SECTION : I

INTRODUCTION, DISCUSSION AND EXPERIMENTAL TO PROXIMATE ANALYSIS OF SOME MEDICINAL PLANTS
INTRODUCTION TO
PROXIMATE ANALYSIS OF SOME MEDICINAL PLANTS

Since disease, decay and death have always co-existed with life, the study of diseases and their treatment must also have been contemporaneous with the dawn of human intellect. The ancient civilization of India had also a glorious history of materia medica which has been a source of many remedies even to the present day. Plants have been used by man since prehistoric days for relieving sufferings and curing illness. The history of medicine in India can be traced to the remote past. The earliest recorded mention of the medicinal use of plants is found in the 'Rigveda', which is one of the oldest repositories of human knowledge and is believed to have been written between 4500 and 1600 B.C., and where in mention has been made of the 'Soma' plant and its effects on man. In a later production, the Atharvaveda, the use of the drug is more varied. It is in the Ayurveda, which is considered as an Upveda, that is definite properties of drugs and their uses of the ancient medical science of India are mentioned. Ayurveda, is the very foundation stone of the ancient medical science of India. Ayurveda, which deal with different aspects of the science
of life and the art of healing. The age of Ayurveda is fixed about 2500 to 600 B.C. Susruta Samhita which was written not later than 1000 B.C. contains a comprehensive chapter on therapeutics and Gharaka Samhita, written about the same period, gives a remarkable description of the materia medica as it was known to ancient Hindus. 'Bhoja-prabandha', a treatise written about A.D. 980 contains a reference to inhalation of medicaments before surgical operations and an anaesthetic called 'Sammohini' is said to have been used in the time of Buddha.

Later, during the Buddhist period, considerable progress was made and medicinal plants were cultivated under the direction of highly qualified specialists. The influence of Hindu medicine permeated far and wide into Egypt, Greece and Rome and moulded the Greek and Roman medicine and through the former, Arabic medicine also. During this period, Indian medicine was at its zenith and the knowledge of the Hindu physicians in the domain of drug therapy and toxicology was far in advance of others. With the advent of the Muslim conquerors, the decline was even more rapid. The Muslims brought their own healing system, which was fairly advanced for that period. The Arabic system thus
introduced became the system of relief, and brought with it a rich store of its own materia medica.

The Egyptians in 1500 B.C. or even 3000 B.C., were not the first people to exhibit an active concern about the plants. Over 6000 years ago, the ancient Chinese were using drug plants as were the Egyptians, Sumerians and Senites, long before these were any physicians in the modern world. European medicines may be said to have been founded by Hippocrates in the 4th century B.C.

In the 17th century, Vesalas had revolutionised anatomy and para-modern surgery. In the 18th century, Bizarre medicaments gave way to more important medicaments.

The first half of the 19th century saw the progress of chemistry of phenomenal pace. In the second half of the 19th century, pharmacology became truly scientific. Many new drug including plants, minerals and biological products had more been submitted to scientific screening before being incorporated in therapeutics.

During the centuries that have gone by, the materia medica of the indigenous systems of medicine has become extensive and heterogenous. Out of about 2000 items recorded
in Indian Medicinal literature, less than 200 are of mineral and animal origin; the rest are derived from vegetable sources. The vegetable materia medica has been built up in the course of centuries and every region of India has contributed to its development. The practitioners of various Indian systems in different parts of India tried to utilize the locally growing plants as far as possible and accepted those which were found useful after trial for treatment of diseases.

Materia Medica was enormously investigated and studied on the basis of 'Panchabhautika' and 'Tri Dosha Siddhantas'. The effects of the five inherent properties of every substance viz. Rasa, Guna (property), Veerya (heating and cooling effects), Vipaka (remote action after assimilation) and Prabhava (specific action) on health and disease were explained. All substances were classified under different classes according to the nature of such origin as Mineral, Vegetable and Animal and also according to their properties and actions as Deepana (carminative), Pachana (Digestive) etc. Each drug was given different names (Synonyms) indicating its medicinal properties, actions, botanical description, habitat etc.

Hindu sciences teach that plants have a sort of dormant or latent consciousness and care capable of feeling pleasure and
pain. In Santi Parva of Mahabharatha we find references to the sensativeness of plants to heat, cold, to the sound of thunder etc., as well as to odours both pleasant and unpleasant. Charaka divides plants into four classes viz. Vanaspities (trees bearing fruits without flowers): Vanaspatyas (trees bearing both fruits and flowers) Oushadhees (herbs that whither after fructification) and Virrudhas (other herbs with spreading stems).

In order to understand Ayurveda, one must first learn the meaning of the terminology and the language used in Ayurveda. The approach of Ayurveda to man is quite different. The spiritual outlook is very important.

If the modern scientists cannot understand some of the Ayurvedic theories, it is because of the limitations of modern science. As and when science advances the ayurvedic lore becomes more and more understandable. To use my super science, which means that it is a welcome combination of philosophy and science. Further Scientific Research will prove this one day, because truth must always prevail\(^1-3\).
CELEOLOGY OF THE TEACHERS OF AYURVEDA

Dakshaprajapati

Deiva Parampara

Asvini Kumāras

Indra

Bharadwaja

Dharavatari

Asthreya

Rishi Parampara

Agnivesa Phela Jetukarna Parasara Kṣemendra Susruta Aupa Aurobinda Pausha Karna Cūpa Veita

Kheera- paari

Va

Vata

Ya

Raksha

Ita

Charaka and Drickabala

Redactors

śaarpa (Redactor)
The progress of medicine had become very rapid and revolutionary in the period of 20th century.

The indigenous system of medicine, Ayurved is still one of the most important and applicable system of medicine. Ayurveda system of medicine is still applied amongst a great percentage of population throughout India officially estimated to be over 85%. Ayurveda aims to preserving and promoting health as well as preventing and curing disease. The preservative and preventive aspects have lost their individuality due to varied reasons and have got mixed up with other culture, religion and tradition.

Ayurveda aims at treating the patient as a whole. In India system of medicine, a number of herbal drugs have been used by the human being for the treatment of various disease and complaints. These Indigenous drugs have been proved useful for the welfare of human society, and employs drugs of low toxicity or non-toxic, taken in comparatively large doses and mainly orally. The drugs do not produce a quick symptomatic effect, but work slowly and very often officaniously to increase the patients natural resistance and recuperative powder.

The Indigenous system of medicine practised in India is based mainly on the use of plants, and there exists a rich
The PID Publications and Information Directorate of the Council of Scientific and Industrial Research is presently furnishing latest computerised information on medicinal plants to various researchers in the country.

In present work, following eight medicinal plants are to be analysed for their some chemical composition and their particular effects on blood sugar, glucose tolerance etc. They are:

<table>
<thead>
<tr>
<th>No.</th>
<th>Botanical Name</th>
<th>English Name</th>
<th>Selected Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cassia Sophora Linn.</td>
<td>Senna Sophora</td>
<td>Seed</td>
</tr>
<tr>
<td>2.</td>
<td>Euphema Officinalis Gaertn. Syn.</td>
<td>Indian gooseberry</td>
<td>Seed</td>
</tr>
<tr>
<td>3.</td>
<td>Eugenia Jambolana Lam. OR Syzygium Cuminii (Linn) Skeels Syn.</td>
<td>Black plum or Indian blackberry</td>
<td>Seed</td>
</tr>
<tr>
<td>4.</td>
<td>Alpinia Galanga Willd.</td>
<td>Greater galangal OR Java galangal</td>
<td>Rhizomes</td>
</tr>
<tr>
<td>5.</td>
<td>Momordica Charantia Linn.</td>
<td>Bitter gourd</td>
<td>Fruit</td>
</tr>
<tr>
<td>8.</td>
<td>Kickxia Ramosissima Wall. OR Toad flax Linaria Ramosissima Wall.</td>
<td>Plant</td>
<td></td>
</tr>
</tbody>
</table>
A number of medicinal properties are described to the selected medicinal plants (Plants parts). A brief account of morphology, distribution, description, chemical constitution and medicinal uses of this selected medicinal plants is given below 4-10.

1. **Cassia Sophera Linn. (Senna Sophera)**:

*Cassia sophera* belongs to the family *Leguminosae*.

A shrub or under shrub 2.4 - 3 m. high, annual or perennial. Leaves 18 - 23 cm. long; rhachis grooved, glabrous or nearly so, with a solitary conical gland near the base. Leaflets 6 - 10 pairs, 3.8 - 6.3 by 1.3 - 2.0 cm., opposite, membranous, glabrous. Lanceolate, acute or acuminate, glabrous, base usually rounded; main nerves 10-12 pairs; petiolules 1.5 - 2 mm. long, glabrous. Flowers in axillary, short, few-flowered, corymbose racemes; pedicels 6 mm. long, pubescent; bracts 4 mm. long, green, ovate, acute, caducous, calyx 6 mm. long, divided to the base; segments membranous, obtuse, green petals 5, subequal, 1.3 cm. long, ovate, obtuse, yellow. Stamens 10 of which the 3 upper are reduced to staminodes, the remaining 7 usually perfect, the 3 lower longer and with larger anthers then the 4 lateral one, of which one is sometimes reduced to a staminode. Pods 7.5 - 10 by 1 cm. and about 5 mm thick, slightly
recurred, somewhat turgid, septate between the seeds, not or scarcely torulose. Seeds 30 - 40, broadly ovoid, acute, compressed, dark brown, 6 by 4 mm.

This plant is distributed throughout India and most tropical countries. It is considered to have expectorant, depurative, and alterative properties.

The leaves, bark and seeds are used medicinally.

The leaves are purgative in action, the dose being 90 grains. A drink made of the leaves with sugar and water is administered with jaundice; a decotion of the leaves is given in fever and gout; an infusion of the fresh leaves is used both internally and externally in sub-acute stages of gonorrhea; externally the infusion is given as an injection; the infusion is also given as an anthelmintic, as a febrifuge in rheumatic and inflammatory fevers, and in skin diseases; externally the infusion is used as a wash for syphilitic sores. The juice of the leaves acts as an expectorant in coughs. The juice of the leaves is viewed as a specific in ringworm, especially when made into a plaster in combination with sandal-wood.

In Madras, the infusion of the leaves is taken internally for gonorrhoea in its sub-acute stages, and it is also used externally for syphilis.
The bark also is used as a cathartic; the bark in the form of infusion and powdered seeds, mixed with honey, are given in diabetes.

The seeds made into a paste with sulphur and water are used as a cure for patches of pytyriasis and psoriasis. This virtue seems to lie in the chrysophanic acid with it and other species of Cassia.

The root is administered internally with black pepper for snakebite. For scorpion-sting the juice of the root (Vrindamādnava) or of the leaf (Yogaratnaka, Bhaishjyaratnavalli, Chakradatt) is put into the ear. It is also used in diuretic.

In Tongking and Laos, the plant is used as an expectorant.

A decoction of the whole plant is said to be useful in diminishing urine, and also to act as an expectorant. This decoction was administered to cases of acute bronchitis and was found to give relief.

Emblica officinalis Gaertn belongs to the family Euphorbiaceae.

A deciduous small or middle sized tree with crooked trunk and spreading branches; bark greenish grey, peeling off in conchoidal flakes; branchlets glabrous or finely subescent, 10-20 cm. long, often deciduous. Leaves subsessile, 10 - 13 by 2.5 - 3 mm. closely set alone the branchlets, distichous, light green, glabrous, narrowly linear, obtuse, imbricate when young, having the appearance of pinnate leaves; stipules ovate, finely acute. Flowers greenish yellow, in axillary fascicles on the leaf bearing branchlets, often on the naked portion below the leaves with fimbriate bracts at the base. Male flowers numerous, on short slender pedicels. Sepals 6, oblong, obtuse, 1.2 mm long. Female flowers few, subsessile. Sepals as in the male. Fruit 1.3 - 1.6 cm. diam.; fleshy, globose, with 6 obscure rooticle furrows, pale yellow, of three 2-seeded crustaceous cocci. Seeds 6, 3 gonous.

A small genus of trees, native of India ascending to 4,500 ft on the hills, Ceylon, Malaya and China. Emblica officinalis is met with wild or cultivated, throughout the greater part of India.
Almost all parts of tree are used medicinally. The tree is held in very high repute in Ayurvedic and unani systems of medicine.

The fruit is acrid, sour, bitter, sweetish, cooling, alexiteric, carminative, laxative, toxic, antipyretic, useful in burning sensations, vomiting, biliousness, leprosy, constipations used in biliousness, 'Kapha', poisoning, 'Tridosha', incipient blindness. Fresh fruit is used in Turkestyan in inflammations of the lungs and of the eyes as a collyrium. In Persia, it is used as a vermifuge. The green fruits are made into pickles and preserves to stimulate appetite. A paste of the fruit is a useful application over the public region in irritability of the bladder in retention of urine and to the forehead in Cephalalgia.

The fruit is probably the richest source of vitamin C, Fruit is successfully used in the treatment of human scurvy. The fruit juice contains nearly 20 times as much vitamin C as orange juice and a single fruit is equal in antiscorbutic value to one or two oranges. The antiscorbutic value is well conserved by preserving the fruits in salt solution or in the form of dry powder. The dried fruit lose only 20% of its vitamin in 375 days when kept in a refrigerator, but loses 67% in the same period when stored at room temperature.
The Indian gooseberry, the fruit of Emblica officinalis is a common medicine used everyday in Indian households. Dried fruit is useful in haemorrhage, diarrhoea and dysentery; with iron it is a valuable remedy in anaemia, jaundice and dyspepsia. Juice of the fresh fruit and ghee mixed together is a good restorative tonic. A decoction prepared from the fruit combined with Terminalia Chebula and Terminalia belerica is useful in chronic dysentery and biliousness. A mixture of the fruit juice and sugar relieves burning in the vagina. A decoction of the dried fruit is injected with benefit in gonorrhoea.

The fruits are used in the preparation of writing ink and hair dyes. The dried fruit is detergent and is used as shampoo for the head.

The flowers are cooling and aperient. The root, the bark and the ripe fruit are astringent. In the Konkan, the juice of the fresh bark with honey and turmeric is given in gonorrhoea. The steam bark is effectively given in diarrhoea. The root bark with honey is used in aphthous stomatitis. A fermented preparation made from the root is used in jaundice, dyspepsia, cough etc.

The leaves are, in Baroda, used as an infusion with fenugreek seeds in cases of chronic dysentery, and are also
considered a bitter tonic. In the same locality, the milky juice is considered a good application to offensive sores. In Cambodia the leaves are used in the preparation of antithemic lotions and baths. Essential oil distilled from the leaves is largely employed in perfumery. Leaves and fruit are used as fodder for cattle. Leaves contain a brownish yellow colouring matter used in dyeing tussor and mulberry silks and wool; when used with iron mordant, a black colour is produced. The leaves, bark and fruits are rich in tannins one giving on hydrolysis gallic acid, ellagic acid and glucose, and other giving ellagic acid and glucose.

The seed is one of the most used and reputed drugs in indigenous Indian medicine. The seed is acrid, sweet, aphrodisiael antipyretic, useful in biliousness, asthma, bronchitis, leueorrhoea, vomiting, 'vata' (Ayurveda). An infusion of the seeds is given as a febrifuge and in diabetes; it is also used as a collyrium and applied with benefit to recent inflammations of the conjunctive and other eye complaints. A powdered of the emblic seed and red sandal is given with honey to stop nausea and vomiting. An infusion of the seeds is given as a drink in fevers. A decoction of the seeds with the addition of dried
grapes and sugar is used as a gargle for loss of taste after fever; an ointment made of the burnt seeds with oil is useful for scabies and itch. Seeds contain a fixed oil, phosphatides and a small quantity of essential oil with a characteristic odour. The fixed oil (yield 16%) which is brownish yellow in colour, has the following physical and chemical characteristics:

- Sp.gr. 31°C, 0.9220; \( n^3_{D} \) 1.5758; acid val. 12.7; Sap.val. 185;
- iodine val., 139.5; R.M.val. 1.03; acetyl val. 2.03; unsapon. matter, 3.81%; sterol content 2.70%; saturated fatty acids of the oil are: linolenic, 8.78; linoleic, 44.0; oleic, 28.40; stearic, 2.15; palmitic, 2.99; myristic acid 0.95%.

Every part of the plant is equally useful in the antidotal treatment of snake-bite and scorpion sting.
3. Eugenia Jamboiana Lam. OR Syzygium Cuminii (Linn) Skeels Syn. (Black plum OR Indian blackberry):

Eugenia Jambolana belongs to the family Myrtaceae.

A large, evergreen glabrous tree, with a 30 m. in height and 3.6 m. in girth, with a bole up to 15 m., found throughout India upto an altitude of 1,800 m. Bark pale brown, slightly rough on old stems with shallow cracks and depressions exfoliating in woody scales. Blaze 3.8 cm. fibrous, red or pinkish brown, the juice turning purplish black on the blade of a knife. Leaves very variable, usually 7.5 - 15 by 3.8 - 6.3 cm. lanceolate elliptic - oblong or broadly ovate-elliptic, acute, acriminate or subobtuse, coriaceous, smooth and shining above, with numerous close parallel fine secondary nerves uniting to form an intramarginal vein. Petiole 8 - 25 mm. long, channelled, Flowers 7.5 - 13 mm. across, whitish, fragrant, sessile, arranged mostly in threes in trichotomous panicles 3.8 - 10 cm. long which usually appear from the scars of fallen leaves, but sometimes in the leaf axils. Fruit variable in size upto 2.5 cm. long, oblong crowned with the truncate calyx limb black with pink juicy pulp.

A tree, found nearly all over India, extending from the Himalaya to Southern India, Ceylon-Malaya, Australia.
The fruit is sour, acrid, sweet; a general tonic, tonic to the liver, enriches the blood; strengthens the teeth and gums; useful astringent, in bilious diarrhoea; good gargle for sore throat; good lotion for ringworm in the head. The ripe fruit is widely eaten in India. A wine is prepared from the ripe fruit in Goa; a spirituous liquor is also distilled from it. Fruits are used for making preserves, squashes and jellies. The juice of the unripe fruit is used for preparing vinegar. The vinegar from the fruit is tonic, astringent, carminative, useful in diseases of the spleen. A decoction of the fruit is equally useful, a mixture of its juice and mango juice, in equal parts, is a very effective drink for quenching thirst in diabetes; the ripe fruit is very effectively used as antiscorbutic.

Glucose and fructose are the principle sugars in the ripe fruit; not even a trace of sucrose was detected. Malic acid is a major acid (0.59 % of the wt. of the fruit), a small quantity of oxalic acid is reported to be present. Gallic acid and tannins account for the astringency of the fruit.

Seed contains a glucoside jamboline, a new phenolic substance, a trace of pale yellow essential oil, chlorophyll, fat, resin, gallic acid etc. The phenolic substance isolated
from jambul seeds, which has also been detected in Chinese rhubarb has since been identified as euagic acid. The seed, or stone of the fruit, has acquired some reputation as a remedy in diabetes, and is believed to check the diastasic conversion of starch into sugar in that form of disease depending on increased production of glucose, but although many favourable reports as to its use have been published. A careful research by Mr. T. Stephenson, F.C.S. into the comparative medicinal value of oil and fresh seeds and of the kernel and pericarp and into the various processes for the production of medicinal preparations, has led to the conclusion that only fresh seeds, freed from the pericarp, should be used and that heat should be avoided in their extraction.

The seed is astringent, diuretic; stops urinary discharges (ynani). The powder of the dried seeds is prescribed in five to ten grain doses in diarrhoea and dysentry; this powder is also given with an equal quantity of mango seed powder mixed with curds for these diseases and for enlargement of the spleen, scanty or suppressed urine.

The bark is acid, and sweet; digestive astringent to the bowels, anthelmintic; good for sore throat, bronchitis, asthma, thirst biliousness, dysentry, blood impurities, ulcers.
The bark extract is reported to have an effect on glycojenolysis and glycogen storage in animals. The bark is astringent, and used alone or in combination with other astringents like cardamon and cinnamon, is used in decoction in cases of chronic diarrhoea and dysentry and as a gargle in sore-throat, spongy germs, etc. The fresh juice of the bark is given with goat's milk in the diarrhoea of children.

In Las Bela, the bark, reduced the ashes and mixed with oil, is used for burns. The bark, in doses of five to ten grains, mixed with curds in given for the treatment of menorrhagia. A paste made with water is locally used over inflamed and painful parts.

The leaves are astringent; the juice of the leaves, used alone or in combination with other astringents, is a useful remedy in dysentery with bloody discharges; the juice of tender leaves mixed with goat's milk, with or without aromatics, is useful for diarrhoea of children. The ash of the leaves is used for strengthening the teeth and the gums.

Analysis of leaves gave the following values; crude protein, 9.1; ether ext. 4.3; crude fiber, 17.0; ash, 6.0; Ca, 1.3; P, 0.19; and tannins, 6.6% steam distillation of
leaves gave an essential oil with an pleasant odours, not unlike that of unripe mangoes. The yield and physical characteristics of the oil vary according to the season of collection. The oil contain terpenes, limonene and dipentene, 20; sesquiterpenes of cadalane type, 40; sesquiterpene axrene type, 10% or less.

Extracts of the bark, stems, leaves, buds and flowers possess moderate antibiotic activity against Micrococcus Pyogenes var. aureus. An extraction of the leaves also showed moderate activity against Escherichia coli. Extracts of bark and seeds and also leaves are used in diabetes.
4. **Alpinia Galanga Willd** (Greater galangal OR Java galangal):

Alpinia galanga belongs to the family Zingiberaceae.

The plant is 5 - 7 ' high, Rootstock perennial, tuberous, slightly aromatic. Leaves 23-45 by 3.8 - 11.5 cm., oblong-lanceolate, acute, glabrous, green above, paler beneath, with slightly callous white margins; sheaths long, glabrous, ligule reaching 10 mm. long, but usually shorter, rounded. Flowers greenish white, in dense flowered panicles 15 - 30 cm. long; branches short; rhachais, pubescent; pedicels 3 - 4 mm. long, bracts 10 mm long ovate-lanceolate. Calyx 10 mm. long, tubular irregularly 3-toothed corolla 3 - 2 cm. long, tube 13 mm. long; lobes oblong, obtuse, subequal 6 mm. broad. stamen 2 cm. long. Fruit the size of a small cherry, orange red.

This plant is found in East Bengal and south India. It is a native of Sumatra and Java but is now completely naturalised in many parts of India. The plant has a reputation in the indigenous system of medicine and is fairly largely used in southern India.

The rhizome is pungent, bitter, heating, stomachic; improves appetite, taste, and voice; useful in 'Vata' bronchitis, and disease of the heart. From the green rhizomes, a pale yellow oil with a pleasant odour can be obtained on
distillation. This oil contain 48 % of methyl cinnamate, 20 to 30 % of cineole, camphor and proba. $\alpha$-pinene. As a volatile oil is one of the important constituents of the drug, suggestions have been made to try it for the same purposes as the other volatile oils, e.g. as a carminative.

Hakims use the rhizome in impotence, bronchitis, and dyspepsia. It is disinfectant, used to destroy bad smell in the mouth or any other part of the body. It is also advocated in diabetes mellitus. The rhizomes of this species are aromatic pungent, and bitter and are used in the form of an infusion in fever, rheumatism and catarrhal affections. As a drug they are supposed to improve the voice. The rhizome is hot and stimulating; used in mesalihs, has a sweet scent; is put into bazar spirits to make it more intoxicating. This habit of flavouring spirits with galenjal also prevails in Russia.

In Mysore, the rhizome is a domestic medicine, much used by old people with bronchial catarrh. The rhizome is also used internally for poisoning. The rhizome is given in doses of five to ten grains; it is generally prescribed in combination with liquorice and long pepper in bronchitis and as an stomachic tonic; a decoction of the rhizome is beneficial in bronchial catarrh with beneficial effect (Koman).
Intravenous injections of small doses of a tincture or an infusion of *A. galanga*, produce a sharp fall in blood pressure in experimental animals. The blood pressure, however, comes to normal in short time. The fall in blood pressure is accompanied by a rise in the volume of the intraabdominal organs like the spleen and the intestines showing that dilation of the splanchnic blood vessels is one of the causes of the fall of blood pressure. The contractions of the both auricles and the ventricles are lessened showing that the drug has a depressant action on the heart. The drug is a depressant to the cardio-vascular system.

Asthma like conditions produced artificially in animals by administering pilocarpine are immediately relieved by small doses of the tincture of *A. galanga*. The drug has no marked action on the other systems of body. The secretion of urine is slightly diminished but this effect appears to be vascular for the rate of secretion comes to normal as soon as the blood pressure comes to normal. The action on the gastro-intestinal tract is similar to that produced by other essential oils.

Yajolu found that administration of a paste of *A. galanga* in honey lessened the paroxysms of cough in children suffering from whooping cough. He also found that in young children suffering from bronchitis administration of this drug relieved the
distressing symptoms and also had a favourable action on the
temperature of the patients. The antispasmodic action of the
drug may also prove useful in conditions like asthma. It has
3ot advantage of having a very pleasant odour and thus may be
used in cough and digestive mixtures. It has been suggested that
it may be useful in intestinal and biliary colic.

The seeds are calefacient alterative, stoachic, stomachic;
they are useful in diarrhoea and vomiting. In China, tubers
and seeds are used as a fragrant adjunct to complex prescriptions.

The tubers, which are faintly cromatic, pungent, and
somewhat bitter are the larger galangal of the shops and are
used as a substitute for ginger. They are given in infusion in
fevers, rheumatism, and catarrhal affections.

Small quantities of greater galangal used to be
exported from India. But there has been no export since 1937 –
1938.
5. **Momordica Charantia Linn.** (Bitter gourd):

*Momordica Charantia* belongs to the family Cucurbitaceae.

Annual; stem longed, much-branched, angled and grooved, more or less pubescent or hairy; young parts hairy or villous. Tendrils simple, slender, elongate, pubescent. Leaves almost orbicular in outline, 5 - 12.5 cm. diam., pubescent or subglandular on both sides, cordate at the base, deeply divided into 5 - 7 lobes, the lobe acute or subacute, apiculate, coarsely spinousdentate, constricted at the base, the sinus between them narrow, rounded, petioles 2.5 - 5 cm. long, channelled, pubescent. Flowers monoecious. Male flowers solitary; peduncles 5 - 10 cm long, glabrous or pubescent, furnished with a large reniform or orbicular bract at or below the middle. Calyx 6-10 mm. long pubescent, lobes 5 - 6 mm. long, elliptic, subacute. Corolla somewhat irregular, lemon yellow, segments obtuse or emarginate. 1.6 - 2 mm. long veined. Female flowers; Peduncles 5 - 10 cm. long slender, bracteate usually at or near the base. Staminodes 3, glanduliform. Ovary fasiform, muricate; stigmas 3, bifid. Fruit bright orange coloured, 5 - 15 cm. long, pendulous, fusiform, usually pointed or beaked, ribbed, and bearing numerous triangular tubercles giving in the appearance of a crocodile's back 3-valved at the apex when mature. Seeds 8 - 13 mm. long, compressed, corrugate on the margin, sculptured on both faces.
The plant is cultivated throughout India as a vegetable crop, also in Malaya, China, tropical Africa and in America. Two types are grown in North India, the hot season or Jethuya and the rainy season or Baramasiya; the latter bears fruit nearly throughout of the year.

Fruit is wholesome but very bitter and has to be steeped in salt water, then will boiled and squeezed and therefore the removal of the upper skin, as also scraping away ridges and tubercles where bitterness is concentrated. The fruit is very bitter, carminative, tonic stomachic, aphrodisiac, anthelmintic; astringent to the bowels, but laxative for piethroic constitutions; lessens expectoration, used in syphilis, rheumatism troubles of the spleen, opthalmia. Fruit is useful in gout, rheumatism, and sub-acute cases of the spleen and liver. It is suppose to purify blood and dissipate melancholia and gross humours. Fruit and leaves are both administered internally in leprosy, piles, jaundice, and as an anthelmintic. The express juice of the fruit mixed with chalk or sugar is used in aphthae and dysmenorrhea and as a dressing over burns, boils, eruptions, etc.

The fruit is much valued as a stomachic by the Mundas of Chota Nagpur. In China, the fruit is regarded as tonic, and cooling; but it is a drastic purgative when ripe. In Guiana, the
ripe fruit deprived of its seeds is macerated in sweet almond oil and used as a vulnerary.

The juice of the fruit is recommended in snake-bite but whether given internally or applied externally it is equally useless.

The leaves contain a bitter substance, momordicin, resins, two resin acids etc. In the Konkan, 1/3 of the pound of the juice of the leaves is given in bilious affections, as an emetic and purgative, alone or combined with aromatics; the juice is rubbed in burning of the soles of feet, and with black pepper is rubbed round the orbit, as a cure for nightblindness. It is used internally as a laxative and as an ointment for sores. The juice of the fresh leaves acts as a mild purgative and is prescribed for children. An infusion of the leaves is taken for contusions. The pounded leaves mixed with some fatty material are made into an ointment useful in scabies and other skin diseases. In Cambodia, the leaves are considered antipyretic, they are given in delirium. The leaves are crushed and steeped in water which is then given internally as a remedy for diarrhoea and dysentery. Externally the leaves are used on a galactagogue.

In India, the roots stated to be used successfully for procuring abortion. A case wherein abortion was produced at the
between wai and Panchgani, Plentiful, Belgaum, Ahmedabad. Throughout India on walls, rocky and stone places ascending to 7000 ft. in the Himalayas. A small genus of herbs found in the region extending from Spain and North west Africa to Afghanistan. Two species have been recorded in India.

This plant is highly valued as a remedy for diabetes (Murry).
CHEMICAL CONSTITUTION:

As dry samples of the medicinal plants were selected, the moisture content was not determined. The protein contains in addition to true protein, other nitrogenous substances, such as amino acids and alkaloids; as the alkaloidal content of some of the medicinal plants is known to be high; the alkaloids were extracted, nitrogen was estimated and was subtracted from protein nitrogen; the fat is not merely a mixture of glycerides, but contain sterols, lecithins, and other substances of similar solubility, the fiber is partly cellulose and partly lignified or suberized substances; the ash is a mixture of common inorganic elements and may contain traces of an indefinite number of rare elements. This can be disclosed by exacting chemical and spectroscopic methods; and finally nitrogen free extract represents, in addition to the carbohydrates other than cellulose, and organic acids, the resultant of all the errors of the determination of all the other constituents.

MOISTURE:

Food and food products may contain water in different forms. The most common form is free or absorbed water. Many products also contain adsorbed or bound water. Water of crystallization and mechanically occluded water may also be present in some materials.
In cereals, dry legumes flour and meal the amount of water usually ranges from 10 - 15 %. In the edible portions of fruits and vegetables it may reach to 95 %, but in starchy vegetables such as potatoes and fresh-shelled beans, it is commonly only 70 to 80 %. Milk contains on average of 87 %, lean meat and fish muscle 50 to 70 % and open oysters 70 to 90 % fresh basis.

Most of the methods for the estimations of water in foods depend on the loss in weight on heating. Some of the widely used methods are: Oven-drying method\textsuperscript{11}, Hydro\textsubscript{2} drying method\textsuperscript{11}, Spencer vacuum drying method\textsuperscript{11}, Toluene distillation method\textsuperscript{14}, Fischer titration method\textsuperscript{15-16}, Nuclear Magnetic Resonance method\textsuperscript{17}.

**FAT:**

Fats and fatty oils are widely distributed in the vegetable kingdom occurring both in the vegetative and reproductive structures, it being highly probable that all living cells contain a certain amount of fatty materials. High percentage of fat is usually associated with complete absence of starch, with exception for example seed, leaf, bark, root, peanut and cocoa bean.

Kernels of nuts, such as almonds, walnuts, and Brazil nuts contain as high as 70 % of fat; the soyabean, a starch free...
legume contains up to 20%, but starchy legumes such as beans and peas, contain less than 3%. Maize kernels contain up to 9% and wheat up to 4% of fat. The amount of fat in milk on an average is 4.25%. In whole hen’s eggs 10-15%, and egg yolk 33.3%. Meat contains an extremely variable amount from less than 1 to over 95%.

Generally fat content is estimated by Soxhlet extractor using solvents such as chloroform, carbon tetrachloride, carbon bisulphide, and neptha; but most widely used solvents are anhydrous ethyl ether and petroleum ether (40-60°C).

ASH:

The amount of ash remaining after the combustion of plant material varies considerably according to the part of plant.

Root and leafy vegetables and the pulp of the fruits, although low in ash content on the fresh basis, when calculated to the dry substance may show a higher percentage than whole seeds. Parts of seeds, however show a wider range, for example wheat grain seldom contains as high as 3.5% ash; but the bran may contain 8% and the germ 5%; on the other hand, patent flour may contain only 0.3% and commonly about 0.5%12.

Incineration in a muffle furnace is widely employed to determine the total ash of the food stuffs.
NITROGEN - PROTEIN:

The application of the importance of proteins in the history of scientific biochemistry, during first half of the nineteenth century.

The first systematic investigation of these nitrogen-containing materials was began during the 1830's by the Dutch chemist Gerardus Johnnes Mulder (1802-1880). While Mulder was investigating an organic substance appeared to be widely distributed in biological material, he received a letter from the great Swedish chemist Berzelius who suggested the term to him\(^{18-19}\). Liebig\(^{20}\), a few years later investigated the composition of several plant and animal proteins.

The term 'protein' is derived from the Greek work 'Proteious' which means 'primary or holding first place'. They are present in the cytoplasm as well as the cell membrane of all cell without exception. Mammalian muscle contains about 20% protein, blood plasma 7%, cow's milk 3.5%. The vegetables richest in proteins are the legumin-beans, peas and lentils. Leafy fruit and flower vegetables and tubers are of no value as source of protein. Hence lettuce contain about 1.2%, asparagus 1.8%, cabbage 1.6%, cereals 8-15%, and oil seeds as high as 50%. Cheese contain 25% protein. Lean meat and fish muscle about 20% all on the fresh basis\(^{12}\).
The protein, or more correctly the crude protein, of foods is calculated from the total nitrogen, best determined by the Kjeldahl's method, by either the general factor 6.25 or a special factor such as 6.38 for milk and milk products and 5.70 for wheat flour and its products. High protein is usually associated in oils seeds with high oil content, medium protein in cereals and various seeds with high starch content, and low protein in sugar beets and certain fruits with relatively high sugar content.

CARBOHYDRATES:

All living organisms ultimately derive their energy from the sun. Man can utilize certain but not all the carbohydrates produced by plants. Carbohydrates notably from cereal grains, represent the primary source of energy for the world's population. The low carbohydrate diet of the Eskimos and the high-carbohydrate diets of many oriental peoples indicate that man can be healthy with wide variations in carbohydrate intake.

Carbohydrate foods constitute a large proportion of the human dietary. Carbohydrates occur in plants in the sap; in fruits; as storage reserves in seeds, roots, and tubers, and as constituents of the structural tissues. They are also found in the milk of mammals and to some extent, as a storage reserve in
animals. These naturally occurring carbohydrates are either sugars or non-sugars.

The carbohydrate contents of food varies considerably. Cereals contain 79 - 25 %, pulses and legumes 61-21 %, leafy vegetables 57.8 - 1.4 %, roots and tubers 50 - 1.7 %, other vegetables 68.9 - 1.9 %, nuts and oil seeds 33 %, condiments and spices 69.4 - 3.0 % and fruits 76.9 - 0.8 %

The methods devised for carbohydrate determination are legion; they include gravimetric, colorimetric and titrimetric procedures. Only a few are stoichioimetric.

Probably most useful for general research work is the alkaline copper method developed over many years by Shaffer, Hartmann, and Somogyi for sugars. Other methods such as phenol-sulphuric acid colorimetric method and Anthrone colorimetric method are also used for the determination of sugars.

**ALKALOID**

From ancient times man has utilised alkaloids as medicines, poisons, and magical potions. The term alkaloid or 'alkali like' was first proposed by the Pharmacist, W.Meissner in 1819. It is usually applied to basic, nitrogen containing
compounds of plant origin. The alkaloids are not widely distributed in the vegetable kingdom; they are derived mainly from the angiosperms, the seed bearing or flowering plants. Alkaloids may occur in solution in the young parenchymatous tissue. The alkaloids are not free in the plant but are combined with some acid, in the form of a salt. In certain cases a specific acid is found associated with alkaloids derived from a definite source, such as quinolic acid in the cinchona group, aconitic acid in theaconites and meconic acid in the opium group.

The separation of mixtures of alkaloid so obtained can be a very tedious task, but may be accomplished by fractional precipitation, partition chromatography on columns, or by the counter current extraction. Alkaloids as a class have interested organic chemists partly on account of their physiological action on the animal organism and partly on account of the complex structure and synthetical puzzles that they pose.

Biozgenesis of alkaloids is that of Pictet\textsuperscript{30-32}, who suggested that alkaloids are waste products and are produced in plants in two successive stages involving (a) disruption of complex nitrogenous substances such as protein or chlorophyll with production of relatively simple fragments, and (b) the recombination or condensation of the fragments with other substances present.
in the plant through secondary reaction such as methylation of hydroxy and imino groups by the intervention of formaldehyde.

**FIBRE:**

Fibre represents an indefinite sort of worthless material or roughage, bearing about the same relationship to nitrogen free extract as sawdust does to starch. Although fibre has no appreciable food value, it functions in the intestinal tract to give bulk to the contents and so stimulates intestinal peristaltic action. The cell-wall material left after boiling with dilute acid and alkali in the process is a mixture of cellulose, lignin and pentosans, together with sand, silica, mineral matter and a little nitrogenous matter. Since fiber is cell wall material no part of a natural vegetable substance is free from it. The amount ranges from less than 1% in some succulent fruits and vegetables to as high as 30% in cinnamon. The content in naked cereal grains seldom exceeds 3% and in wheat bran 11%. In white flour it may be as low as 0.06%. Nut shells and fruit stones free from kernels, contain as high as 60%.
DISCUSSION:

The indigenous systems of medicine in India has become extensive and heterogeneous and based mainly on the use of plants. It has been estimated that out of about 2000 crude drugs that have been used in curing human ailments in India, only about 200 are of mineral and animal origin. The rest are derived from vegetable and plant sources. This is not very large considering the vast area of our country, and the wide variety of plant wealth occurring there. The great range of temperature (about 49°C to -43°C), rainfall (from 100 mm to over 10000 mm) and altitude (Sea-level to over 6000 mm). In India account for the occurrence of over 15000 species of higher plants in India.

Eight medicinal plants which are mainly used in the treatment of Diabetes mellitus were studied for proximate analysis such as moisture, fat, ash, protein, carbohydrate, alkaloids etc. Presently a number of institutions in India are actively engaged in research on medicinal plants and good deal of information is being accumulated.

The following medicinal plants were selected for the proximate analysis.
### MEDICINAL PLANTS:

<table>
<thead>
<tr>
<th>No.</th>
<th>BOTANICAL NAME</th>
<th>ENGLISH NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cassia Sophora Linn.</td>
<td>Senna Sophora</td>
</tr>
<tr>
<td>2.</td>
<td>Emblica Officinalis Gaertn. Syn.</td>
<td>Indian gooseberry</td>
</tr>
<tr>
<td>3.</td>
<td>Eugenia Jambolana Lam. OR Syzygium Cumini(Jinn) Skeel Syn.</td>
<td>Black plum OR Indian blackberry</td>
</tr>
<tr>
<td>4.</td>
<td>Alpinia Galanga Willd.</td>
<td>Greater galangal OR Java galangal</td>
</tr>
<tr>
<td>5.</td>
<td>Momordica Charantia Linn.</td>
<td>Bitter gourd</td>
</tr>
<tr>
<td>8.</td>
<td>Kickxia Ramossima Wall. OR Linaria Ramosissima Wall.</td>
<td>Toad flax</td>
</tr>
</tbody>
</table>

Dietary control is an integral part of management for the Diabetic. The Diet should always provide the essentials for good nutrition and adjustments must be made from time to time for changing metabolic needs. Protein is good for the health of diabetes because: It supplies essential aminoacids.
needed for tissue repair, protein does not raise the blood sugar during absorption as do carbohydrate and does not supply as many as fats. For the diabetic individual a level of 100 gm carbohydrate will prevent diabetes. For the majority of diabetes, 45 to 60% of carbohydrate and 30 to 35% of the fat is recommended. Trowell has postulated that fibre deficient diets may be involved in the etiology of diabetes mellitus.

Systematic investigation of drugs used in indigenous medicine in India on modern scientific lines was started more than thirty years ago. A number of Important medicinal plants prescribed by 'Kavirajas' and 'Hakims' have been investigated. The constituents have been examined, pharmacological action of the active principles worked out by animal experimentation, and preparations made from the drugs have been tasted on patients in hospitals. It is only by a thorough enquiry that the merits of these drugs can be proved and a demand created for them not only in India but also in other parts of the world.

The data represented here in the studies give useful information regarding the quantity of proteins and other nutrients in the eight medicinal plants selected for the present investigation. The results of the analysis are shown in Tables I & II.
Tsukamoto and Ohtachi\textsuperscript{34} examined that the Cassia bark contain 0.15 \% oil, 40 \% of volatile oil and Methyl Cinnamaldehyde. Fairbairn and Saleh\textsuperscript{35} extracted glycoside and anthracene derivative from Senna species by absolute ethanol and methanol. Senna leaf contains 10-15 \% of the glycosidal and 2.5 \% of the total in the pod. Chipault et al\textsuperscript{36} reported that Cassia species contain antioxidants properties. Tiwari and Misra\textsuperscript{37} carried out the chemical examination of the flowers of Cassia Sophora Linn. Several workers\textsuperscript{38-39} carried \( \alpha - \beta - \), and \( \gamma \) sitosterols and anthraquinone derivatives.

From the results of analysis presented in Table I & II, it can be seen that Cassia Sophora seeds contain moisture, 7.66; fat, 7.50; ash, 5.00; protein, 17.56; carbohydrate, 11.87, and fibre 49.50 \%.

Rajarama and Siddiqui\textsuperscript{40} conducted pharmacological studies from ethanolic extract of the fruit pulp of Emblica Officinalis and identified as ethyl gallate, it shows a mild depressant action on central nervous system and has spasmylytic activity. The seeds of Emblica Officinalis contained 26 \% fixed oil, 87\% mixed acid and sitosterol\textsuperscript{41}. Dhar et al\textsuperscript{42} have shown by means of paper chromatographic study that amla contains 13 separable tannins in addition to 3 to 4 colloidal complexes. Pillay and
Iyer\textsuperscript{43} reported in powder dry fruit pulp, fatty matter 6.0; Phyllembllic acid, 6.3 \%; a phenolic compound, emblicol (191-4\textdegree); ellagic acid and other products. Emblica Officinalis\textsuperscript{44} contained linolenic acid, 64.8; and resembled linseed oil closely. The fruit pulp contain: moisture, 81.2; protein, 0.5; fat, 0.1, carbohydrate, 14.1; fibre, 3.4 \% have been recorded\textsuperscript{45}. The edible portion of the fruit of Phyllanthus emblica\textsuperscript{46} contains moisture, 82.5; ash, 0.44; petroleum ether soluble matter, 0.2001; ether soluble, 0.7853; Chloroform soluble, 0.8895; abs. alc – soluble, 46.6075 matter; total proteins, 4.651; free reducing sugars, 1.967; and total hydrolyzable carbohydrate and glycosides, 0.377 \%. Phyllemblin\textsuperscript{47} was isolated from Emblica Officinalis was active against Staphylococcus aureus, E.Coli, Salmonella typhosa and Candida albicans. Khanna and Bansal\textsuperscript{48} isolated Phyllantidine and Phyllantine alkaloids from Emblica Officinalis leaves and fruits and were found to be 0.39 \%.

From the results of analysis of Emblica officinalis seed it contains moisture, 4.1; fat, 3.29; ash, 1.96; protein, 3.00; carbohydrate, 9.81 and fibre, 77.1 \%.

The Eugenia Jambolana seeds are fairly rich in protein. Kehar and Sahai\textsuperscript{49} analysed that the black plum (seed) contained crude protein, 8.5; ether extract, 1.18; nitrogen free extract,
51.70; ash, 21.72 and crude fibre, 16.90% Murti found
moisture, 83.7; protein, 0.7; fat 0.3; crude fibre, 0.9;
other carbohydrate, 14.0 and ash, 0.4% in fruits of Eugenia
Jambolana. Almedia and Volsecchi fermented the fruit of
Eugenia Jambolana contains protein, 1.00; fat, 0.38; reducing
sugar, 10.71; sucrose, 0.12; cellulose, 2.27; ash, 0.51%. Nair
and Subramanian reported that the three triterpenoid compounds
were obtained when Eugenia Jambolana flowers were extracted
with 95% ethanol. β-sitosterol, tannin, ellagic acid,
gallic acid (1-2%) are reported to be present in seeds of Eugenia
Jambolana. The pulp of fruit of Eugenia Jambolana
was also investigated for anthocyanins, serewy, mallic acid
and sugar by paper chromatography method and polarimetric
determination. The alkaloid Jambosine with molecular
formula C_{10}H_{15}N_{3}O_{3}, m.p. 77°C are extracted and was found to
be 0.65%.

From the results of analysis of Eugenia Jambolana
seeds it contains moisture 6.9; fat, 1.69; ash, 4.3; protein
5.12; carbohydrate, 2.75; and fibre, 78.59%.

Nigam and Radhakrishanan extracted 0.04% of oil,
Cineole 2.6%, Methylcinnamate 9.6% and sesquiterpenes from
the rhizomes of Alpinia Galanga. The anticycler agents were isolated from Alpinia Galanga seeds by several workers. Sastry extracted flavones such as alpinin (2.13%) and galangin (1.1%) from the rhizomes of Alpinia Galanga.

From the results of analysis of Alpinia Galanga rhizomes, it contains moisture, 5.1; fat, 1.31; ash, 3.02; protein, 1.68; carbohydrate, 12.31; alkaloid, 0.42; and fibre 76.16%.

Several workers have investigated the fatty acid composition of the oil from the seeds of Momordica Charantia by gas chromatography technique and was found to be Ω-eleostearic acid, 57.0; linoleic acid, 8.33; oleic acid, 12.21; stearic acid 17.00%. Sucrow extracted Charatin m.p. 266-8°C by alcohol from the dried fruits of Momordica charantia. Sucrow has studied the sterol glycoside and stigmastadien-3β-ol and its β-D-glucoside from the fruit of Momordica Charantia. Hikaru et al. have isolated two triterpene glucosides, momordicosides A & B from seeds of Momordica Charantia. Airan and Ghatge revealed that the seed cake of Momordica charantia extracted in the petroleum ether contained alkaloid, and protein fraction containing methionine and cystine. Airan and Ghatge reported that dried root of Momordica Charantia contains 12.45% ash of which 24.85% is acid insoluble and dried fruit contains
11.70% ash of which 12.00% is acid insoluble. Dhalla et al analysed the fruit of Momordica Charantia contains moisture, 90.40; total ash, 7.31; acid insoluble ash, 0.97; total alkaloids, 0.03; free acids, 8.11; mucilage, 6.25%. Rivera isolated momordicine alkaloid from the fruits of Momordica Charantia.

From the results of analysis of Momordica Charantia fruit it is reported that it contains moisture, 5.12; fat, 6.54; protein, 11.93; carbohydrate, 18.10; and fibre 43.69%.

Sharma et al. discovered two new rotenoids, villosal and villosinol, from the pods of Tephrosia villosa. David et al. also isolated villosin, villosone, villol and villinol rotenoids from Tephrosia villosa. Several workers isolated a new Phenylated flavanone, thephrinone by column chromatography from Tephrosia villosa. Rao and Srimannarayana have isolated a new coumestone, tephrosol from Tephrosia villosa roots and structure was detected by chemical and spectral analysis.

From the results of analysis of Tephrosia villosa leaves, it contains moisture, 4.68; fat, 6.04; ash, 6.06; protein, 11.78; carbohydrate, 10.55; and fibre 59.2%.
Gunasekera et al.\textsuperscript{78} investigated that the extraction of the bark and timber of four Madhuca Indica species yielded $\beta$-amyrin, $\beta$-amyrin acetate, $\beta$-amyrin cinnamate, $\beta$-amyrin deconate, $\beta$-amyrenone, betulinic acid, friedelin hederagenin, isocarborinol, ursolic acid, $\infty$-spinasterol and $\infty$-spinasterol-$\beta$-D-glucoside. Bhatnagar et al.\textsuperscript{79} isolated $\beta$-sitosterol, stigmastanol, n-hexacosanol, 3-$\beta$-caproyloleae-12 en-2801, olenic acid and palmitate from different extract of Mahuca Indica leaves. Quercitin, dihydroquercitin, penta methylquercitin, 3,7,3',4'-tetramethylquercitin flavonoids were assayed by Awasthi and Mitra\textsuperscript{80} in the nut cell of Madhuca. Thiagarajan and Srikantan\textsuperscript{81} studied the lubricating properties of Madhuca Indica oil and have the following characteristic: Iodine value 64.5; acid number 12.0; $d_{15}$ 0.9170; Saponification value, 195.3. Khan\textsuperscript{82} examined that Mahua oil contain 1.9% nitrogen. Dutta\textsuperscript{83} has studied the saponin hydrolyzate from the mahua oil cake by paper chromatography revealed the presence of glucose, arabinose, xylose, rhamnose; and pectin was absent. Bhargav and Singh\textsuperscript{84} reported that the oil secured from seeds of Bassia latifolia (41% yield) was found to contain 2.53% unsaponifiable material and two sterols. Hariharan et al.\textsuperscript{85} isolated two
saponins from the defatted seeds of Bassia latifolia, and their structures determined according to NMR and chemical degradation studies. Wehmer\textsuperscript{86} shown the composition of Madhuca indica seeds and it contains moisture, 5-12; protein, 8.0; fatty oil, 51.1; nitrogen free extr., 27.9; fibre, 10.3; and ash, 2.7\%. Sutaria and Magar\textsuperscript{87} carried out systematic chemical constituents of Madhuca Indica flowers and showed that it contains moisture, 21.6; fat, 1.3; total nitrogen content, 0.79; non-protein nitrogen, 0.18; crude protein, 4.94; total sugar, 89.7; reducing sugar, 66.2; invert sugar, 23.5; fructose, 15.3; pentoses, 3.3; and ash, 2.5\%.

From the results of analysis of Madhuca Indica bark, it contains moisture, 5.99; fat, 6.0; ash, 9.07; protein, 1.56; alkaloids, 1.06; carbohydrate, 11.25; and fibre, 65.07\%.

Kavimova\textsuperscript{88} investigated the biological active glucoside and tannins in the leaves of Kickxia Ramosissima by paper chromatography.

From the results of analysis of Kickxia Ramosissima plant it is reported that it contains moisture, 2.0; fat, 3.22; ash, 8.60; protein, 5.68; carbohydrate, 5.5; alkaloid, 1.29, and fibre, 73.71\%.
In the present study, the total nitrogen content was estimated by semi-micro Kjeldahl's method, it consists of protein alkaloids, etc. It is highly probable that the alkaloids nitrogen some of medicinal plants were tested for alkaloids by alkaloidal reagents.

The results of the proximate analysis are presented in Table I & II. From the results it can be concluded that Cassia Sophora contain the highest fat content, whereas Alpinia Galanga the lowest. Ash is present in maximum amounts in Momordica Charantia. Cassia Sophora surpasses all the other medicinal plants in protein content. Momordica Charantia contains the maximum carbohydrate, while Eugenia Jambolana minimum. Among the other plants Emblica officinalis possesses the highest amount of alkaloid.
**TABLE I**

**PROXIMATE ANALYSIS OF MEDICINAL PLANTS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Medicinal Plant (English name)</th>
<th>moisture</th>
<th>Fat</th>
<th>Ash</th>
<th>Proteins</th>
<th>Carbohydrates</th>
<th>Alkaloids</th>
<th>Starch/Fibre etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cassia Sophora Linn. (Senna Sophora)</td>
<td>7.66</td>
<td>7.50</td>
<td>5.00</td>
<td>17.56</td>
<td>11.87</td>
<td>0.91</td>
<td>49.50</td>
</tr>
<tr>
<td>2.</td>
<td>Emblica Officinalis Gaerth. Syn. (Indian gooseberry)</td>
<td>4.10</td>
<td>3.29</td>
<td>1.96</td>
<td>3.00</td>
<td>9.81</td>
<td>0.74</td>
<td>77.10</td>
</tr>
<tr>
<td>3.</td>
<td>Eugenia Jambolana Lam. OR Syzygium Cumini (Linn) Skeels Syn. (Black plum or Indian blackberry)</td>
<td>6.90</td>
<td>1.69</td>
<td>4.30</td>
<td>5.12</td>
<td>2.75</td>
<td>0.65</td>
<td>78.59</td>
</tr>
<tr>
<td>4.</td>
<td>Alpinia Galanga Willd. (Greater galangal OR Java galangal)</td>
<td>5.10</td>
<td>1.31</td>
<td>3.02</td>
<td>1.68</td>
<td>12.31</td>
<td>0.42</td>
<td>76.16</td>
</tr>
<tr>
<td>5.</td>
<td>Momordica Charantia Linn. (Bitter gourd)</td>
<td>5.12</td>
<td>6.54</td>
<td>14.10</td>
<td>11.93</td>
<td>18.10</td>
<td>0.52</td>
<td>43.69</td>
</tr>
<tr>
<td>8.</td>
<td>Kickxia Ramossimma Wall. OR Lineria Ramossimma Wall. (Toad flax)</td>
<td>2.00</td>
<td>3.22</td>
<td>8.60</td>
<td>5.68</td>
<td>5.50</td>
<td>1.29</td>
<td>73.71</td>
</tr>
<tr>
<td>No.</td>
<td>Name of Medicinal plant (English name)</td>
<td>Alkaloids/Active Principles</td>
<td>Amount in percent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------</td>
<td>----------------------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Emblica Officinalis Gaertn. Syn. (Indian gooseberry)</td>
<td>Phyllantine</td>
<td>0.050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phyllantidine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Eugenia Jambolana Lam. OR Syzygium Cumini (Linn) Skeels Syn. (Black plum OR Indian blackberry)</td>
<td>1-epicatechin</td>
<td>0.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Alpinia Galanga Willd. (Greater galangal OR Java galangal)</td>
<td>Galangin</td>
<td>0.900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Momordica Charantia Linn. (Bitter gourd)</td>
<td>Momordicine</td>
<td>0.032</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Tephrosia Villosa Pers. Syn. (Purple Tephrosia)</td>
<td>Rutin</td>
<td>0.250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Kickxia Ramosissima Wall. OR Linaria Ramosissima Wall. (Toad flax)</td>
<td>Arinoglycoride</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CASSIA SOPHERA LINN

SENN A SOPHERA
EMBLICA OFFICINALIS GAERTN. SYN.

INDIAN GOSEBERRY
EUGENIA JAMBOLANA LAM.

BLACK PLUM
ALPINIA GALANGA WILDD.

GREATER GALANGAL
MOMORDICA CHARANTIA LINN.

BITTER GOULD
TEPHROSI A VILLOSA PERS. SYN.

PURPLE TEPHROSIA
MADHUCA INDICA J.F. Gmel. SYN.

INDIAN BUTTER TREE
KICKXIA RAMOSISSINA WALL.

TOAD FLAX
STANDARD GRAPH FOR CARBOHYDRATE ESTIMATION

OPTICAL DENSITY AT 560 mµ

CONCENTRATION OF GLUCOSE IN µg
PHYLLANTIDINE

PHYLLANTHINE

GALANGIN

L-EPICATECHIN

RUTIN
EXPERIMENTAL

PROXIMATE ANALYSIS OF SOME MEDICINAL PLANTS:

The proximate analysis of the following medicinal plants was carried out on the basis of their chemical constitution such as moisture, fat, ash, nitrogen-protein, carbohydrates, alkaloids, starch-fibre etc.

MEDICINAL PLANTS:

<table>
<thead>
<tr>
<th>No.</th>
<th>BOTANICAL NAME</th>
<th>ENGLISH NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cassia Sophora Linn.</td>
<td>Senna sophera</td>
</tr>
<tr>
<td>2.</td>
<td>Emblica officinals Gaertn. Syn.</td>
<td>Indian gooseberry</td>
</tr>
<tr>
<td>3.</td>
<td>Eugenia Jambolana Lam. Syzygium Cumini(L) Skeels syn.</td>
<td>Black Plum or Indian Black berry</td>
</tr>
<tr>
<td>4.</td>
<td>Alpinia Galanga Willd.</td>
<td>Greater galangal OR Java galangal</td>
</tr>
<tr>
<td>5.</td>
<td>Momordica Charantia Linn.</td>
<td>Bitter gourd</td>
</tr>
<tr>
<td>8.</td>
<td>Kickxia Ramosissima Wall. Linaria Ramosissima Wall.</td>
<td>Toad flax</td>
</tr>
</tbody>
</table>

These medicine plants, after identified by an expert Botanist, were collected from different regions. They were dried
throughly at room temperature, powdered and sieved through a 60-80 mesh sieve. The individual dried samples thus obtained were kept in air tight dried glass bottles at room temperature and used for chemical analyses. The results were calculated on the dry basis of the medicinal plants.

**MOISTURE**

In a 50 ml beaker (5.0 g.) of the medicinal plants were weighted and then placed in an air-oven at 105° C. After 5 to 6 hours the beaker was transferred to a desiccator. The beaker was weighted along with dried contents. It was again placed in the air-oven for one hour at 105° C, transferred to a desiccator and weighted again. This process was repeated till content in weight. From the loss in weight the amount of moisture per 100 gm. of the sample was calculated.

**FAT**

For the extraction of fat from the dried sample the soxhlet extractor was used.

Finally powdered dried sample (8 to 10.0 gm) of the plant material was weighted on a fat free paper and hanged tightly on the upper portion of the extraction chamber, gripped on its sides. The bottom flask was filled with petroleum either 40-60 C and refluxed on water bath by attaching a water condensor. The
process of extraction was continued for 2 to 3 hours till ether condensing at the upper portion became colourless. The flask was disconnected from the condensor and the thimble containing the fat free material. The ethereal extract containing fat after evaporation of ether was then weighd. The fat content was calculated in terms of gram per 100 gm. of plant material.

ASH:

In a Silica crucible finely powdered dried sample (5.0 gm) of the plants material was weighed, ignited in a muffle furnace at about 600° C for 4 to 5 hours untill a residual white ash was obtained. The crucible was cooled in a desiccator and weighed again. From the weight of the residual the amount of total ash per 100 gm. of the medicinal plants was calculated.

NITROGEN-PROTEIN CONTENT:

For the determination of the crude protein in the medicinal plant the total nitrogen was determined by the modification of semi-micro Kjeldahl's method.

In a semi-micro Kjeldahl's flask finely powdered dried sample (0.5 gm) of the medicinal plants, 1.0 g of the catalyst, mixture of copper sulphate, potassium sulphate and selenium dioxide (10:20:1) and 10 ml of concentrated sulfuric acid were taken. The contents were mixed and the flask was heated over a low flame
initially forthing stopped. The heating was then increased and
digestion was prolonged for about 4 - 6 hours till a clear solution
was obtained. It was then cooled, and contents and washings were
transferred into the Kjeldahl's distillation apparatus through the
funnel and set for distillation. Saturated sodium hydroxide (40%)
was added dropwise from connected funnel until the solution became
black. The liberated ammonia was absorbed in 100 ml of saturated
boric acid solution containing 2 to 3 drops of a mixed indicator,
prepared by mixing of 5 parts of 0.1% (W/V) alcoholic solution of
bromocresol green and 2 parts of 0.1% (W/V) alcoholic solution of
methyl red and diluting the mixture to 30 ml with 95% alcohol,
until it became green. It was then titrated against 0.04 hydro-
chloric acid solution until pink colour was obtained at the end
point. The percentage of nitrogen was calculated according to the
following formula:

\[
\text{Percentage of nitrogen} = \frac{100 \times 0.0014 \times N \times Y}{0.1 \times g}
\]

Where \( Y \) = Titration value in ml
\( g \) = Weight of the dried sample in gm.
\( N \) = Normality of hydrochloric acid solution

Crude protein content was calculated by multiplying
the percentage of nitrogen with 6.25.
CARBOHYDRATE ³

Finely powdered dried sample (0.4 gm) of the medicinal plants was dropped in 80% boiling ethanol and crushed thoroughly with sterilized sand to extract sugars. The solution was centrifuged. The supernatant was clarified with decoloursizing charcoal. The clear solution was hydrolysed with 1 N H₆O in a boiling water bath for 15 minutes. It was then neutralised with 1 N NaOH, cooled, made up to volume and analysed for total sugars.

To 1 - 5 ml of sugar solution an equal volume of low-alkalinity copper reagent was added. Samples, blanks, and standard sugar solutions were heated 10 minutes in a vigorously boiling water bath and then cooled. 1 - 2 ml of arsenomolybdate reagent was then added. When all the cuprous oxide was dissolved after mixing the solution was diluted to 10 ml mark on the colorimeteric tube and then allowed to stand 15 minutes but not more than 40 minutes. Then, absorbance were read at 560 mp on MK(105) systronic made spectrophotometer. The average absorbance of the blank was subtracted from the average absorbance of the samples; then the sugar content was computed from a curve previously established with standard sugar solutions.
ISOLATION OF EMBLICA OFFICINALIS ALKALOID:

The dried sample (50.0 gm) was treated with ammonium hydroxide (28%), ethanol (25%) and ethyl ether for 12 hours and was extracted in chloroform in soxhlet apparatus for 24 hours. PH was adjusted to 3 and it was later extracted in chloroform. The extract was dried in vacuo, redissolved in chloroform and treated with 0.1 N HCl. The mixture was centrifuged and the precipitate (alkaloidal content) collected and dried in vacuo.

The alkaloidal content was separately dissolved in chloroform and applied on whatman No.1 Paper strips along with the reference compounds (Phyllantine, Phyllantidine). Strips were developed for 12 hours by descending chromatography in an organic solvent mixture of n-butanol: acetic acid: water (50:3:25). Developed strips were air dried, sprayed with Dragendorff’s reagent and heated at 100°C for 10 minutes. Two dragendorff’s positive spots (Rf 0.20; 0.86) coinciding with those of the reference compounds phyllantidine and phyllantine respectively were observed. From the weight of residue the percentage of two total alkaloid were than calculated.

ISOLATION OF ACTIVE PRINCIPLE FROM EUGENIA JAMBOLANA:

Eugenia Jambolana seed powder (2.0 gm) was extracted with 20 ml acetone by maceration for overnight. The extract was filtered, and residue was re-extracted with more, approx. 5 ml of
acetone for an hour and again filtered. The two extracts were mixed, and evaporated of to 5 ml. 20 μl of extract was spotted on a Silica gel layer (20 x 20 cm²), along with 10 μl solution of 1-epicatechin reference standard, used in a concentration of 1 mg/ml freshly prepared solution. Chromatogram was developed in the system Benzen : Ethylacetate : Methanol : Water (20:20:20:0.5) to the height of about 10 cm, and sprayed with 1% vanillin hydrochloric acid reagent. The percentage of 1-epicatechin was calculated.

**ISOLATION OF ACTIVE PRINCIPLE FROM ALPINIA GALANGA**

The dry sample (20.0 gm) was digested with 90% alcohol and filtered. The tincture of Glanga root in alcohol was distilled, a honey thick substance was obtained. It was extracted with ether until the ether extract became colourless. The ether was evaporated and the residue was then extracted with boiling alcohol. The alcohol extracts were concentrated and treated with excess of ether. The clear ether alcohol solution was shaken successively with 20% aqueous sodium carbonate solution. Acidification of the carbonate extract gave a brown solid which was crystallised from ether. It was found to be galangin (M.P. 214 - 215°C). The percentage of galangin was calculated.
ISOLATION OF TOTAL ALKALOID IN MOMORDICA CHARANTIA:

The dried sample (50.0 gm) was extracted in absolute alcohol. The colour of the extract was yellow and it yielded 0.730% total solids. The total solid was dissolved in ammonia. It was acidified with acetic acid and the weight of precipitate calculated as phlobaphene. The yellow filtrate was alkanilized, extracted with chloroform and chloroform residue dissolved in 2% sulfuric acid. The total alkaloidal contents were subjected to paper chromatography using a mixture of n-butanol:acetic acid: water (4:1:5) as solvent. On spraying the chromatogram with Dragendorff's reagent it showed the presence of one band having Rf value 0.98. The amount of the crude alkaloid has been found to be 0.032%.

ISOLATION OF ACTIVE PRINCIPLE AND ALKALOID FROM TEPHROSIA VILLOSA:

The leaves (20.0 gm) were collected locally and extracted exhaustively with Pet. ether (60-80) and then with ethanol. After the separation of acidic and basic fractions, the ethanolic extract was concentrated and crystallized to yield Rutin (M.P. 192°C, yield 0.250%), identified by chemical and structural degradation. The basic fraction was chromatographed over alumina to yield crystals (M.P. 157°C) which give a positive reaction with Dragendorff's reagent.
ISOLATION OF ACTIVE PRINCIPLE FROM KICKXIA RAMOSISSIMA WALL:

Kickxia Ramosissima whole plant excluding the root was extracted with hot water for several times. The water was evaporated and residue was extracted with various organic solvents, the total mixed solvent was evaporated and the amorphous residue was crystallised having a fairly constant m.p. of 240° C ± 4° C.

STARCH-FIBER etc:

After determination of percentage of moisture, fat, ash, nitrogen-protein, alkaloids, carbohydrate, starch fibre etc. were calculated by difference.

The analytical data is recorded in Table I and II.