CHAPTER 1

INTRODUCTION
Since the primitive days of human existence man had always been dependent upon the plant not only for the daily needs but also for the treatment of illness as well. Very few of them have had the knowledge of medicinal plants but day by day the therapeutic importance of plants came into contingency. Fortunately India has been the land of almost all privileged medicinally potent plants.

Plants are unlimited source of natural products. The therapeutic use of plants for the treatment of human sufferings is known since the days of antiquity. There are more then 350 thousand species of higher plants out of which a small portion has been investigated for their biologically active constituents. There have been continuous reports on biologically active principles from plants.

The strength and dimension of scientific knowledge regarding medicinal profile of plants can be evidenced from literature Rigveda and Atharvaveda which are the oldest repositories of knowledge in Indian system of medicine. The two important texts of Ayurveda, Charak and Susruta describe the various medicinal preparation and their properties in detail obtained from plant sources.

In the 'Raja Bhoja' period (A.D. 980), 'Bhoja Prabhandha' a treatise describing various medicinal preparations is one of the richest source of plant based drugs. It contains descriptions of anaesthesia and details of various surgical operations. Well known medicinal use of "Sanjeevani" in Indian
mythology and use of chloroform in anaesthesia are described in 'Bhoja Prabhandha'.

Intermingling of medicinal use of plants in Indian system of medicine with those from Egypt, and Greece dates back to history. The great physician 'Dioscorides' describes the 'Dhatura' to be useful in asthma, Nux Vomica in paralysis and cro-ton as a purgative. The indiscriminate use of pesticides, industrial waste and toxic used in preventive measures has caused overall environmental pollution day by day which is one of the most global concerns related to human suffering. Diseases like cardiac arrest, mental disorder arthritis and geriatric are the most common concern among our civilization. A poor country like India having a vast portion of population living in unhygienic conditions is devoid of even primary health care centres. Furthermore, economic and infrastructure constraints prevent this facility to our vast unmanageable population which necessitates the use of herbal drugs which are more potent, low cost and free from any side effects which is in sharp contrast to synthetic drugs.

Tremendous advancement in the field of instrumental techniques coupled with sophistication of spectroscopic methods made it possible to isolate and elucidate the therapeutically active quintessence contained in plants. A number of natural products still continue to be important drugs even today of which well known are: Codeine (antitussive/analgesic), colchicine (antigout), physostigmine (cholinergic), atropine (anticholinergic), quinine, artemisinn (antimalarial), digitoxin, digoxin (cardiotonics) and morphine (analgesic).
Potentials of synthetic drugs dominated the field of synthetic chemistry since the earlier part of the 20th century and use of herbal drugs were mostly ignored. More recent scientific pursuits have explored a vast number of plant based active principle which is increasing day by day\textsuperscript{14}. Application of powerful analytical tools like chromatography, radioactive tracers, electrophoresis, IR, \textsuperscript{1}H-NMR, \textsuperscript{13}C-NMR, and mass spectroscopy has greatly widened the horizon of natural product chemists. Plant based natural products are now in routine use either directly or as a precursor for the synthesis of many synthetic drugs.\textsuperscript{5-8}

Flavonoids are phenolic pigments of plants which are wide spread natural products as secondary plant metabolite which have a broad spectrum of biological activities\textsuperscript{9}. Frequently reported mutagenic\textsuperscript{10} and less frequently reported antimitogenic\textsuperscript{11,12} activity of flavonoids are known for the last 55 years. Yoshinori Tsuchiya et.al.\textsuperscript{13} have isolated chrysosplenol B and chrysoplenol C which showed potent antiviral activity especially against rhinovirus. Two 3-methoxy flavones isolated from Rutaceae\textsuperscript{14}. Ternatin(1) and melternatin(2) were tested against DNA and RNA virus. Several flavonoids namely flavones, flavonones and flavonols were studied and were found to be active against leukemia virus, reverse transcriptase activity. As regards the action of flavonoids against HSV quercetin, procyanidine and petrgonidin were found to be virucidal\textsuperscript{15}.

Flavonoids are known to inhibit a number of enzymes such as phosphodiesterase\textsuperscript{16-18} Ca\textsuperscript{2+} AT pase\textsuperscript{19}, aldose reductase\textsuperscript{20,22}, lipoxygenase\textsuperscript{23-24} and cyclooxygenase\textsuperscript{25}. A broad spectrum of flavonoids namely Apigenin(3),
Luteolin(4), 3,4'-dihydroxyflavone(5), Eriodictyol(6), Taxifolin(7), Kaempferol(8), Quercetin(9), Myricetin(10), Morin(11) and Silychristin(12) showed a positive inhibitory behaviour against trypsin and leucine aminopeptidase\textsuperscript{26}.

Isoflavone genistein-7-glucoside (13) and genistein-C-monoglucoside isolated from Lupinus luctus\textsuperscript{27} are characterised as indogenous growth regulator of yellow lupin. A number of flavonoids were assayed for their larval inhibition\textsuperscript{28}. A group of 40 flavonoids were tested for their insecticidal activity against Heliothiszea and a number of them were found to be active\textsuperscript{29} as anti-inflammatory\textsuperscript{30}, crystostatic\textsuperscript{31}, cytotoxic\textsuperscript{32} in vivo anticancer\textsuperscript{33} and antiviral\textsuperscript{34} properties. The biological effect of flavonoids seems to occur mainly through their interaction with biomolecules like DNA\textsuperscript{35} and regulatory enzymes\textsuperscript{36-41}. The effect of flavonoids have been studied for clinical uses in hypertension, diabetes, rheumatic fever, arthritis and pregnancy\textsuperscript{42}.

Various flavonoids have previously been demonstrated to have anticarcinogenic activity\textsuperscript{43}. Some flavonoids have also been shown to inhibit tumor promotion. Quercetin inhibited tumor promoted by 12-O-tetradecanoyl-phorobol-13-acetate in a mouse skin promotion assay\textsuperscript{44}. Flavonoids may also influence the incidence of breast cancer by acting as antiestrogens\textsuperscript{45} or as aromatase inhibitors\textsuperscript{46}. A number of cytotoxic flavonoids (14-20) from roots of Mountinga calabura\textsuperscript{47} showed significant cytotoxic activity when tested against P. 338 cells. Anti-inflammatory activity of Taxifolin, Santin and ErmanIn has been reported in literature\textsuperscript{48,49}.

5,7,2',4'-Tetrahydroxy lavondulyl flavonone(21) isolated from Sophora exigua\textsuperscript{50} showed antibacterial activities against methicillin resistant
Staphylococcus aureus and its combination with antibiotics. Several flavonoids and phloroglucinols isolated from Hypericum brasiliensc\textsuperscript{51} possess antibacterial activity. 5,7,2'-Trihydroxy-6,6'-di methyl 6''-(4-methyl pent 3-enyl) pyrano (2'',3'',4',5') isoflavanone, 5,2',4'-trihydroxy 7-methoxy 6-methyl-8-(3-methylbut-2-enyl)-isoflavanone and 5,7,2',4'-tetra hydroxy 6-methyl 5'(3,7-dimethyl octa, 2,6-dienyl) isoflavanone isolated from Desmodium canum\textsuperscript{52} showed antimicrobial activity. Some flavonoidal glycoside and chalcone glycosides were isolated from clerodendrom plomidis\textsuperscript{53} which showed pronounced antifungal properties.

**SOME OF THE RECENTLY INVESTIGATED PHYSIOLOGICALLY IMPORTANT FLAVONOIDS ARE LISTED BELOW -**

(i) Antifungal activity of some naturally occurring flavonoids from Clerodendron plomides\textsuperscript{54}.

(ii) Antifertility effect of the flavonoids from Vitex negundo\textsuperscript{55}.

(iii) Antibacterial activity of flavonoid glycoside from the leaves of Rumex Chalepensis\textsuperscript{56}.

(iv) Antiinflammatory activities of flavonoids of Baphia nitida Lodd (Leg.) on mice & rat\textsuperscript{57}.

(v) Flavonoids with antitumor activity of phenol compounds of Artemisia Scoparia\textsuperscript{58}.

(vi) Antimutagenic effect of plant flavonoids in the Salmonella arsay system\textsuperscript{60}.

(vii) Flavonoids with antioxidative activity from Thymus vulgaris\textsuperscript{60}.

(viii) Plant antiviral active-flavonoids from Rutaceae family\textsuperscript{61}.
(ix) Flavonoids with antioestrogenic activity from flower of *Butea frandosa*.

(x) Antidiarrhoeic activity and isolation of an active flavonoid constituents from *Euphorbia hirta*. Flavonoids with anticancer activity from *Flemingia philippinensis*.

(xi) Antiulcerogeny of the flavonoid fraction from *Bidens aurea*; comparison with ranitidine and omeprazole.

(xii) Antiperlipidemic effect of flavonoids from *Prunus davidiana*.

(xiii) Flavonoids with anti-allergic effect from *Citrus unshice*.

(xiv) Flavonoids with antihepatotoxic properties from *Baccharis trimera*.

(xv) In vitro anticomplementary activity of constituents from *Morinda morindoides*.

(xvi) Inhibitory effects of various flavonoid isolated from the leaves of *Pessimmon Angiotensin* converting enzyme activity.

Taxonomically the family Compositae or Asteraceae, representing about 1310 genera and 13,000 species, is one of the largest family of flowering plants. The family compositae representing a vast array of heterocyclic constituents has been subject of extensive research which has attracted many chemists and bio-chemists and a vast substantial body of research have built up over the past few decades. It is a well known fact that a large number of plants of the compositae were used for their curative properties. The rich molecular diversity of compositae coupled with their therapeutic properties inspired the early organic chemists at the turn of centenary to explore the chemistry to identify the therapeutic profile. We are in a fortunate position that much is known about the flavonoid pattern in compositae. Compositae, in fact
are exceptionally rich, both in the range of secondary compound present and also in the number of complex structure known of anyone class. It is very distinctive in their chemical attributer. Table-1 comprises a bewildering spectrum of molecular diversity isolated from compositae plants.

**TABLE - 1**

<table>
<thead>
<tr>
<th>Composite family</th>
<th>Part</th>
<th>Compounds isolated</th>
<th>Reference</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eupatorium guayanum</td>
<td>whole plant</td>
<td>Kaempferol-3-O-glucoside, Kaempferol-3-O-rutinoside, Quercetin-3-O-glucoside, Quercetin-3-O-rutinoside</td>
<td>71 (22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(24)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(25)</td>
</tr>
<tr>
<td>Leuzea carthamoides DC.</td>
<td>herb &amp; root</td>
<td>Quercetin-5-glucoside, Quercetin-3,3'-dimethyl ether, Quercetin-7-glucoside, Quercetin and isorhynnetin, 6-methoxy kaempferol and patuletin.</td>
<td>72 (26)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(27)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(28)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(29)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(30)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(31)</td>
</tr>
<tr>
<td>Psiadia arabica</td>
<td>aerial part</td>
<td>5,3'-dihydroxy-7,2',4',5'-tetramethoxy flavone and 5-hydroxy-7,2',3',4',5'-pentamethoxyflavone</td>
<td>73 (32)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(33)</td>
</tr>
<tr>
<td>Inula grantioides</td>
<td>aerial part</td>
<td>5-hydroxy-3,6,7,2',5'-pentamethoxyflavone</td>
<td>74 (34)</td>
<td></td>
</tr>
<tr>
<td>Artemisia compestris</td>
<td>aerial part</td>
<td>Isosakuranetin (5,7-dihydroxy-4'-methoxyflavone)</td>
<td>75 (35)</td>
<td></td>
</tr>
<tr>
<td>Eupatorium micropylum</td>
<td>leaves</td>
<td>5-hydroxy-6,7,3',4'-tetramethoxyflavone, rutin, Quercetin kaempferol</td>
<td>76 (36)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(37)</td>
</tr>
<tr>
<td>Achillea santolina</td>
<td>aerial part</td>
<td>5-hydroxy-3,6,7,3',4'-pentamethoxy flavone, 7-hydroxy-3,6,3'4'-tetramethoxy flavone</td>
<td>77 (38)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(39)</td>
</tr>
<tr>
<td>Plant Name</td>
<td>Part Description</td>
<td>Chemical Compounds</td>
<td>Page</td>
<td>(Note)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Jungia paniculata</td>
<td>whole plant</td>
<td>3,5,7,8,4'-pentahydroxyflavone-3-O-β-glucofuranoside, kaempferol 3-O-β-D(6''-gully)-glucopyranoside</td>
<td>78</td>
<td>(40)</td>
</tr>
<tr>
<td>Cirsium rhinoceros</td>
<td>aerial part</td>
<td>Apigenin, luteolin, pectolinarigenin-7-O-β-D-glucopyranoside, linarin pectolinarin, hispidulin-7-O-α-L-rhamnopyranosyl (1→2)-β-D-glucopyranoside</td>
<td>79</td>
<td>(41)</td>
</tr>
<tr>
<td>Centaurea calcitrapa</td>
<td>flowers</td>
<td>apigenin-7-glucoside, cyanidin-3-glucosidem cyanidin-3,5-diglucoside</td>
<td>80</td>
<td>(45)</td>
</tr>
<tr>
<td>Vernonia nigritiam</td>
<td>flowers</td>
<td>Quercetin, 3-glucosylquercetin, 3-methylquercetin</td>
<td>81</td>
<td>(48)</td>
</tr>
<tr>
<td>Pterocaulon virgatum</td>
<td>flowers</td>
<td>5-(3-methyl-2-butenyloxy)-6, 7-methylenedioxy-coumarin, 5,6,7-trioxygenated coumarin</td>
<td>82</td>
<td>(50)</td>
</tr>
<tr>
<td>Haplopappus multifolius</td>
<td>stems</td>
<td>Aesculetin, prenyletin, haplopinol quercetin, quercetin-3-methyl ether</td>
<td>83</td>
<td>(52)</td>
</tr>
<tr>
<td>Artemisia mesatlantica</td>
<td>whole plant</td>
<td>4',5,6,7,8-pentamethoxyflavone, lactone-aguaianolide (mesantlantin)</td>
<td>84</td>
<td>(53)</td>
</tr>
<tr>
<td>Echinops niveus</td>
<td>whole plant</td>
<td>Taraxasterol acetate, β-sitosterol, β-amyrin, betulinic acid, taraxasterol, lupeol, apigenin, luteolin, β-sitosterol glucoside, nivergin</td>
<td>85</td>
<td>(54)</td>
</tr>
<tr>
<td>Viguiera pinnatilobata</td>
<td>whole plant</td>
<td>17,18-dehydroviguiepinin, viguiepinol (C_{20}H_{32}O)</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Part</td>
<td>Constituents</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Centaurea sphaerocephala</td>
<td>aerial</td>
<td>Lignans(-1)-matairesisol, (-)-arctigenin, (-)-arctin</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>part</td>
<td></td>
<td>(60)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(61)</td>
<td></td>
</tr>
<tr>
<td>Artemisia schimperi</td>
<td>aerial</td>
<td>New nor-monoterpene-1,5-octadien-3-methyl-7-one,</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>part</td>
<td>Quercetin-3-3',4-trimethyl ether</td>
<td>(64)</td>
<td></td>
</tr>
<tr>
<td>Tessaria integrifolia</td>
<td>dried</td>
<td>3,4-dicaffeoylquinic acid, 3,4,5-tricaffeoylquinic acid,</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>leaves</td>
<td>Quercetin, Quercetin-3-O-glucoside, rutin naringin,</td>
<td>(65)</td>
<td></td>
</tr>
<tr>
<td>Echinops niveus</td>
<td>whole</td>
<td>Tamarixetin, acetyflavone-glucoside echinacin, ectunaticin</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>plant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notonia grandiflora</td>
<td>whole</td>
<td>epifrieditiol, β-sitosterol-β-glucoside</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td></td>
<td>plant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pluchea arguta</td>
<td>whole</td>
<td>3,4-di-epi-3'-chboro-2-hydroxy-argutcinin, 3,4'-di-epi-odonticin</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>plant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centaurea rolhmalerana</td>
<td>aerial</td>
<td>Chicin, β-sitosterol, stigmasterol, β-sitosterol-3-β-D-glucoside</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>part</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cirsium chlorolepis</td>
<td>roots</td>
<td>Known-5-hydroxy methyl-2-furancarboxaldehyde and 5-methoxy methyl</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-furancarboxaldehyde</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>New-cirmaldehyde, cirsiumoside</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echinops echinatus</td>
<td>aerial</td>
<td>Ethyl palmitate, β-sitosterylurate, β-amyrinacetate, β-sitosterol,</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>part</td>
<td>betulinic acid, apigenin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achillea teretifolia</td>
<td>whole</td>
<td>Oleandric acid, artemetin, 3',4',3,6,7-pentamethyl ether,</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td></td>
<td>plant</td>
<td>Sintenin (3β,9α)-diasetoxycosinolide.</td>
<td>(66)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(67)</td>
<td></td>
</tr>
<tr>
<td>Plant</td>
<td>Part</td>
<td>Natural Products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Artemisia austriaca</em></td>
<td>Aerial part</td>
<td>5-hydroxy-6,7,3',4'-tetramethoxy flavone, eupatilin, iaceosidin, chrysoeriol, apigenin, eupafolin, luteolin, apigenin-7-glucoside, luteolin-3'-glucoside.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Artemisia annua</em></td>
<td>Whole plant</td>
<td>quercetagetin-4'-methylether, 2,2-dihydroxy-6-methychromene, 2,2,6-trihydroxychromene</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Crisium japonicum var. ussuriense</em></td>
<td>Whole plant</td>
<td>hispidulin-7-O-neohesperidoside together with the known cirsimaritin-4'-glucoside and acacetin-7-rutinoside</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centipeda minima</em></td>
<td>Whole plant</td>
<td>Sitosterol, tetratriacontanyl nanadecanoate, 3,3',5,5'-tetramethoxy stilbene, 2-isopropyl-5-methylhydroquinone-4-O-β-D-xylopyranoside, 2-α, 3-β 23, 19-α-tetrahydro oxyurs 12-en-28 oic acid-28-O-β-D-xylopyranoside, 3-α-21β, 22-α 22-tetrahydroxyolean-12-en-28-O-β-D-xylopyranoside, 3-β, 16-α-21β, 22-α 28-penta tetrahydroxyolean-12-en-28-O-β-D-xylopyranoside</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tanacetum ferulaceum</em></td>
<td>Aerial part</td>
<td>6-α-hydroxy-5,7,- α-H, 8-β-H-eudesm-4(15)-en, 12-olide, 4-β, 6-α-dihydroxy-5,7,- α-H, 8-β-H-eudesman-8, 12-olide</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Eupatorium chinense</em></td>
<td>Aerial part</td>
<td>Squalene taraxasterol, taroxasterol palmitate methyl ripaiochromene A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(7)  (8)  (9)  (10)  (11)  (12)
(37) glu-Rhm

(38)

(39)

(40) glucose

(41) glucose

(42) rutinose
Table - 2 compares a bewildering spectrum of molecular diversity isolated from *Centratherum anthelminticum kuntze*.

**TABLE - 2**

<table>
<thead>
<tr>
<th>SNo.</th>
<th>Part</th>
<th>Compound Isolated</th>
<th>Reference</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seeds</td>
<td>4-(\alpha)-methyl-5-(\alpha)-stigmasta-8, 14, (24') z-trien-3-(\beta)-ol(4(\alpha)-methyl vernosterol), 5(\alpha)-stigmasta-8, 14, (24') z-trien-3-(\beta)-ol (vernosterol), 5(\alpha)-stigmasta-7, 14, (24') z-dien-3-(\beta)-ol(avenasterol)</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Seeds</td>
<td>Ethylacetate, 2-ethoxy-butane, ethyl butylether, 2-methyl propanoic acid, 1,2-dimethyl imidazole, ethyl benzene, 4-carene, camphene, benzaldehyde, (\beta)-pinene 2-carene, bornylene, phenylacetaldehyde, sabinene, isolimonene, (\beta)-terpineol, terpineol-4, (\alpha)-terpineol, corvone anise camphor, isocaryophyllene, caryophyllene, silinene 4-methyl phenyl phenyl ether-volatile oil of the plant.</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Aerial Part</td>
<td>Pharacognostical analysis &amp; chemical constituents of <em>C-anthelminticum fruits</em> were carried out. Isolation &amp; structure elucidation of a flavonoid has also been reported.</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Aerial Part</td>
<td>Glaucolide-B</td>
<td>109</td>
<td>(74)</td>
</tr>
<tr>
<td>5</td>
<td>Seeds</td>
<td>Elephantin</td>
<td>110</td>
<td>(75)</td>
</tr>
<tr>
<td>6</td>
<td>Whole Plant</td>
<td>Elephantol</td>
<td>111</td>
<td>(76)</td>
</tr>
<tr>
<td>7</td>
<td>Whole Plant</td>
<td>Deoxyelephantopin</td>
<td>112</td>
<td>(77)</td>
</tr>
</tbody>
</table>
PROBLEM TAKEN AND WORK DONE

Even with the tremendous advancement in the field of medicinal science, claiming to have expertise in eradicating the major problems of human suffering is no more granted. A number of diseases and causes are still unconquered and remain elusive.

Plants are a versatile source of human needs ranging from food, shelter, herbal drugs and are eco-friendly. A number of plant-products coupled with their pharmacological properties have been reported during the past two decades. A number of plants are either investigated or being evaluated for their pharmacological activity which necessitates further research in this area.

The author therefore took up the task to investigate the following plants from compositae family: *Centratherum anthelminticum* (kuntze,) and *Cotula anthemoides* (linn.) for their flavonoidal constituents and findings are summarised below:
Thus it is apparent that the genus compositae is rich source of flavonoidal constituents.

Fascinated by the biological activity of numerous flavonoids of the family compositae coupled with their potential therapeutic profile the author took up the challenging task of phytochemical investigation of the flavonoidal constituents of following two compositae plants.

1. Centratherum anthelminticum kuntze.
2. Cotula anthemoides linn.

Centratherum anthelminticum kuntze.\textsuperscript{103-105} belongs to the natural order Compositae, which is commonly known as 'Somraj' in Hindi. It is distributed throughout in India upto 5,500 feet in the Himalayas and Khasia Hills. Its seeds have a hot sharp taste. It is reported to be of great medicinal importance in leucoderma and fever. It is also used in the treatment of asthma, kidney troubles, hiccough and used to remove blood from the liver. The seeds are also credited with tonic, stomachic and diuretic properties.

Cotula anthemoides linn.\textsuperscript{103-105} belongs to the natural order Compositae, which is commonly known as 'Babuna' in Hindi. It is distributed in Punjab, Upper Gangetic Plain, Bihar, China, N. & S. Africa. The plant heated with oil is applied externally in rheumatism. The infusion is used as an eye wash in most diseases of the eye. A decoction is a Xosa remedy for head and chest colds.
I. **ISOLATION AND STUDY OF A NOVEL FLAVONE GLYCOSIDE: ACACETIN-7-O-β-GLUCOPYRANOSYL (1→4)-α-D-XYLOPYRANOSIDE. FROM THE SEEDS OF **CENTRATHERUM ANTHELMINTICUM (KUNTZE).**

This chapter deals with the study of a ethylacetate soluble fraction of the ethanolic extract of the seeds of *Centratherum anthelminticum* (Kuntze) afforded a novel flavone glycoside (yield 0.073%) molecular formula C_{27}H_{30}O_{14}, mp 206-207⁰C and [M]+ 578 (EIMS). Its structure was elucidated as Acacetin-7-O-β-D-glucopyranosyl (1→4)-α-D-Xylopyranoside[I] by various colour reactions, spectral data and chemical degradations.
II. ISOLATION AND CHARACTERISATION OF A NOVEL FLAVONOL : 8,5'-DIMETHOXY 3',4'-METHYLENEDIOXY 3,7-DIHYDROXY FLAVONE FROM SEEDS OF CENTRATHERUM ANTHELMINTICUM (KUNTZE).

This chapter incorporates the isolation and structure elucidation of a novel flavone (yield 0.0625%), molecular formula C_{16}H_{14}O_{6}, mp 300^\circ and [M]^+ 358 (EIMS) obtained from methanol soluble fraction of the ethanolic extract of the seeds of Centratherum anthelminticum (Kuntze). Its structure was identified as 8,5'-dimethoxy 3',4'-methylenedioxy 3,7-dihydroxy flavone [II] by various colour reactions, spectral data and chemical degradations.
III. ISOLATION AND STUDY OF A NOVEL ISOFLAVONE GLYCOSIDE: 5, 7-DIHYDROXY-6, 3',4'-TRIMETHOXY ISOFLAVONE-7-O-α-L-RHAMNO-PYRANOSYL(1→6)-β-D-GLUCOPYRANOSIDE FROM THE SEEDS OF COTULA ANTHEMOIDES (LINN).

This chapter includes the isolation and characterisation of a novel isoflavone glycoside (yield 0.070%), molecular formula C_{30}H_{36}O_{16}, mp 193^\circ C and [M]^+ 652 (EIMS) obtained from methanol soluble fraction of ethanolic extract of the seeds of Cotula anthemoides (Linn). Its structure was determined as 5,7-dihydroxy-6,3',4'-trimethoxy isoflavone-7-O-α-L-rhamnopyranosyl (1→6)-β-D-glucopyranoside [III] by various colour reactions, spectral data and chemical degradations.
IV. ISOLATION AND STUDY OF A NOVEL FLAVONE GLYCOSIDE : 5,7-
DIHYDROXY-6,8-DIMETHYL-3-METHOXYFLAVONE-7-O-β-GALACTO-
PYRANOSYL (1→2)-α-L-RHAMNOPYRANOSIDE FROM SEEDS OF
COTULA ANTHEMOIDES (LINN).

The chapter deals with the isolation and structure elucidation of a
novel flavone glycoside (yield 0.056%), molecular formula C_{30}H_{36}O_{14}, mp 215^\circ C
and [M]^+ 620 obtained from ethylacetate soluble fraction of ethanolic extract of
the seeds of Cotula anthemoides (Linn). Its structure has been identified as 5,7-
dihydroxy-6,8-dimethyl-3-methoxyflavone-7-O-β-D-galactopyranosyl (1→2)-α-L-
rhamnopyranoside[IV] by different colour reactions, spectral data and chemical
degradations.

[IV]
REFERENCES


