

A Review on Bioactive Compounds of Fabaceae Family

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ABSTRACT

Fabaceae family is third largest family in world. It is also known as the legumes, pea, bean, or pulse family. It is also a vital family of flowering plants. The family is divided into six sub-families: Caesalpinioideae, Cercidoideae, Detarioideae, Dialioidae, Duparquetioidae, Faboideae or Papilionoideae. Legumes are essential for human nutrition which consists proteins, minerals, calories and vitamins. It is also known as grain legumes because they are edible. Legumes are used for crops, manures and forages. It is also used in nitrogen fixing by the help of bacteria Rhizobium, it shows symbiotic relationships with each others. Fabaceae family consists several phytoconstituents such as Flavonoids, Saponins, Alkaloids, Phenols, Tannins, Glycosides, Terpenoids etc. The present review paper emphasis on 25 plants of Fabaceae family. The plants are mentioned with which plants parts are used by using of various solvents with their presence of phytoconstituents.

Keywords: Fabaceae family, Legumes, Phytoconstituents

INTRODUCTION

Fabaceae family is known as the legume, pea, bean, or pulse family and it is a large and economically important family of flowering plants. The name 'Fabaceae' comes from extinct genus 'Faba' which is included in 'Vicia' (Asfaw et al., 2021). It is the most common family found in tropical rainforests and in dry forests in the Americas and Africa (Rahman et al., 2014). Fabaceae is the third largest family of plants in the world having approximately 19,500 species and 770 genera (Maroyi, 2023). Astragalus with 2400 species, Acacia with 950 species, Indigofera with 700 species, Crotalaria with 700 species, and Mimosa with 500 species are largest genera which contain approximately 9.4% of all flowering plant species (Ahmad et al., 2016). The family is divided into six sub-families that is Caesalpinioideae (148 genera and 4400 species), Cercidoideae (12 genera and 335 species), Detarioideae (84 genera and 760 species), Dialioidae (17 genera and 85 genera), Duparquetioidae (monotypic genus), and Faboideae or Papilionoideae (503 genera and 14000 species) (Maroyi, 2023). Fabaceae family are trees, shrubs, sub-shrubs, woody lianas, climbing annuals, herbs and aquatics. Leaves are compound, double compound or trifoliate and sometimes it have

swollen leaf base. Flowers are asymmetric, bilaterally symmetric or radially symmetric and bats, birds, insects pollinate them. Usually fruit is two-valved, dehiscent pods, rarely fleshy but can occasionally indehiscent and split into two segments and its ovary is superior with one locular (Maroyi, 2023). Legumes are vital to human nutrition for their rich sources of proteins, calories, minerals and vitamins. In Afro-Asian dietary practices, legumes serve as the primary sources of protein and calories, influenced by both economic factors and cultural traditions. Legumes are also known as grain legumes because they are mainly grown for their edible seeds. Grain legumes are used as pulses (dhal) with cereals and are cultivated in both tropical and temperate regions in worldwide. They increase the protein content of cereal-based diets and may enhance the overall nutritional quality of these diets. Cereal proteins are lack in certain essential amino acids, especially lysine. Conversely, legumes are known to provide sufficient levels of lysine; however, they are low in sulfur-containing amino acids such as methionine, cystine, and cysteine (Iqbal et al., 2006). Legumes are used as crops, forages and green manures. It also synthesize a huge range of natural products such as flavours, drugs, poisons and dyes. Legumes are useful for plants for converting atmospheric nitrogen to nitrogenous compounds

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(Patel et al ., 2014). It is done by the bacteria of the genus *Rhizobium* which is present in the root nodules. Here both bacteria and legumes developed symbiotic relationship so they are able to fix free nitrogen for plants and in return legumes are able to provide fixed carbon which is produced by photosynthesis (Ahmad et al ., 2016). Because of fixing atmospheric nitrogen for protein synthesis its foods have their own nutritional value (Asfaw et al ., 2021).

REVIEW OF LITERATURE

Phytoconstituents:

Phytoconstituents are naturally occurring, biologically active substances that can be found in

plants that promote human health by serving as nutrients and therapeutic substances. Phytoconstituents are found in various parts of plants like in root, stem, leaf, flower, fruit and seeds. Phytoconstituents are classified into primary and secondary metabolites, on the basis of their role in plant metabolism. Primary metabolites are common sugars, amino acids, proteins, nucleic acids, chlorophylls etc. Secondary metabolites are alkaloids, terpenes, flavonoids, lignans, plant steroids, curcumins, saponins, phenolics, and glucosides (Koche et al ., 2016). Here some plants of Fabaceae family are mentioned with their phytoconstituents in various solvents:

Sr. No	Plant Name	Plant Parts	Solvents	Phytoconstituents	References
1	<i>Acacia berlandieri</i>	Leaves, Stem bark	30% Acetone	Diterpenes, Sterols, Phenols, Tannins, Flavonoids, Saponins	(Cavazos, 2021)
			20% Methanol	Diterpenes, Phenols, Sterols, Flavonoids, Saponins	
			7% Acetic acid	Diterpenes, Sterols, Phenols, Tannins, Flavonoids, Saponins	
2	<i>Acacia rigidula</i>		30% Acetone	Cardic glycosides, Sterols, Diterpenes, Flavonoids, Phenols, Tannins, Saponins	
			20% Methanol	Diterpenes, Sterols, Phenols, Tannins, Flavonoids, Saponins	
			7% Acetic acid	Cardiac glycosides, Sterols, Diterpenes, Phenols, Tannins, Flavonoids, Saponins	
3	<i>Acacia nilotica</i>	Pods	Aqueous	Alkaloids, Phenolic, Tannins, Flavonoids, Glycosides, Saponins, Anthraquinones, Coumarins, Anthocyanins	(Mohamad ou et al ., 2024)
			Hydroethanolic	Alkaloids, Phenolic, Tannins, Flavonoids, Terpenoids, Glycosides, Anthraquinones, Coumarins, Anthocyanins	
4	<i>Bauhinia reticulata</i>	Bark	Aqueous	Alkaloids, Phenolic, Tannins, Flavonoids, Glycosides, Anthraquinones, Coumarins, Anthocyanins	
			Hydroethanolic	Alkaloids, Phenolic, Tannins, Flavonoids, Terpenoids, Saponins, Glycosides, Coumarins, Anthraquinones, Anthocyanins	
5	<i>Tamarindus indica</i>	Bark	Aqueous	Alkaloids, Phenolic, Tannins, Flavonoids, Terpenoids, Saponins, Anthraquinones, Glycosides, Coumarins, Anthocyanins	
			Hydroethanolic	Alkaloids, Phenolic, Flavonoids, Terpenoids, Tannins, Glycosides,	

				Anthraquinones, Coumarins, Anthocyanins, Saponins	(Mehdi et al., 2019)
		Leaves	Ethanol	Alkaloids, Flavonoids, Phenols, Glycosides, Resins, Saponins, Tannins, Furocoumarins, Triterpenoids, Carbohydrates, Coumarins	
			Aqueous	Flavonoids, Phenols, Glycosides, Resins, Saponins, Tannins, Furocoumarins, Triterpenoids, Carbohydrates	
6	<i>Albizia richardiana Benth</i>	Bark	Methanol	Carbohydrates, Saponins, Glucosides, Glycosides, Alkaloids	(Rahman et al., 2015)
7	<i>Acacia catechue</i>	Leaves	Water	Carbohydrates, Alkaloids, Flavonoids, Resin, Protein, Anthocyanin, Saponin, Steroids, Tannins, Glycoside, Phenol, Terpenoids	(Tripathi et al., 2017)
			Methanol	Carbohydrates, Alkaloids, Flavonoids, Resin, Protein, Saponin, Steroids, Tannins, Phenol, Terpenoids	
			Petroleum ether	Carbohydrates, Alkaloids, Flavonoids, Protein, Anthocyanin, Steroids, Tannins, Glycoside, Phenol, Terpenoids	
		Stem	Water	Carbohydrates, Alkaloids, Flavonoids, Protein, Resin, Saponin, Anthocyanin, Steroid, Glycoside, Phenol, Terpenoids	
			Methanol	Carbohydrates, Alkaloids, Flavonoids, Protein, Resin, Saponin, Anthocyanin, Steroid, Phenol, Terpenoids	
			Petroleum ether	Carbohydrate, Alkaloid, Protein, Flavonoid, Steroid, Phenol, Glycoside	
		Roots	Water	Carbohydrates, Alkaloids, Flavonoids, Protein, Resin, Saponin, Anthocyanin, Steroid, Glycoside, Phenol, Terpenoids	
			Methanol	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Anthocyanin, Saponin, Steroid, Tannin, Phenol, Terpenoids	
			Petroleum ether	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Steroid, Tannin, Glycoside, Phenol	
8	<i>Prosopis cineraria</i>	Leaves	Water	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Steroid, Anthocyanin, Saponin, Glycoside, Phenol, Terpenoids	
			Methanol	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Saponin, Steroid, Tannin, Phenol, Terpenoids	
			Petroleum ether	Carbohydrate, Alkaloids, Flavonoid, Protein, Phenol, Glycoside, Anthocyanin	
		Stem	Water	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Saponin, Anthocyanin, Steroid, Glycoside, Phenol, Phlobatanin, Terpenoids	

			Methanol	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Saponin, Steroid, Tannin, Phenol, Phlobatanin, Terpenoids	
			Petroleum ether	Carbohydrate, Alkaloids, Flavonoid, Protein, Resin, Steroid, Glycoside, Phenol, Phlobatanin, Terpenoids	
9	<i>Passiflora edulis</i>	Fruit	Ethanol	Cardiac glycosides, Tannins, Flavonoids, Sterol, Emodols, Alkaloids, Anthracenosides, Glycosides, Saponins, Triterpenes, Phlobatinins, Reducing sugars	(Jagessar, 2017)
			Aqueous	Tannins, Emodols, Saponins, Anthracenosides, Glycosides, Reducing sugars	
10	<i>Vicia faba L.</i>		Ethanol	Cholesterol, Tannins, Cardiac glycosides, Flavonoids, Saponins, Emodols, Glycosides, Alkaloids, Phlobatinins, Reducing sugars	
			Aqueous	Tannins, Glycosides, Alkaloids, Sterol, Triterpenes, Saponins	
11	<i>Cyamopsis tetragonolobo L.</i>	Seeds	Methanol	Saponin, Quinone, Phenol, Steroids, Flavonoid, Cardiac glycoside, Terpenoid	(Ganatra et al., 2013)
			Ethanol	Quinone, Phenol, Flavonoid, Terpenoid	
			Acetone	Quinone, Phenol, Steroids, Flavonoid, Cardiac glycoside, Terpenoid	
			Ethyl acetate	Quinone, Phenol, Steroids, Flavonoid, Cardiac glycoside, Terpenoid	
			n-Hexane	Quinone, Phenol, Steroids, Flavonoid, Terpenoid	
13	<i>Abrus precatorius Linn</i>	Aerial parts	Methanol	Alkaloids, Flavonoids, Phenol, Saponins, Steroids, Tannins	(Gnanaraja et al., 2014)
14	<i>Cajanus cajan</i>			Flavonoids, Tannins, Saponin	
15	<i>Cicer arietinum Linn.</i>	Aerial parts	Methanol	Alkaloids, Phenol, Tannins, Flavonoids	(Arora et al., 2013)
		Seeds	Hexane	Phytosterols, Fixed oil and fats, Alkaloids, Phenols, Tannins, Flavonoids	
			Chloroform	Carbohydrates, Flavonoids, Glycosides	
			Ethyl acetate	Phytosterols, Phenols, Tannins, Flavonoids	
			Ethanol	Alkaloids, Carbohydrates, Phenols, Tannins, Flavonoids	
			Aqueous	Alkaloids, Carbohydrates, Proteins, Amino acid, Phenols, Tannins, Flavonoids	
16	<i>Clitoria ternatea Linn</i>	Aerial parts	Methanol	Alkaloids, Flavonoids, Phenol, Saponins, Steroids	(Gnanaraja et al., 2014)
17	<i>Dalbergia sissoo</i>			Alkaloids, Flavonoids, Phenol, Saponins, Steroids, Tannins	
18	<i>Delonix regia</i>			Alkaloids, Flavonoids, Phenol, Steroids, Tannins	

19	<i>Lens culinaris Medic</i>			Alkaloids, Flavonoids, Phenol, Saponins, Tannins	
20	<i>Millettia pinnata</i>			Alkaloids, Flavonoids, Phenol, Saponins, Steroids, Tannins	
21	<i>Tephrosia purpurea</i>			Alkaloids, Flavonoids, Phenol, Saponins, Steroids, Tannins	
22	<i>Trigonella foenum-graecum</i> Linn.	Aerial parts	Methanol	Alkaloids, Flavonoids, Phenol, Saponins, Steroids	(Gnanaraja et al ., 2014) (Kumari et al ., 2016)
		Seeds	Distilled water	Tannins, Flavonoids, Alkaloids, Terpenoids, Saponins, Cardiac glycosides, Glycosides, Reducing sugars, Phlobatanins, Steroids, Phenolic, Amino acids, Proteins, Quinones	
			Methanol	Tannins, Flavonoids, Alkaloids, Terpenoids, Saponins, Cardiac glycosides, Reducing sugars, Phlobatanins, Steroids, Phenolic, Amino acids, Proteins, Quinones, Anthraquinones	
			Acetone	Tannins, Flavonoids, Alkaloids, Terpenoids, Saponins, Cardiac glycosides, Reducing sugars, Phlobatanins, Steroids, Phenolic, Amino acids, Proteins, Quinones, Anthraquinones, Glycosides	
			Ethanol	Tannins, Flavonoids, Alkaloids, Terpenoids, Saponins, Cardiac glycosides, Reducing sugars, Phlobatanins, Steroids, Phenolic, Amino acids, Proteins, Quinones, Anthraquinones, Glycosides	
23	<i>Glycine max</i> Linn.	Seeds	Hexane	Fixed oil and fats	(Arora et al ., 2013)
			Chloroform	Phytosterols, Alkaloids, Proteins, Amino acids, Flavonoids	
			Ethyl acetate	Phenols, Tannins, Flavonoids	
			Ethanol	Phytosterols, Alkaloids, Carbohydrates, Proteins, Amino acids, Phenols, Tannins, Flavonoids, Glycosides	
			Aqueous	Alkaloids, Carbohydrates, Proteins, Amino acids, Phenols, Tannins, Flavonoids, Glycosides	
24	<i>Arachis hypogea</i> L.	Leaves	Ethanol	Alkaloids, Glycosides, Saponins, Phytosterols, Steroids, Phenols, Tannins, Anthraquinones, Carbohydrates	(Alex et al ., 2020)
			n-Hexane	Alkaloids, Glycosides, Saponins, Phytosterols, Steroids, Phenols, Tannins, Anthraquinones, Carbohydrates, Flavonoid	
			Ethyl acetate	Alkaloids, Glycosides, Saponins, Phytosterols, Steroids, Phenols,	

				Tannins, Anthraquinones, Carbohydrates, Flavonoid	
			Aqueous	Alkaloids, Flavonoid, Saponins, Carbohydrates, Tannins	
25	<i>Medicago sativa</i>	Leaves	Ethanol	Flavonoid, Phenol, Protein, Fixed oil, Alkaloids, Terpenoids, Saponins	(Ali et al ., 2016)
			Petroleum ether	Terpenoids, Phytosterols	(Savalia & Desai ., 2013)
			Chloroform	Alkaloids, Terpenoids, Phytosterols	
			Ethyl acetate	Alkaloids, Phenols, Flavonoids, Terpenoids, Phytosterols	
			Ethanol	Alkaloids, Phenols, Flavonoids, Terpenoids, Phytosterols	
			Water	Phenol, Saponins	
		Seeds	Petroleum ether	Alkaloids, Carbohydrates, Flavonoids, Phenols, Steroids, Terpenoids	(Gomathi et al ., 2015)
			Benzene	Anthraquinones, Alkaloids, Carbohydrates, Phenols, Steroids	
			Chloroform	Anthraquinones, Phenols, Saponins, Flavonoids, Tannins, Terpenoids	
			Ethyl acetate	Amino acids, Steroids, Tannins, Anthraquinones, Carbohydrates	
			Ethanol	Anthraquinones, Amino acids, Alkaloids, Carbohydrates, Flavonoids, Glycosides, Saponins, Tannins, Terpenoids	
			Methanol	Anthraquinones, Amino acids, Alkaloids, Flavonoids, Saponins, Tannins, Terpenoids	
			Aqueous	Alkaloids, Flavonoids, Steroids, Terpenoids	

CONCLUSION

Fabaceae family is known as pea, bean, pulse, or legumes family which is the third largest family in world wide. Legumes are essential for human nutrition and it is used in crops, manures and fodders. Legumes are also used for fixing of nitrogen. Fabaceae family consists several secondary metabolites. Even as per review various plants of Fabaceae family are present here by using of many solvents for extraction process to identified the presence of bio-active compounds in parts of plants.

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