps the lower end of the condenser cool. The flask is rotated occasionally to wash down any material that adheres to its sides.

At the end of the specified time (3 to 4 hours) heating is discontinued, the apparatus is allowed to cool for 10 minutes and the tap T is opened and the tube L_1 lowered slowly; as soon as the layer of the oil completely enters into the graduated part of the receiver the tap is closed and the volume is read.

The tube L_1 is then raised till the level of water in it is above the level of B, when the tap T is slowly opened to return the oil to the buld. The distillation is again continued for another hour and the volume of oil is again read, after cooling the apparatus as before. If necessary, the distillation is again continued until successive readings of the volatile oil do not differ.

The measured yield of volatile oil is taken to be the content of volatile oil in the drug.

the dimensions of the apparatus may be suitably modified in case of necessity.

11.—Thin-Layer Chromatography (TLC)

Thin-layer chromatography is a technique in which a solute under goes distribution between two phases, a stationary phase acting through absorption and a mobile phase in the form of a liquid. The absorbent is a relatively thin, uniform layer of dry finely powdered material applied to a glass, plastic or metal sheet or plate. Glass plates are most commonly used. Separation may also be achieved on the basis of partition or a combination of partition and absorption, depending on the particular type of support, its preparation and its use with different solvent.

Identification can be effected by observation of sports of identical R_f value and about equal magnitude obtained, respectively, with an unknown and a reference sample chromatographed on the same plate. A visual comparison of the size and intensity of the spots usually serves for semi-quantitative estimation.

Apparatus

a) Flat glass plates of appropriate dimensions which allow the application at specified points of the necessary quantities of the solution being examined and appropriate reference solutions and which allow accommodation of the specified migration path-length. The plates are prepared as described below; alternatively, commercially prepared plates may be used.

b) An aligning tray or a flat surface on which the plates can be aligned and rested when the coating substance is applied.

c) The adsorbent or coating substance consisting of finely divided adsorbent materials, normally 5 μm to 40 μm in diameter, is suitable for chromatography. It can be applied directly to the plate or can be bonded to the plate by means of plaster of Paris (Hydrated Calcium Sulphate) or with any other suitable binders. The adsorbent may contain fluorescing material tohelpin visualising spots that absorb ultra-violet light.

d) A spreader which, when moved over the glass plate, will apply a uniform layer of adsorbent of desired thickness over the entire surface of the plate.

e) A storae rack to support the plates during drying and transportation.

f) A developing chamber that can accommodate one or more plates and can be properly closed and sealed. The chamber is fitted with a plate support rack that supports the plates, back to back, with lid of the chamber in place.

g) Graduated micro-pipettes capable of delivering microlitre quantities say 10 μl and less.

h) A reagent sprayer that will emit a fine spray and will not itself be attacked by the reagent.

i) An ultra-violet light, suitable for observation at short (254 nm) and long (365 nm) ultra-violet wavelengths.

Preparation of plates- Unless otherwise specified in the monograph, the plates are prepared in the following manner. Prepare a suspension of the coating substance in accordance with the instructions of the supplier and, using the spreading device designed for the purpose, spread a uniform layer of the suspension, 0.25 to 0.30 mm thick, on a flat glass plate 20 cm long. Allow the coated plates to dry in air, heat at 100° to 105° for at least 1 hour (except in the case of plates prepared with cellulose when heating for 10 minutes is normally sufficient) and allow to cool, protected from moisture. Store the plates protected from moisture and use within 3 days of preparation. At the time of use, dry the plates again, if necessary, as prescribed in the monographs.

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 1 hour at room temperature. Remove a narrow strip of the coating substance, about 5 mm wide, from the vertical sides of the plate. Apply the solutions being examined in the form of circular spots about 2 to 6 mm in diameter, or in the form of bands (10 to 20 mm x 2 to 6 mm unless otherwise specified) 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 plate 15 cm, or the distance specified in the monograph, from the starting line. Allow the solvent to evaporate and place the plate in the tank, ensuring that it is as nearly vertical as possible and that the spots or bands are above the level of the mobile phase Close the tank and allow to stand at room temperature, until the mobile phase has ascended to the marked line. Remove the plate and dry and visualise as directed in the monograph; where a spraying technique is prescribed it is essential that the reagent be evenly applied as a fine spray.

For two-dimensional chromatography dry the plate after the first development and carry out the second development in a direction perpendicular to the first.

When the method prescribed in the monograph specified 'protected from light' or 'in subdued light' it is intended that the entire procedure is carried out under these conditions.

Visualisation

The phrases *ultra-violet light* (254 nm) and *ultra-violet light* (365 nm) indicate that the plate should be examined under an *ultra-violet light* having a maximum output at about 254 or at about 365 nm, as the case may be.

The term secondary spot means any spot other than the principal spot Similarly, a secondary band is any band other than the principal band.

Rf. Value

Measure and record the distance of each spot from the point of its application and calculate the Rf. value by dividing the distance travelled by the spots by the distance travelled by the front of the mobile phase.

Books of References:

1. A Hand Book of Medicinal Plants by Prajapati/Purohit/Sharma/Kumar.
2. Medicinal Plants by S. G. Joshi.
3. The Ayurvedic Pharmacopoeia of India. Part-1, Volume – I, II, III
4. A Lexicon of Medicinal Plants in India by D. N. Guha-Bakshi, P. Sensarma, D. C. Pal
5. Quality control Methods for Medicinal plants Materials by WHO, Geneva-1998
6. The International Pharmacopoeia, 3rd Edition, Geneva, WHO.
7. Diagnosis and Treatment of diseases in Aurveda part-1 by V. Das & V. Lalitosh
8. Charak samhita text with English Translation by Ram Karan Sarma & V. Das Vol-1,2
9. Indian Materia medica by K. M. Dr. Nadkarni.
10. Drabyagona Samhita by Kvj. Sreenikatan Chackrabarty.
11. Medicinal plants of Bangladesh (Chemical constituents) by Dr. Abdul Ghani Ph.D
12. Useful plants of India and Pakisgan by J.F Dastur 1964
13. Chironjeeb Bano-Oushadhi (Part-1-11) by Sheebkali Bhattacharjaya
14. Bangladesh National Ayurvedic Formulary 1992 by Bangladesh Unani & Ayurvedic Board.
15. Herbal medicine for human health by R.R. Chowdhury 1991
16. Shishu Palon o Chikitsha by Dr. Nihar Ranjan datta
17. A Hand Bood of Ayurveda by Vaidya Bhagwan Das, Acaryamanered-1987
18. Health & Hermony through Ayurveda by Dr. Mehta A.K, Dr. Gupta N.K, Dr. Sharma R.N
19. Indian Therapeutics (1928) by Dr. D. V. Sandu.
20. List of Raw Drugs & Medicinal Preparations (1926), published by Government of Madras.
21. Fundamental Principles of Ayurvedic Medicines, published by the Government of Madras.
22. Clinical Application of Ayurvedic Medicines etc., (1924), by Zandu Pharmaceutical Works, Ltd., Bombay, 13.
23. Index Book and Therapeutic Guide (1928 Edn. & 1943 Edn.) published by the Deccan Ayurvedashram Pharmacy, Ltd., Hyderabad. (Deccan).