ABSTRACT

The present thesis entitled 'Chemical and Antimicrobial Studies of Plant Products and Other Organic Compounds' has its contents laid out into eight chapters.

Chapter I constitutes the introduction which deals with an account of the brief development of plant product chemistry and its utilization. Special emphasis has been laid on the occurrence, chemistry, and biosynthesis of some of the active plant principles like essential oils, fixed oils, glycosides, proteins and carbohydrates. The methods and techniques used in the analysis and structural elucidation of plant products have been briefly reviewed. The object of the present investigations along with a short resume of the work done has also been included.

Chapter II deals with the chemical examination of the seeds of Adenanthera pavonina Linn. The seeds have been found to contain fixed oil (7.5%), crude protein (4.5%), reducing sugars (3.16%) as glucose, and unsaponifiable matter (1.36%). The reddish-yellow fixed oil has been found to be the glyceride of palmitic (23.71%) and stearic (0.86%) as saturated (24.57%) fatty acids and oleic (30.93%) and linoleic (44.50%) as unsaturated (75.43%) fatty acids. The unsaponifiable matter
consists of stigmasterol. The ethanolic extract of the defatted seeds has been found to contain a stigmasterol glucoside in which the sugar moiety consisted of glucose. The protein hydrolysate has been found to consist of alanine (6.96%), aspartic acid (14.17%), cysteine (4.64%), glutamic acid (20.33%), glycine (12.77%), leucine and isoleucine (11.49%), methionine (6.5%), proline (8.25%), serine (7.66%) and tyrosine (6.74%). The sugars present in the seeds have been identified as arabinose, glucose, rhamnose and xylose.

Chapter III has been devoted to the chemical examination of the seeds of *Ailanthus excelsa* Roxb. The seeds have been found to contain fixed oil (6.0%), crude protein (4.5%), reducing sugars (0.76%) and unsaponifiable matter (1.16%). The greenish-yellow fixed oil has been found to be the glyceride of palmitic (16.0%) as saturated (16.0%) acid and oleic (71.62%), linoleic (5.94%), and linolenic (6.44%) as unsaturated (84.0%) acids. The unsaponifiable matter consists of β-amyrin and β-sitosterol. The protein hydrolysate has been found to consist of alanine (12.58%), arginine (8.39%), cystine (19.57%), glycine (18.18%), glutamic acid (9.79%), β-phenylalanine (16.78%), proline (6.99%) and valine (7.68%). The sugars present in the seeds have been identified as glucose, galactose and lactose.

Chapter IV deals with the chemical examination of the
seeds of *Moringa pterygosperma* Gaertn. The seeds have been found to contain fixed oil (8.75%), crude protein (11.6%), reducing sugars (0.78% as glucose) and unsaponifiable matter (1.19%). The greenish-yellow fixed oil has been found to be the glyceride of myristic (0.36%), palmitic (12.78%), stearic (1.34%), arachidic (0.27%), behenic (4.68%), and lignoceric (2.11%) as saturated (21.54%) acids and oleic (76.79%) and linoleic (1.37%) as unsaturated (78.46%) acids. The unsaponifiable matter consists of an unidentified saturated hydrocarbon and β-sitosterol. The protein hydrolysate has been found to contain arginine (6.64%), aspartic acid (11.14%), cystine (7.07%), glycine (14.93%), glutamic acid (13.63%), histidine (6.13%), leucine and isoleucine (4.08%), lysine (12.1%), methionine (9.59%), proline (7.36%) and β-phenylalanine (4.55%). The sugars present in the seeds have been identified as glucose, mannose, rhamnose and sucrose.

Chapter V constitutes the chemical examination of the seeds of *Mucuna pruriens* Bak. The seeds have been found to contain fixed oil (4.5%), crude protein (2.8%), reducing sugars (1.06%) and unsaponifiable matter (1.23%). The reddish yellow fixed oil has been found to be the glyceride of myristic (0.96%), palmitic (21.93%), stearic (5.18%), arachidic (0.8%) and behenic (1.01%) as saturated (29.88%) acids, and oleic (29.04%) and linoleic (41.08%) as unsaturated (70.12%) acids. The waxy-yellow unsaponifiable matter consists of β-sitosterol.
The protein hydrolysate has been found to consist of alanine (12.96%), glycine (21.16%), leucine and isoleucine (9.38%), methionine (11.6%), proline (9.72%), serine (14.16%), threonine (6.82%), tyrosine (6.14%) and valine (8.02%). The sugars present in the seeds have been identified as glucose, galactose and sucrose.

Chapter VI deals with the preliminary studies on the essential oil from the roots of *Inula racemosa* Hook. The essential oil was extracted by water and steam distillation method in a yield of 0.25%. The GLC study has revealed the presence of eight major components, alantolactone being 40.43%. The oil has exhibited strong *in vitro* antimicrobial efficacy which may be attributed to the larger proportion of alantolactone.

Chapter VII has been devoted to the preparation of rhodanines. Three rhodanine derivatives as p-hydroxybenzaldene rhodanine, m-nitrobenzaldene rhodanine, and vanillidene rhodanine have been prepared by condensing p-hydroxybenzaldehyde, m-nitrobenzaldehyde and vanillin with rhodanine. These rhodanine derivatives have been tested for their antimicrobial properties.

Chapter VIII gives the results of the *in vitro* antimicrobial studies on the essential oils derived from the whole plant of
Glossogyne pinnatifida DC, the roots of Inula racemosa Hook., the leaves of Lagascea mollis Linn., and the heartwood of Santalum album Linn., fixed oils from the seeds of Adenanthera pavonina, Ailanthus excelsa, Fagopyrum esculentum, Moringa pterygosperma and Mucuna pruriens and p-hydroxybenzaldene rhodanine, m-nitrobenzaldene rhodanine and vanillidene rhodanine as rhodanine derivatives were tested against Gram positive and Gram negative bacteria and fungi. The essential oils in the present investigations, in general, exhibited moderate activity against most of the test bacteria and mild efficacy against the test fungi. The neat oils of G. pinnatifida, I. racemosa and S. album have exhibited better efficacy than the control (Streptomycin 1000 ppm) against E. coli, X. campestris and X. malvacearum. The fixed oils, in general, have exhibited mild efficacy against the test bacteria. These fatty oils were found resistant against most of the test fungi. The rhodanine derivatives have exhibited fair activity against test bacteria and moderate activity against test fungi. The essential oils and rhodanines when compared with the standard on serial dilution retained their efficacy upto 100 ppm and 250 ppm respectively against some of the test bacteria.