

## ***Review on *Crotalaria L.****



[A DESSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENT FOR THE MASTER DEGREE OF PHARMACY]

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**BATCH: 7<sup>th</sup>**

**Submission Date:**

**13 September 2019**

**Session: Spring-2019**

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## LETTER OF APPROVAL

It is gladness to certify that, the project work, “**Review on *Crotalaria L.***”. Submitted by **ID: 183- 46-220** to the Department Of Pharmacy, Daffodil International University, is the outcome of the investigations which was conducted under my supervision. The discussion has been prepared under my guidance, approved as its style & contents and has been received as satisfactory in partial fulfillment of the requirement for the Master Degree of Pharmacy. No part of this project has been & is being submitted elsewhere for award of any Degree or Diploma.

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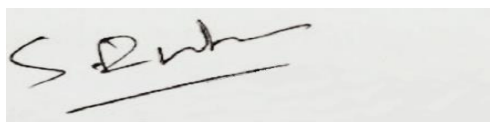
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## DECLARATION

I hereby declare that, this project is done by me under the supervision of **Dr. Mohammed Shafikur Rahman, Assistant Professor**, Department of Pharmacy, Daffodil International University, positively fulfillment of the requirement for the Master degree of Pharmacy.

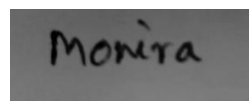
I am exposing that this project is my original work. I also declare that neither this project nor any part thereof has been submitted elsewhere for the award of Master Degree.

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## ACKNOWLEDGEMENT

At first, all commendation are to the almighty Allah, the Omnipotent, Omnipresent, Omniscient who empowered me to conduct the tusk of this research and for his mercy and kindness to complete this work appropriately.

I wish to extend my special thanks to my supervisor **Dr. Mohammed Shafikur Rahman**, Assistant Professor, Department of Pharmacy, Daffodil International University, for his constant Support, expert planning, sincere direction, supervision, invaluable suggestions, indispensable guidance, encouragement and continuous follow up through whole of this work. He helped me a lot by checking the proof and suggesting necessary modifications to improve the quality of the dissertation. I would like to express my heartiest thanks to his for providing valuable collection of relevant research articles which was a major help in writing the dissertation.

I thank my advising committee, especially **Dr. Sharif Mohammad shaheen**, professor & Head, Department of Pharmacy, Daffodil International University for kind support and advice.

I especially pleasure to **Mr. Md. A.K. Azad**, Assistant Professor, Department of Pharmacy, Daffodil International University. It is also great pleasure for me to offer my burden to all my respected teacher of Department of Pharmacy, Daffodil International University for investing their valuable time, sharing their knowledge and providing guidance, as well as a friendly shoulder to learn on. Cordial thanks to my family. I would have not reached where I am without the unconditional love, support and advice of my family.

My special heartfelt thanks to **Abul Bassar Md. Oliullah**, Department of pharmacy, Daffodil International University, Batch: 11<sup>th</sup> and all of my friends and to all well-wisher. I would like extend my thanks to the office staff of Department of Pharmacy, Daffodil International University.

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## ABSTRACT

*Crotalaria L.* (Fabaceae) is one of the largest genus of Papilionoideae comprising of about 500 species. It comprises phytochemicals such as alkaloids, tannins, saponins, pyrrolidazone alkaloid, flavonoids etc. This review was performed to open a new way for the upliftment of medicinal uses of *Crotalaria L.* The phytochemical constituents and pharmacological activity of *Crotalaria L.*, species including *C. verrucosa*, *C. juncea*, *C. pallida*, *C. retusa* and *C. sessiliflora*, focusing on potential therapeutics to detail their activities against many indications. Good medicinal value in the treatment of skin infection, fever and ulcer. Widely used in traditional veterinary pharmacy in preventing liver disease. *Crotalaria* some species are fallow as crops consumed by human being entirely the whole world. *Crotalaria* has highly nutritional value as rich source of  $\beta$ -carotene, which is a precursor of vitamin A. The foliage has high amounts of calcium, mineral, iron, thiamine, riboflavin, vit-B6, niacin and ascorbic acid, while the seeds and roots are considerably toxic. The pharmacological activities such as antibacterial, anti-inflammatory, thrombolytic, antipyretic, anti-diabetic, CNS depressant, antifertility etc. were evaluated using agar well diffusion, heat induced of protein denaturation and hemolysis, HRBC clot denaturation, yeast induced pyrexia, allowance induced type II hyperglycemia, hole cross and open field test and in-vitro method. This work may helpful to researcher for further study. This review was designed to highlight the actual chemical constituent and pharmacological activities of *Crotalaria L.*

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Phyto medicine in global healthcare:**

From thousand years ago plants have many medicinal property that's are useful for whole mankind to recovery diseases. Medicines that's are obtained from plants are used to form of unpaid drugs such as teas, herbals and other formulations. Herbal medicine also known as phyto medicine, refers to the use of plant seeds, berries, roots, leaves, bark or flowers for medicinal purposes. In accordance with World Health Organization (WHO), from 119 plant-derived medicines, about 74% are used in recent medicine. WHO also probable that 4 billion people are used herbal medicine for primary health care. Herbal medicine is a common component in c, Homeopathic, Naturopathic, Ayurvedic Traditional oriental, Naturopathic Native American and Indian medicine.

In highly developing countries including Bangladesh and Asian sub-continent about 75% of the populations tangible on different forms of traditional medicine for their primary health care.

### **1.2 Ethno pharmaceuticals Study:**

Ethno botanical and ethno pharmaceutical studies are the main and best way for screening medicinal properties of plants. Homespun people use their native plants for medical purposes that may be of high potential and value for modern pharmacology.

Ethno pharmacy is the inter-disciplinary science that inspect the perception and use of pharmaceuticals, within a given human society. It deals with the proper study of the pharmaceutical means considered in relation to the cultural contexts of their use. Such as the study of the cultural determinants that characterize the uses of these means within a culture.

It involves:

1. Discovery and ethnotaxonomt of the natural material, from which the remedy will be produced.
2. Traditional preparation of the pharmaceutical forms
3. Pharmacological action of bio-evaluation such preparations
4. Clinical effectiveness
5. Socio-medical aspects implied in the uses of these pharmaceuticals
6. Public health and pharmacy practice-related issues concerning the public use and the re-evaluation of these drugs develop a marketable pharmaceutical product.

### **1.3 Prospects of natural products and phyto medicine:**

Different techniques are used to acquire compounds for drug discovery, such as synthetic chemistry, isolation from plants and other natural sources, synthetic chemistry, combinational chemistry and molecular modeling combinational chemistry. Natural new drugs is launched on the market during the few couple of years. These all new drugs have received approval for the treatment of cancer, neurological diseases, cancer, in factious diseases, cardiovascular and may other metabolic diseases, immunological, inflammatory and related diseases, cardiovascular and genetic disorders. The new drugs was launched on the market from 2000 to till date, after changing from natural sources undergoing clinical trials. Finally, the potential activities of herbal medicines could lie in their high acceptance by patients, efficacy, relative safety and low costs.

#### **1.4 About Crotalaria L.: Fabaceae**

Crotalaria L. (rattlepods) is a species of flowering grower in the legume family, Fabaceae. This shrub belongs to the sub family of Faboideae.

#### **Feature of Crotalaria L.:**

This genus is accepted in the rural uses and its native range is Tropics & Subtropics.

##### **1.5.1 Habit:**

Shrubs, shrub lets or perennial herbs, rarely small trees, small leaves or annual herbs.

##### **1.5.2 Ecology:**

It is seasonally dry tropical, subtropical to warm temperate forest, woodland, xerophytes shrub land and grassland, often in disturbed places on sand or rocky outcrop.

##### **1.5.3 Picture of Crotalaria L.:**



##### **1.5.4 Range:**

E. Asia- southern China, India, Sri Lanka, Nepal, Bangladesh, Myanmar, Thailand, Cambodia, Afghanistan, Pakistan, Laos, Vietnam, Malaysia, Indonesia, Philippines, New Guinea and so much countries.

### **1.5.5 Cultivation Details:**

Crotalaria plants are brought up in a light and hot location, attained in dry to moist, well-drained soils. Plants also can tolerate saline soils. The plant is a common waster throughout the ecliptic. This genre has a symbiotic concern with certain soil bacteria and other bacteria; these bacteria build wart on the roots and fix atmospheric nitrogen to the environment. Some of this nitrogen is exploited by the growing plant but some can also be used by other plants growing nearby position.

### **1.5.6 Medicinal Use:**

The roots and flowers are used as a treatment against fever and stomach pains. It also used to purify the blood and to cure skin diseases & other diseases. The plant also produces neutral seed-gum polysaccharide, tharomosaccharide and flowers produce kaempferol.

### **1.5.7 Pharmacological Activity:**

**It contains lots of pharmacological activity**

- Anti-pyretic activity
- Anti-diabetic activity
- Potential CNS depressant activity
- Broad spectrum anti-bacterial activity
- Anti-inflammatory activity
- Anti-bacterial & antifungal activity
- Anti-oxidant activity

### **1.5.8 Taxonomic Tree:**

1. Kingdom: Plantae – plantes, Planta, Vegetal, plants
2. Subkingdom: Viridiplantae – green plants
3. Infrakingdom: Streptophyta – land plants
4. Super division: Embryophyta
5. Division: Tracheophyta – vascular plants, tracheophytes
6. Subdivision: Spermatophytina – spermatophytes, seed plants
7. Class: Magnoliopsida
8. Superorder: Rosanae
9. Order: Fabales
10. Family: Fabaceae – peas, legumes
11. Genus: *Crotalaria L.* – rattlebox

**CHAPTER TWO**

**LITERATURE REVIEW**

2.1 Previously the study of pharmacological activities and their used plant parts of different *Crotalaria L.* species in different solvent are given below tables:

**2.1.1 Table 1: *Crotalaria verrucosa***

Pharmacological activities	Plant parts	Extraction solvent
Antibacterial	Leaves	n-butanolic
Antipyretic	Leaves	Ethanol
Wound healing	Leaves	Aqueous
Anti-fertility	Leaves	95% ethanolic, 70% Ethanolic
Thrombolytic	Leaves	Ethanol
CNS depressant	Leaves	Ethanol
Hepatoprotective	Leaves	Ethanol
Anti-diabetic	Leaves	Ethanol
Anti-inflammatory	Leaves	Ethanol

**2.1.1 Table 2: *Crotalaria juncea***

Pharmacological activities	Plant parts	Extraction solvent
Hypolipidemic effect	Whole plant	Ethanolic
Reproductive systems	Seeds	Petroleum ether, benzene, ethanol
Antibacterial and antifungal effects	Flowers and seeds	Ethanol, ethanolic
Anti-diarrhoeal	Leaves	Methanolic
Anti-inflammatory	Seeds	Ethanolic
Anti-arthritis	Leaves	Ethanolic
Hepatoprotective	Seeds	Petroleum ether
Antioxidant	Seeds	Methanol
Antiulcerogenic	Leaves	Ethanolic
Antifertility	Seeds	Various extraction

**2.1.1 Table 3: *Crotalaria pallida***

<b>Pharmacological activities</b>	<b>Plant parts</b>	<b>Extraction solvent</b>
Antibacterial	Leaves	Methanol, ethanol, ethyl acetate, petroleum ether, chloroform, water
Anti-inflammatory	Leaves	Ethanol, ethyl acetate, petroleum ether, chloroform, water
Antioxidant	Leaves	Ethanol, ethyl acetate, petroleum ether, chloroform, water
Estrogenic activity	Leaves	Ethanol
Mutagenic activity	Leaves	Ethanol
Thrombolytic	Leaves	Methanol
HIV-protease inhibitor	Leaves, flowers and stems	Methanol and ethanol

**CHAPTER THREE**

**RESULT & DISCUSSION**



3.1 Literature review on *Crotalaria L.* have been done and the results showed that different pharmacological activities and chemical constituents have been carried out previously. The pharmacological activities, their used plant parts and chemical constituents are listed below in

Species	Plant part used	Phytochemicals isolated	Pharmacological activity
<i>Crotalaria Verrucosa</i>	Seeds and stems	$\beta$ -sitosterol	Anti-pyretic potential, Anti-diabetic activity,
	Seeds	Crotalaburnine (also known as Anacrotine), Crotaverrine acetate (Oacetylcrotaverrine or Ligularidine), Crotaverrine (Ocrotaverrine), Apigenin-O-glycoside, Isosenkirkin, Isosenkirkin Acetate.	Potential CNS depressant activity, Broad spectrum anti-bacterial activity, Anti-thrombolytic effect of this plant was observed, Abortifacient and anti-imolantation activity along with body modification such as vaginal cornification, uterine weight enhancement, Significant wound-healing property.
	Stem	Tri-terpenoid[Taraxerol(Alnulin)]	
	Leaves	(Necic lactone) 2-methyl-3-(2-oxo- [5H]-5-hydroxymethyl-5- methylfuran-3-yl)-propanoic acid	
	Leaves	Senecionine, galactose-specific lectin, chodesmine alkaloids, seneciophylline, trichodesmine, riddelline and cardiogenin 3-O-[ $\beta$ ]-d-xylopyranoside	Anti-diarrhoeal effects, Anti-inflammatory activity, Antibacterial & Antifungal

<i>Crotalaria juncea</i>	Seeds	Toxic dehydropyrrolizidine alkaloids (DHPAs): junceine and isohemi-junceines trichodesmine, carbohydrate, protein, toxic amino acids a-aminogoxylaminobutyric acid, a-amino-b-oxylaminopropionic acid and a,g-diaminobutyric acid. Another phytochemical observed to be present in sunn hemp seeds is cardenolidecardiogenin 3-O-beta D-xylopyranoside.	activity, Hypolipidemic, antioxidant activity Negative impact on fertility and potent in case of showing pregnancy inhibitive activity, Reduction of the elevated level of enzymes which are markers of hepatotoxicity.
	Plant	Moisture, cellulose, hemi-	

	fiber	celluloses, lignin, pectin.	
	Stem	Cellulose, pentosan, urinic anhydrite.	
	Dried stalks of the plant	Moisture, ether extract, albuminoids, carbohydrate(35.8), woody fiber soluble mineral matter	
<i>Crotalaria pallida</i>	Seed	Flavonoids ( cropalliflavones A-C), Alkaloids ( usaramine-N-oxide and cropallins A-B)	Widely popular as traditional medicine, Anti-diarrheal activity,
	Leaf	Linolenic acid, palmitic acid, linoleic acid ( omega-6-fatty acid)	Cytotoxic and anti-diabetic activity, Useful in case of scrofula, mastitis and dysentery.
	Barks	5,7,40-trihydroxy-20-methoxyisoflavone, 2-hydroxygenistein, Daidzein, Morin, $\beta$ -sitosterol, Lupeol, Lupeol acetate, Crotafuran B, Crotafuran D, Crotafuran E, Apigenin	Neurasthenia, leucorrhoea, tumours and dizziness, Anti-oxidant, anti-cancer, estrogenic as well as anti-inflammation activity.
<i>Crotalaria retusa L.</i>	Seed flour	Main minerals- Magnesium, calcium, phosphorus, sodium, potassium, lead, Nickel, Copper, Arsenic.	Free radicals neutralizing activity, Antiproliferative activity towards all the three most cancers cell.
	Seed oil	Main fatty acids- Lenoleic acids, Oleic acids, Stearic acids, Palmitoleic acids, Arachidic acids, Palmitic acids.	
	Pod	General glycoside, Saponins, Tanins.	
	Flower	Flavonoids, Sterols.	

	Stem	Saponins, Tanins, Alkaloids.	Antibacterial, Antioxidant, Antimicrobial.
<i>Crotalaria sessiliflora</i> - L.	Whole plant	Flavonoids (2', 4', 5,7-tetrahydroxyisoflavone, 2', 4', 7-trihydroxyflavone, 4', 7-dihydroxyflavone, isovitexin), hydroquinone.	Anti-oxidant activity (hydroquinone, vitexin, orientin and isoorientin),
	Seeds	Integerrimine, monocrotaline and tri-chodesmine.	Anti-tumor
	Fruits and leaves	Monocrotaline	properties, Vasodilatory and hypotensive effects

### Discussion:

Plants are the most important origin of dynamic compounds for the development of new medicinal agents. In recent time from the study it can be proposed that the *Crotalaria L.* possess various pharmacological activity and containing lots of chemical compounds. Therefore these examination have helped in developing new drugs for the medicinal uses and other use in human beings. The phytochemicals studies like flavonoids, alkaloids, saponins, flavonoids, phenolic, alkaloids compounds present in plants are responsible for many biological activities. The present review may helpful to researcher for further study and discovery of new drugs to human welfares.

# **CHAPTER FOUR**

## **CONCLUSION**

## CONCLUSION:

Medicinal plants have been performed an important role in the history of drug discovery and many other researches. From ancient time many traditional medicinal plants were used to cure illness. At present the researchers show that the lead compounds which are found in the medicinal plant or natural sources drug exhibit less side effects and minimize the toxicity level in the body. The present study was carried out to open new way for the improvement of medicinal uses of *Crotalaria L.* The aim of this study is to present an overview of phytochemical constituents and pharmacological activity of *Crotalaria L.* species including *C. verrucosa*, *C. juncea*, *C. pallida*, *C. retusa* and *C. sessiliflora*, focusing on potential application of therapeutics as well as medicinal uses in order to describe their beneficial and other activities against numerous indications. Some *Crotalaria* species are cultivated as crops to be consumed by human beings that throughout the world. This plant is widely consumed due to its nutritional value as a rich source of  $\beta$ -carotene, which is precursor of vitamin A. The leafage are contains high amounts of calcium, iron, thiamine, riboflavin, niacin and ascorbic acid, while the seeds, barks and roots are considerably toxic. The pharmacological activities of *Crotalaria L.* including antibacterial, anti-inflammatory, thrombolytic, antipyretic, anti-diabetic, CNS depressant, antifertility, wound healing activity, hepatoprotective activity, hyperlipidemia, effect on reproductive system, antioxidant, antiulcer genic, estrogenic and mutagenic, HIV-protease inhibitor etc. The paper reviewed *Crotalaria L.* as a hopeful medicinal plant which have a wide range of pharmacological activities that could be utilized in several medical applications because of its effectiveness and safety.

## **CHAPTER FIVE**

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