ABSTRACT

The present thesis entitled 'Chemical and Antimicrobial Studies of Plant Products' is divided into seven chapters.

Chapter I

It is an introductory chapter and deals in brief with the importance of plant products and the prominent landmarks in the phytochemical investigations. The methods and techniques utilised in the present investigation have also been briefly reviewed. A short resume of the work done has also been reported in this chapter.

Chapter II

It deals with the chemical examination of the essential oil obtained from the plant of Melissa parviflora Benth. in an yield of 2%.

The light yellow essential oil having characteristic odour has been completely analysed and found to contain d-camphene (2.5%), dl-α-pinene (2.30%), 1-β-pinene (2.13%), \( \Delta^3 \)-carene (2.05%), d-limonene (12.95%), azulene (1.26%), linalool (13.36%), 1:8 cineole (9.33%), citronellal (4.00%),
citronellol (8.2%), citral (13.00%), geraniol (21.01%), nepetalactone (1.91%), thymol (4.00%) and citronellic acid (2.00%).

Chapter III

It gives an account of chemical examination of the seeds of *Dillenia indica* Linn.

The seeds have been found to contain moisture (8.77%), ash (5.98%), fixed oil (17.5%), saponin (3%), crude protein (2.5%) and carbohydrates (1.24%, reducing sugars w/w as glucose).

The fixed oil is found to contain fatty acids like capric (0.200%), lauric (8.685%), myristic (54.55%), palmitic (8.34%), stearic (2.25%), oleic (21.6%) and linoleic (4.4%) and unsaponifiable portion of the fixed oil is found to contain n-hentriacontanol, lupeol, β-sitosterol and a hydrocarbon. Analysis of saponin showed that it is a triterpenoidal saponin and the aglycone part is betulinic acid and the sugar attached to it is xylose.

Amino acids obtained by the hydrolysis of protein are estimated spectrophotometrically. Thus protein part of the
seeds has been found to contain amino acids like aspartic acid (11.12%), lysine (9.26%), arginine (16.74%), serine (6.45%), glutamic acid (8.79%), alanine (7.38%), proline (1.77%), tyrosine (12.06%), cystine (12.53%), leucine (8.47%), phenyl alanine (4.58%) and two more unidentified acids in traces. Carbohydrate analysis showed that the seeds contain two sugars—glucose and xylose.

Chapter IV

This chapter describes the chemical examination of the seeds of Grevillea robusta A.Cunn. which have been found to contain moisture (11.03%), ash (3%), glycosides (9%), fixed oil (29.6%), crude protein (6%) and carbohydrates (reducing sugars, 15.34% w/w as glucose).

Complete analysis of fixed oil has shown that it contains fatty acids like palmitic (3.87%), heptanoic (22.85%), stearic (19.2%), oleic (34.32%), linoleic (0.74%), arachidic (18.7%) and linolenic (34.43%) and lupeol, β-amyrin, β-sitosterol, stigmasterol and a waxy mass in the unsaponifiable matter.

Analysis of glycoside showed that it is a flavonoidal glycoside, rutin linked to rhamnose and glucose.
The protein hydrolysate has been found to contain amino acids like lysine (14.35%), histidine (7.752%), arginine (10.36%), aspartic acid (11.16%), glycine (4.316%), hydroproline (3.19%), cystine (9.768%), methionine (9.572%), phenyl alanine (15.16%), leucine (14.35%) and an unidentified in traces.

Analysis of carbohydrate has shown that the seeds contain four sugars—galactose, glucose, arabinose and rhamnose.

Chapter V

This chapter presents chemical examination of the seeds of *Euphorbia heterophylla* Linn.

The seeds are found to contain moisture (6.25%), ash (4%), fixed oil (41.5%), crude protein (8%) and carbohydrates (reducing sugars, 4% as glucose).

The light yellow fixed oil is found to contain fatty acids like myristic (0.234%), pentanoic (0.036%), palmitic (13.310%), heptanoic (0.176%), stearic (6.528%), oleic (20.376%), linoleic (19.62%), linolenic (38.45%), arachidic (0.417%) and behenic (0.852%). The unsaponifiable matter of the oil is found to contain a hydrocarbon, lupeol,
\(\beta\)-amyrin and \(\beta\)-sitosterol.

The protein hydrolysate has been found to contain lysine (9.239%), histidine (11.41%), arginine (8.153%), glycine (10.33%), glutamic acid (13.61%), alanine (9.239%), proline (2.174%), valine (8.153%), cystine (10.847%), phenyl alanine (11.41%), leucine (2.174%) and isoleucine (3.261%). The sugars present in the seed are identified as lactose, sucrose and glucose.

Chapter VI

This chapter deals with the preparation of rhodanine and its condensed products with aldehydes and ketones. Elemental analysis and spectral data of various rhodanine derivatives have been reported.

Chapter VII

This chapter accounts the determination of microbiological activities of plant extracts of *Dillenia indica*, *Emelia robusta*, *Euphorbia heterophylla* and *Grevillea robusta*; essential oils of *Artemisia pellens*, *Artemisia vulgaris*, \(\text{and}\) *Melissa parviflora*, *Vitex negundo* and of rhodanine derivatives. Among the tested it has been observed that the rhodanine derivatives have higher antimicrobial activity.
Acetone and alcoholic extracts of the plants in general, have more activity than the other extracts.

Melissa parviflora and Artemisia pellens have more antimicrobial properties than other tested essential oils.

Some of the essential oils and rhodanine derivatives have exhibited considerable antimicrobial properties even at low concentrations.

These antimicrobial studies suggest that the essential oils and rhodanine derivatives may find use in the preparation of drugs.