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A review on poisonous plants of fabaceae occurring in Bangladesh and their medicinal value

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Abstract

The aim of this review is to provide a report on poisonous and toxic medicinal plants of Fabaceae used for different treatments. In Bangladesh, the family is represented by 254 species out of which 169 are assessed to be medicinal. Among them, 45 plants are poisonous and possess various therapeutic properties. Poisonous medicinal plants are used for various ailments such as skin complaints, rheumatism, fever, labor, cold, snakebite, paralysis, dysmenorrhoea, dysentery, impetigo, lung diseases, scabies etc. The review has revealed that wide numbers of phytochemicals have been isolated from the various medicinal plants which possess activities like anticancer, antibacterial, anodyne, antifungal, anti-inflammatory, antitumor, analgesic, antiseptic, aphrodisiac, anti-rheumatic, astringent, antidote, emetic, diuretic, purgative, anti-allergic and various other medicinal properties. This information is valuable for pharmaceutical companies to formulate new drugs.

Keywords: Poisonous plant, medicinal plant, therapeutic properties, fabaceae, Bangladesh

1. Introduction

History of medicinal plant usage is as old as mankind itself. Introduction to medicinal plants usage is a result of many years of struggles next to illnesses. Due to that, man has learned to pursue drugs from leaf, bark, seeds, fruits, and other parts of the plants. In spite of enormous advances of modern scientific medicine, traditional medicine is still the primary form to treat diseases of majority of people in developing countries together with Bangladesh. According to WHO (World Health Organization), it was estimated that about 80% population of developing countries depends on the medicinal plants for their primary health care needs, even though the allopathic medicine is available. Also, modern pharmacopoeia still contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Plant toxins are substances produced as secondary metabolites that are identical to extra cellular bacterial toxins in their properties. They show both useful and harmful effects in human beings and animals. They Show a wide range of side effects from minor itching, nausea, vomiting to adverse effects like psychosis, paralysis. It is a fact that virtually any substance can be harmful at high enough concentrations- as Paracelsus (1493-1541) said in the sixteenth century, "the dose makes the poison". Poisons include both naturally produced compounds and synthetic compounds. Natural poisons are produced by species of bacteria, fungi, protists, plants and animals.

Fabaceae, the third largest family of flowering plant in terms of species richness (Lewis *et al.* 2005) [9] and second largest family with regard to medicinal plant richness, is one of the widely distributed plant family. In Bangladesh, the family is represented by about 69 genera and 254 species (Ahmed *et al.* 2009) [1]. Among them, 169 species (*i.e.* 67%) included in 61 genera (*i.e.* 88%) are recognized with medicinal value (Jahan 2016) [7]. Among them, 45 species are assessed as poisonous to human, fish or livestock. They produce several toxic substances which can be fatal for the above mentioned ones. Plants, either grown naturally or cultivated in the gardens can be poisonous or injurious to human health. Poisoning can occur by several ways such as: by contact causing skin irritation, ingestion causing internal poisoning, absorption by skin and inhalation (In the respiratory system). Many plants are used in some way or the other in medicines especially in homeopathic pharmacology. This review article has the basic details of the toxic plants of Fabaceae such as the botanical name, toxic part of the plant and its potential medicinal properties.

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2. General properties of toxic plants of Fabaceae

Plant grows in a highly competitive environment. It is continually threatened by other plants, micro-organisms, Insects and by both large and small mammalian, avian, and reptilian herbivores. In order to survive, each plant must draw upon a complex of defences, which may be physical, such as spines or leathery leaves, or chemical such as toxins.

The secondary metabolites produced in plants are of foremost interest because they are often specific to a particular species or genera and must, therefore, have been designed to serve a particular protective function. Among the most prevalent are

numerous classes of rotenonoids, phenolics, terpenes and steroids, cyanogenic compounds and alkaloids. Several therapeutic properties have known to be present in different species of Fabaceae due to availability of certain metabolites. Besides mild to severe toxicity they can be medicinally potential as antibacterial, contraceptive, anti-allergic, antimalarial, febrifuge, expectorant, anticancer, mitigenic, anodyne, diuretic, anti-inflammatory, antitumor etc.

Toxic plants of Fabaceae along with their habit, parts and some medicinal properties are listed in table 1.

Table 1: Summary of the toxic and poisonous medicinal plants of the family Fabaceae

Sl. No.	Name of the Species	Habit	Parts used	Medicinal properties	Reference
1	<i>Abrus precatorius</i> L.	Climbing herb	Seed, leaf, fruit, root	Toxic, Antibacterial, Contraceptive, Antiallergic, Antimalarial, Febrifuge, Expectorant	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
2	<i>Aeschynomene indica</i> L.	Undershrub or shrub	Seed	Toxic	Quattr. 2012 [10]
3	<i>Aganope heptaphylla</i> (L.) Polhill	Climbing shrub	Leaf, Seed	Antibacterial, Toxic	Quattr. 2012 [10]
4	<i>Canavalia cathartica</i> Thouars	Climbing herb	Fruit, seed	Toxic, Stimulant	Quattr. 2012 [10]
5	<i>Canavalia ensiformis</i> (L.) DC.	Woody climber	Mature bean, pod, leaf, seed	Anticancer, Mitigenic, Anodyne, Toxic, Diuretic, Anti-inflammatory, Antitumor	Quattr. 2012 [10]
6	<i>Canavalia gladiata</i> (Jacq.) DC	Woody climber	Seed, leaf, root	Toxic, Anticancer, Anti-inflammatory, Analgesic, Antiseptic	Quattr. 2012 [10]
7	<i>Canavalia maritima</i> Thou.	Climber	Leaf, Root, Seed, Whole plant	Aphrodisiac, Anti-rheumatic, Tonic, Toxic	Quattr. 2012 [10]
8	<i>Canavalia virosa</i> (Roxb.) Wight & Arn.	Climber	Root, seed, leaf	Toxic, Anthelmintic, Diuretic	Quattr. 2012 [10]
9	<i>Castanospermum australe</i> A. Cunn. & Fraser	Tree	Laef, seed, pod	Toxic, anti-HIV, Antihyperglycemic, Anticancer, Astringent, Analgesic	Quattr. 2012 [10]
10	<i>Crotalaria alata</i> D. Don	Herb	Root, Whole plant	Antidote, Tonic, Toxic	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
11	<i>Crotalaria incana</i> L.	Herb	Whole plant, root	Toxic, Astringent	Quattr. 2012 [10]
12	<i>Crotalaria pallida</i> Ait.	Herb	Seed, leaf, whole plant	Mutagenic and carcinogenic, Toxic, Antitumor, Vermifuge	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
13	<i>Crotalaria quinquefolia</i> L.	Herb	Leaf	Anti-microbial, Toxic	Quattr. 2012 [10]
14	<i>Crotalaria retusa</i> L.	Undershrub	Fruit, Leaf, Root, Seed, Stem, Whole plant	Abortifaciant, Analgesic, Anti-septic, Febrifuge CNS depressant, Emetic, Laxative, Spasmolytic, Hepatotoxic, Vermifuge	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
15	<i>Crotalaria sessiliflora</i> L.	Herb	Whole plant	Toxic, Anti-septic	Quattr. 2012 [10]
16	<i>Crotalaria spectabilis</i> Roth	Undershrub	Seed, whole plant	Toxic	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
17	<i>Dendrolobium triangulare</i> (Retz.) Merr.	Shrub	Pod, Root	Antidote, Emetic, Toxic	Quattr. 2012 [10]
18	<i>Derris cuneifolia</i> Benth.	Woody climber	Root	Toxic	Alam and Bashak 1997 [2], Quattr. 2012 [10]
19	<i>Derris elegans</i> Benth. var. <i>vestita</i> (Baker) Prain	Woody climber	Leaf, Root, Stem, Seed	Antidote, Toxic	Quattr. 2012 [10]
20	<i>Derris elliptica</i> (Wall.) Benth.	Shrub	Bark, Fruit, Leaf, Root	Insecticidal, Larvicidal, Poisonous to Fish, Cattle	Yusuf <i>et al.</i> 2009 [12]
21	<i>Derris ferruginea</i> (Roxb.) Benth.	Woody climber	Root	Toxic	Quattr. 2012 [10]
22	<i>Derris scandens</i> (Roxb.) Benth.	Woody climber	Root, stem	Diuretic, emmenagogue, expectorant and laxative, poisoning of fish	Quattr. 2012 [10]
23	<i>Deris trifoliata</i> Lour.	Climbing shrub	Bark, Leaf, Root, Stem	Anti-spasmodic, Anti-septic, Anti-rheumatic, Anti-arthritis, Carminative, Counter irritant, Cytotoxic, Insecticidal, Laxative, Stimulant, Toxic	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
24	<i>Desmodium styracifolium</i> (Os.) Merr,	Shrub	Root, Whole plant	Aperient, Colic, Deobstruent, Diuretic, Emmenagogue, Stomachic, Toxic	Yusuf <i>et al.</i> 2009 [12], Quattr. 2012 [10]
25	<i>Erythrina stricta</i> Roxb.	Tree	Flower, leaf	Toxic, Antidote to poisoning, Anti-inflammatory, Antioxidant	Quattr. 2012 [10]
26	<i>Erythrina suberosa</i> Roxb.	Tree	Leaf, Seed, Stem	Anti-inflammatory, Anti-septic, Cathartic, Diuretic, Toxic, Fish poison	Quattr. 2012 [10]
27	<i>Erythrina variegata</i> L.	Tree	Leaf, root, bark	Laxative, diuretic, expectorant, toxic, Analgesic, Anti-inflammatory, Antibacterial, Anxiolytic	Yusuf <i>et al.</i> 2009 [12]

28	<i>Gliricidia sepium</i> (Jaeq.) Kunth ex Walp.	Tree	Flower, root, leaf	Anti-inflammatory, Antibacterial, Antimicrobial, Toxic	Quattr. 2012 ^[10]
29	<i>Indigofera galeoides</i> DC.	Shrub	Leaf	Toxic, Digestive, Stimulant	Gillett 1958 ^[6] , De Kort & Thijssse 1984 ^[5]
30	<i>Indigofera hirsuta</i> L.	Herb	Leaf, root, whole plant	Toxic, Ophthalmic, Diuretic	De Kort & Thijssse 1984 ^[5] , Ambasta 1986 ^[3]
31	<i>Indigofera linifolia</i> (L. f.) Retz.	Herb	Whole plant, Root	Laxative, Toxic	Quattr. 2012 ^[10]
32	<i>Indigofera tinctoria</i> L.	Shrub	Root, flower, leaf	Toxic, Antidote, Expectorant, Febrifuge, Sedative	Quattr. 2012 ^[10]
33	<i>Lathyrus sativus</i> L.	Climbing herb	Seed	Cathartic, Toxic	Quattr. 2012 ^[10]
34	<i>Melilotus alba</i> Desr.	Herb	Whole plant	Febrifuge, Aromatic, Digestive, Toxic, Carminative, Aanticoagulant, Antidote	Quattr. 2012 ^[10]
35	<i>Melilotus officinalis</i> (L.) Pall.	Herb	Leaf, Whole plant	Aromatic, Antidote, Anticoagulant, Astringent, Carminative, Colic, Tonic, Febrifuge, Emollient, Styptic, Toxic	Quattr. 2012 ^[10]
36	<i>Melilotus indica</i> (L.) All.	Herb	Whole plant, Leaf	Toxic, Purgative, Laxative	Quattr. 2012 ^[10]
37	<i>Millettia extensa</i> (benth.) Baker	Woody climber	Root, bark	Toxic, Contraceptive	Ambasta 1986 ^[3] , Jain 1991 ^[8]
38	<i>Millettia pachycarpa</i> Benth.	Shrub	Whole plant, root	Emmenagogue, Toxic, Insecticide	Ambasta 1986 ^[3] , Jain 1991 ^[8]
39	<i>Mucuna gigantea</i> (Willd.) DC.	Woody climber	Pod	Toxic	Balfour 1879 ^[4] , Quattr. 2012 ^[10]
40	<i>Mucuna nigricans</i> (Lour.) Steud.	Climbing Shrub	Pod hair, Seed, Stem, Root	Toxic, Vermifuge	Quattr. 2012 ^[10]
41	<i>Pachyrhizus erosus</i> (L.) Urban	Climbing herb	Leaf, Bean, seed	Toxic, Purgative, Anthelmintic, Insecticide	Quattr. 2012 ^[10]
42	<i>Phaseolus lunatus</i> L.	Climber	Raw bean, Seed, Leaf	Astringent, Antifungal, Ant parasitic, Antibacterial, Anti-proliferative, Hypolipidemic, Sedative, Toxic	Quattr. 2012 ^[10]
43	<i>Pueraria peduncularis</i> (Grah. ex Benth.) Benth.	Climbing herb	Root	Toxic	Van der Maesen 1985 ^[11]
44	<i>Rhynchosia minima</i> (L.) DC.	Climbing herb	Flower, Leaf, Seed, Tuber	Abortifacient, Anthelmintic, Antibiotic, Antifungal, Antimicrobial, Antioxidant, Toxic	Quattr. 2012 ^[10]
45	<i>Tephrosia candida</i> DC	Shrub	Bark, root	Toxic	Jain 1991 ^[8]

3. Conclusion

Plants are deliberately poisonous and their toxicity to humans and other animals is an example of natural selection. Awareness regarding the poisonous plants is important which when used in the proper, prescribed dose, acts as potent therapeutic agents. Commercial crops for human food usage must therefore have optimal concentration of biologically active natural products, low enough to be nontoxic to the consumer (at least when eaten in reasonable quantities) but sufficiently great to repel or limit pests. Thus the study concludes that, toxic medicinal plants have some medicinal values. Certain precautions about those plants are enough to use these plants for medicinal purpose.

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