ABSTRACT

The proposed research work entitled "Chemical analysis and biological activity of plant products and synthesised organic compounds" is divided into three sections and these includes twelve chapters.

Chapter One: Introduction

It is an introductory chapter and it incorporates, in brief, with the importance of medicinal plants, plant constituents, heterocyclic compounds and the relevance of the study of their biological activities. A very brief account of chemical methods and techniques used in the present investigation have also been reviewed.

Section A: Analysis of plant products

Chapter Two: Preliminary qualitative analysis of plant seeds

The seeds of Tecoma stans, Tecoma undulata and Shorea robusta were subjected to preliminary chemical analysis have been found to contain moisture - 7.32%, 2.76%, 5.67% and ash 6.16%, 9.07%, 4.20% in T. undulata, T. stans and S. robusta respectively. All the seeds are devoid of volatile oil and alkaloids. They contain carbohydrates, colouring matter, fixed oils, glycosides, proteins, sterols and tannins. Tecoma stans seeds yielded higher percentage of pet. ether extract and alcoholic extract than the other two.

Chapter Three: Fixed Oils

This chapter is devoted for the analysis of fixed oils of seeds. Fixed oils are obtained from the seeds of S. robusta, T. stans and T. undulata in the yields of 22.00%.
34.2%, 17.1% respectively. Fatty acids of *S. robusta* are oleic acid (51.3665%), stearic acid (30.8799%), palmitic acid (5.6982%), linoleic acid (2.6235%) and arachidic acid (9.4318%). The unsaponifiable matter (4.0%) contains α-amyrin, β-sitosterol, lupeol and hydrocarbons.

The fatty acids of *T. stans* are palmitic acid (7.5434%), stearic acid (4.7847%), linoleic acid (26.4167%), linolenic acid (37.9012%), Oleic acid (8.2957%), parinaric acid (14.2040%) and malvalic acid (0.8542%). Unsaponifiable matter (6.2%) of the oil contains β-sitosterol, stigmasterol, dammar-12,25-diene-3β-ol and hydrocarbons.

The fatty acids of *T. undulata* are palmitic acid (6.7987%), stearic acid (4.2103%), Palmitoleic acid (9.7669), linoleic acid (21.6756%) and linolenic acid (56.9960%). The unsaponifiable matter (3.0%) contains, β-amyrin, β-sitosterol, stigmasterol and hydrocarons.

**Chapter - Four : Glycosides**

This chapter deals with the extraction of glycosides from the defatted seeds of *S. robusta, T. undulata* and *T. stans* in the yield of 7.0%, 8.2%, 11.0% respectively. The nature of glycosides has been found to be flavonoidal. The flavonoidal glycosides identified are 3,7-dihydroxy-8-methoxy flavone 7-O-α-L-rhamnopyranosyl-(1→4)-α-L-rhamno pyranosyl-(1→6)-β-D-glucopyranoside from *S. robusta*, 8 C-prenyl, 3,5,3’ trihydroxy, 7,4’ dimethoxy flavone 3-O-β-D-glucopyranoside from *T. Stans*, 5,7-dihydroxy 6-methoxy flavone 7-O-α-L-rhamnopyranoside from *T. Undulata*.

**Chapter - Five : Proteins**

This chapter incorporates the analysis of aminoacids present in proteins obtained from the seeds of *S. Robusta, T. stans* and *T. undulata*. They contain 8.4%, 6.0% and 10.92% crude protein respectively. The crude protein of *Tecoma undulata* seed on amino acid analysis gave histidine (9.08%), lysine (12.13%), threonine (10.77%), tyrosine (9.4%), valine (8.95%), methionine (8.34%), isoleucine (11.07%), leucine (11.07%), tryptophan (8.95%) and phenylalanine (9.40%)
The crude protein of *Tecoma stans* seed has been found to contain alanine (6.50%), glycine (18.23%), glutamic acid (23.56%), isoleucine (6.82%), methionine (5.80%), phenyl alanine (5.06%), proline (8.64%), serine (7.20%), threonine (4.32%), tryptophan (3.42%), tyrosine (3.25%) and valine (7.37%).

The crude protein of *Shorea robusta* seed on amino acid analysis gave arginine (6.81%), histidine (4.77%), leucine (12.33%), isoleucine (11.89%), lysine (5.20%), unidentified (11.89%), methionine (7.12%), phenyl alanine (3.46%), serine (6.42%), tryptophan (3.58%), tyrosine (6.80%), threonine (7.86%), proline (2.34%) and valine (9.36%).

The seeds of *Shorea robusta* contains fourteen amino acids and the crude percentage is also high. The highest percentage of amino acid present in S. Robusta, T. stans and T. undulata seeds are leucine (12.33%), glutamic acid (23.56%) and lysine (12.13%) respectively.

**Chapter - Six : Sugars**

In this chapter, polysaccharide composition of *T. stans* and *T. undulata* has been determined. Polysaccharide analysis revealed that the acetic acid insoluble fraction (*T. stans* 1.02% and *T. undulata* 4.52%) as well as acetic acid soluble fraction (*T. stans* 3.04% and *T. undulata* 4.68%) have been found to contain galactose, mannose in *T. Stans* and *T. undulata*. The molar ratio of galactose and mannose is 4:1 in *T. Stans* and 3:5 in *T. undulata*.

The reducing sugars present in *S. robusta* seeds are D-glucose, D-fructose, mannose and xylose and that of *T. undulata* are D-glucose, lactose, galactose, maltose and D-fructose whereas in T. stans contained D-glucose, galactose, arabinose and rhamnose. The percentage of these reducing sugars as glucose were 4.79% (*S. robusta*) 3.2% (*T. undulata*) and 2.1% (*T. stans*). Therefore it is concluded form the above findings the seeds of *T. stans* and *T. undulata* are richer source of carbohydrates.
Section - B : Preparation of Heterocyclic compounds

Chapter - Seven : Thiazolines

This chapter includes the preparation of thiazoline derivatives by the condensation of different acetophenone derivatives (viz. Acetophenone, p-Br, p-OH and p-phenyl acetophenone, 2,4 dihydroxy acetophenone) with diphenyl thiourea in the presence of bromine, dry benzene. Their mono acetoxy mercuric derivatives are prepared. All the physical data i.e. m.p. (°C), yield (%), element analysis and IR, PMR and Mass spectra are reported in this chapter.

Chapter - Eight : Pyrazolin-5-Ones

In this chapter, preparation of two different series of pyrazoline 5-one derivatives by the treatment of ethyl-2-(aryl substituted hydrazono)-3-oxy butyrate with a solution of 2,4-DNP in glacial acetic acid (first series) and with a solution of phenyl hydrazine in glacial acetic acid (second series). The ethyl-2-(aryl substituted hydrazono)-3oxy butyrate was prepared by the treatment of ethyl acetoacetate with different diazonium salts (obtained from different aromatic amines viz. p-NO₂, m-NO₂, o-NO₂, p-Cl, p-OMe, o-OMe, p-Me, p-Br and N(CH₃)₂ anilines, p and m-naphthyl amines) in the presence of sodium acetate. All the physical data i.e. m.p. (°C), yield (%), element analysis and IR, PMR and mass spectra have been reported in this chapter.

Chapter - Nine : Isoxazoles

This chapter accounts the preparation of isoxazole derivatives by the condensation of 2,4-dichloro-5-fluoro acetophenone with different aromatic aldehydes (benzaldehyde, o-, p- and m-nitro benzaldehyde, p-Cl and p-OMe benzaldehyde, salicylaldehyde and vanillin). All physical data i.e. m.p. (°C), yield (%), elements analysis and IR, PMR and Mass spectra are reported.
Section - C: Biological activities

Chapter - Ten: Antimicrobial studies

In this chapter, the results of antimicrobial activity of synthesised compounds and the extracts of selected seeds have been reported. For the present study filter paper disc diffusion method was used. Activity of these compounds were determined in 2% and 4% solutions in ethylene glycol against three bacteria and three fungi. The fungi tested were *Trichoderma viridae*, *Aspergillus sp.* and *Candida albicans*. The bacteria tested were *Escherichia Coli*, *Shigella dysentriae* and *Bacillus subtilis*. The activity of these compounds were compared with standard drugs streptomycin for bacteria and gresiosulfin for fungi.

Comparision of the results of seed extracts shows that the alcoholic extract of *T. stans* possess good antibacterial activity and the petroleum ether extract of *S. robusta* shows good antifungal activity.

On going through the results of antimicrobial activity of thiazolines, it was observed that the mono acetox mercury derivative of thiazolines possess good activity on all tested organisms. Among the isoxazoles, derivatives containing nitro and chloro group substituted isoxazoles were found to be more active and the remaining compounds are fairly active.

The comparsion of the results of antimicrobial activity of first series of pyrazolin 5-ones, it was observed that these compounds substituted by nitro groups show moderate activity on all organisms. The compounds having substituents like bromo and carboxyl groups have shown more activity on the all tested fungi. Whereas other compounds show greater activity on some fungi (*Trichoderma viridae*, *Candida albicans*) and bacteria (*Escherichia coli*).

The antimicrobial activity of second series of pyrazolin 5-ones nitro group and naphthyl group substituted compounds shows more activity. Some of the compounds are inactive on some organisms. These compounds are less active when compared to first
series of pyrazolin-5-ones due to the increase of two nitro groups in the basic moiety of the first series.

Chapter - Eleven : Anthelmintic activity

This chapter deals with the anthelmintic activity of alcoholic and petroleum ether extracts of seeds and prepared. Pyrazolin-5-ones (two series), thiazolines and isoxazoles derivatives. The activities were determined using earthworms by 'watkins' method. All the alcoholic extracts of all seeds showed very good activity when compared to standard.

Among the synthesised compounds, mono acetoxy mercury derivatives of thiazoline, nitro substituted isoxazoles and pyrazolin-5-ones (two series) have shown better anthelmintic activity and suggested for further screening for their use as anthelmintic drugs.

Chapter - Twelve : Insecticidal activity

The insecticidal activity of alcoholic and petroleum ether extracts of seeds and synthesised pyrazolin-5-ones (two series), thiazolines and isoxazoles derivatives were determined on cockroaches and K_D values are noted.

The results of insecticidal activity revealed that all tested samples possess better insecticidal property than the standard. All alcoholic extracts possess better insecticidal then the standard. Among these extracts, Shorea robusta possess better insecticidal property. Among synthesised compounds substituted by nitro groups in isoxazoles and pyrazolin-5-ones and mono acetoxy mercuric derivatives of thiazolines possess moderate activity compared to the standard.