FAMILY [LEGUMINOSAL OR FABACEA

[1] SYSTEMATIC POSITION

Class	-	Dicotyledonae
Sub class	-	Polypetalae
Series	-	Calyciflorae ➔ Flower Perigynous or Epigynous
Order	-	Rosales → Gynoecium – monocarpellary or polycarpellary and carpels are free. (Apocarpous)
Family	-	Leguminosae [Fabaceae]

MAIN CHARACTERISTICS

Flower	**-**	**Perigynous G-/Hypogynous** G
Gynoecium	-	Monocarpellary
Ovary	-	Unilocular
Placentation	-	Marginal

The ovary is superior and long in which two sutures are present – ventral suture and dorsal suture. The ovules are present in one row on the ventral suture.

Dissimilarities are found in the remaining characters. On the basis of these dissimilarities (inflorescence and floral characters) Leguminosae family is devided into **3 – subfamilies**

1. Papilionatae 2. Caesalpinoideae 3. Mimosoideae

[1] SUB – FAMILY ➔ PAPILIONATAE/LOTOIDEAE

IMPORTANT FEATURES

Sleeping movements commonly occurs in this family.

[1] **Roots :-** Roots are branched and tap root system is present. Root nodules are present. In root nodules N-fixing bacterium Rhizobium leguminosarum is present.

[2] **Leaves :-** Stipulate, Unipinnate, imparipinnate-means lamina is divided into many leaflets and leaflets are in odd number.

Many modification are found in leaves as follows :-

(i) Some of the leaflets of compound leaves of Pea are modified into tendrils for climbing.

(ii) All the leaflets of **Lathyrus odoratus** are transformed into the tendrils.

(iii) The stipules of leaves in both Pea and **Lathyrus odoratus** become Foliaceous (Which help in photosynthesis)

[3] Inflorescence :- Typical raceme or sometimes solitary axillary as - **Lathyrus aphaca.**

[4] General features of Flower :- Bracteate, bisexual, Perigynous/Hypogynous, penta merous and Zygomorphic symmetry. The zygomorphic symmetry is due to presence of different (odd) petals (dissimilar petals & androecium).

[5] Calyx :- Seplas 5, gamosepalous, aestivation valvate or imbricate and anterior sepals is odd.

[6] Corolla :- Petals 5, Papilionaceous (main feature) polypetalous, one petal is odd out of 5-petals, towards the mother axis – means posterior in position. It is the largest and outer most petal which is called **standard or vexillum.**

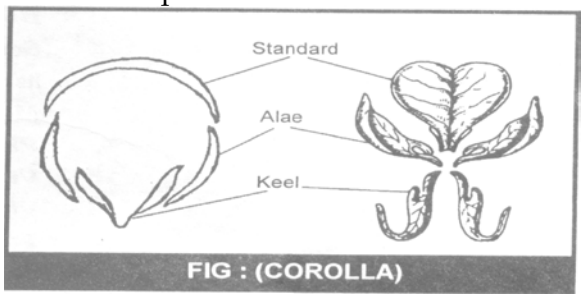


FIG : (COROLLA)

➔ Below the vexillum, two small free petals present are known as **wing** or **alae.** (lateral in position)

➔ The innermost two petals fused together to form a boat like structure called **keel** or carina which encloses the essential organs.

➔ Therefore such type of aestivation is called vexillary or descending imbricate.

***EXCEPTION**

Petals are absent in Lespedeza.

[7] ANDROECIUM

This is the second main diagnostic character for the subfamilies of Leguminosae.

→ Stamens – 10; Diadelphous 1 + (9) ;
9 stamens fused together to form a sheath around the pistil while the tenth posterior one is free

* **Exception →**
10 – stamens are free in **sophora**
10 – stamens are monoadelphous in Pongamia, Crotalaria, Lupinus cymopsis. (10)
The posterior stamen is absent in **Arachis, Dalbergia** and Abrus. 9 – stamens are present in them in Monoadelphous condition. (9)

[8] GYNOECIUM :- Gynoecium is monocarpellary, unilocular. Half inferior/superior and marginal placentation.

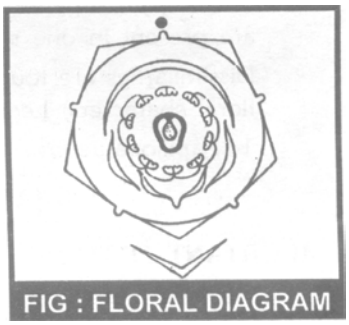
[9] FRUIT :- Legume or pod, dry, dehiscent, one chambered fruit. It has two suture and opens along the both (dorsal and ventral) sutures.
Sometimes Lomentum is also found as in **Arachis** (mungphali)

[10] SEED :- Nonendospermic

[11] FLORAL FORMULA :-

$$Br\ \oplus\ \delta\ \varphi\ K_{(5)}\ C_{1+2+(2)}\ A_{1+(9)}\ \underline{G}_1$$

[11] FLORAL DIAGRAM


FIG : FLORAL DIAGRAM

[12] ECONOMIC IMPORTANCE

[A] FOOD PLANT

[i]	Arhar (Pigeon pea)	=	**Cajanus cajan (Indicus)**
[ii]	Chana (Gram)	=	**Cicer arietinum**
[iii]	Mattar (Pea)	=	**Pisum sativum**
[iv]	Urad (Blak gram)	=	**Phaseolus mungo or vigna mungo**
[v]	Mung (green gram)	=	**Phaseolus radiatus (esculentus) or vigna radiatus**
[vi]	Masoor	=	**Lens esculenta or L. culinaris or Ervum lens**
[vii]	French bean or Kidney bean (Rajma)	=	**Vigna/Phaseplus vulgaris**
[viii]	Soyabean	=	**Glycine max (G. soja)**
[ix]	Gwar (cluster bean)	=	**Cymopisi tetragonoloba**
[x]	Meti	=	**Trigonella foenum graecum**
[xi]	Mungphali (Ground nut)	=	**Arachis hypogea.**
[xii]	Sem	=	**Dolichos lablab**
[xiii]	Horse gram	=	**Dolichos bifolras**
[xiv]	Agast tree	=	**Sesbania grandiflora** Its flowers are edible
[xv]	Kasoori Methi	=	**Medicago flacata**
[xvi]	Mothh	=	**Phaseolus aconitifolia or vigna aconitifolia**
[xvii]	Cowpea (chowla)	=	**Vigna Sinensis**
[xviii]	Asparagus bean	=	**Vigna catiang**
[xix]	Khaseri dal	=	**Lathyrus sativus** The lathyrism disease is produced by the use ofthis dal.
[xx]	Lima beam (Lobia)	=	Phaseolus lunatus

[B] FODDER

[i]	Alfalfa	=	**Medicago sativa**
[ii]	Van Methi (Sweet clover)	=	**Meliolotus indicus**
[iii]	Senji (Indian clover)	=	**Meliolotus alba**
[iv]	Berseem	=	**Trifolium alexandrium.** Used as green mannure
[v]	Bankla	=	**Vicla faba**

[C] FIBRES

[i]	Sunnhemp	=	**Crotalarla ternatea (Juncea)**
[ii]	Dhaincha	=	**Sesbania cannabinus**
			Hard fibres
[iii]	Ratti	=	**Abrus precatorius**

[iv] **Ougenia dalbergiodes**
[v] **Erythrina suberosa**

[D] TIMBER

[i]	Shisham	=	**Dalbergia sisso (Indian Red Wood)**
[ii]	Kala shisham	=	Indian rose wood = **Dalbergia latifolia**
[iii]	African black wood	=	**Dalbergia melanoxylon**
[iv]	Red sandal wood	=	**Pterocarpus santalinus**
[v]	Indian kino tree	=	**Pterocarpus marsupium**
[vi]	Hard sola	=	**Aeschynomeni aspara**

[E] DYES

[i] Red colour is obtained from red sandal wood = Pterocarpus santalinus

[ii]	Neel (Blue dye)	=	**Indigofera tinctoria** (dye is obtained from leaves)
[iii]	Fire of the forest from the flower	=	**Butea monosperma** orange, yellow dye is obtained
[iv]	**Crotalaria striata**	=	Black dye
[v]	**Psoralia plicata**	=	Yellow dye

[F] MEDICINAL PLANTS

(i) Muliathi (Liquoric) = **Glycyrrhiza glabra**
Its roots are used in coughs & cold.
(ii) **Krameria triandra** → The medicine for diarrhea → **"krameria"** is obtained
(iii) **Pongamia pinnata** → Oil of the seed is used for rheumatism.

[G] ORNAMENTAL

(i)	Butterfly pea	=	**Clitoria ternatea**
(ii)	Sword bean	=	**Cannavalia gladiata**
(iii)	Indian coral tree	=	**Erythrina indica**
(iv)	Indian telegraph plant	=	**Desmodium gyrans**
(v)	Glory pea	=	**Clianthus**
(vi)	Phool matar	=	**(sweet pea) – Lathyrus odoratus**
(vii)	**Sophora japonica**	=	**Japanese** pagoda tree
(viii)	**Lupinus albu**	=	
(ix)	**Pongamia pinnata**		

[H] INSECTICIDES :-

(i) Deris elliptica → Rotenone insecticide – rotenone is obtained.

[I] GUM

[i] Bengal kino = It is obtained from the **Butea** (dhak).

[ii] Balsam of Peru = Myroxylon balsemum

[iii] Gwar Gum = Edible gum obtained from the Gwar

[J] OTHER USES :-

(i) **Abrus precatorius** = Crab's eye = Ratti = Jweller's weight – jwellers use it's seeds as weight

(ii) Aeschynomeni **indica "Omfosm pith Plant"** → Its wood is spongy. toys are made from this.

(iii) **Dalbergia latifolia** – Its bark is used in tanning.

(iv) **Aschynomeni aspara** = Indian cork plant. It's wood used as cork.

(v) Silk worm lives on the stem of Butea.

(vi) **Alhagi pseudoalhagi** = Camel's fodder. From twigs screens (chiks) are manufactured

[2] SUB - FAMILY → CAESALPINOIDEAE

[1] **ROOT** :- Tap root system.

[2] **LEAVES**

Usually compound, Unipinnate, paripinnate.

But bipinnate in **Delonix**

Phyllode is found in **Parkinsonia** → means lamina falls and petiole is transformed into a leaf like structure.Such type of modification is for reducing of transpiration.

[3] **INFLORESCENCE** – Panicla or raceme of racemes or compound raceme

"Raceme of racemes."

[4] **GENERAL CHARACTER OF FLOWER**

Bracteate, bisexual, Perigynous/Hypogynous, pentamerous and zygomorphic symmetry of the flower is due to the presence of sterile stamens.

[5] **CALYX**

Sepals 5, polysepalous, imbricate aestivation, odd sepal is anterior one.

[6] **COROLLA**

Petals 5, all alike polypetalous, ascending imbricate aestivation (posterior petal is the innermost.)

* **EXCEPTION →**

Petals are absent in Ashok (Saraca) only 3 – petals are present in Imli (Tamarindus)

[7] **ANDROECIUM**

Stamens 10, free, arranged in two whorls/(Circles) 5 + 5 , some of them are sterile called as staminodes. Most of the genera have 3 staminodes.

* 7 Stamens are present in **Tamarindus,** monoadelphous, out of them 4 are staminodes.

* 5 – 8 normal stamens are present in Saraca (Ashok).

* 5 – normal stamens are found in **Bauhinia variegate** (Kachnar).

[8] **GYNOECIUM**

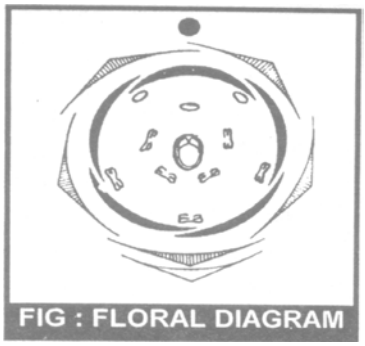
Monocarpellary, ovary half inferior/superior, unilocular, style long, stigma is simple and marginal placentation.

[9] **FRUIT**

Legume or pod is present.

* Lomentum is present in **Tamarindus.**

(10) Seed :- Nonendospermic or endospermic


FIG : FLORAL DIAGRAM

[11] FLORAL FORMULA

Br ⊕ ♂ K_5 C_5 A_{5+5} or A_{7+3} (Staminodes) $\underline{G_1}$

[12] FLORAL DIAGRAM

[13] ECONOMIC IMPORTANCE

(A) FOOD

(i)	Imail	=	**Tanarindus indica**
(ii)	Kachnar	=	(Camel's foot tree) = **Bauhinia variegate**
(iii)	Rawal	=	**Bauhinia purpurea**
(iv)	**Ceratonia Siliqua**	=	Seeds are rich in protein

(B) ORNAMENTAL

(i)	Amaitas	=	**Cassia fistula**
(ii)	Gulmohar	=	**Delonix regia**
(iii)	Nagput (Snake climber)	=	**Bauhinia anguinia**
(iv)	Ashok	=	**Saraca indica**
(v)	Peacock flower	=	**Caesalpinia pulcherima**
(vi)	Vilayati Kikar(Jeruselam Thorn)	=	**Parkinsonia aculeat**e
(vii)	Kachnar	=	**Bauhinia variegate**
(viii)	Ambrestia **nobilis**		

(C) TIMBER

(1)	**Brazil wood**	**=**	**Caesalpinia sappan**
(ii)	**Log wood**	**=**	**Haematoxylon compechianum–**It yields a dye **haematoxylin.**
(iii)	**Purple heart wood**	**=**	**Copaifera pubiflora**
(iv)	**West Indian locust wood**	**=**	**Hymaenia – carbaryl**
(v)	**Hardwickia binata**	**=**	Hardest and heaviest wood
(vi)	Imail	**=**	**Tamarindus indica**
(vii)	**Kingiodendron pinnatum**	**=**	It is used in agricultural implements.
(viii)	**Acrocarpus fraxinifolia**	**=**	It produces primitive type of wood.

(D) MEDICINES

(i) The raw fruits of amaltas **(Cassia fistula)** are used as laxative.
(ii) **Ashokarist** is obtained from the bark of Ashok tree (ayurvedic medicine)
(iii) The leaves and seed Cassia occidentalis and Cassia obtusifolia (also purgative) are used in **skin diseases**
(iv) The bark and leaves of Cassia glauca are used in **diabetes** and **gonorrhoea.**
(v) A tonic is prepared from the bark of Bauhinia variegate.

(E) OTHER USES

(i) **Phanera vahlii –** It yields a commercial gum and bark fibres are used for making **ropes** and **baskets.**
(ii) **Caesalpinia sappan – 'Gulal'** is obtained from its heart wood.
(iii) **Bauhinia purpurea** and ceratonia Siliqua are used as fodder.
(iv) The oil of **Kingiodendron pinnatum** is used for making **soap** and **paint**s.

[3] SUB – FAMILY – MIMOSOIDEAE

[1] **ROOT** :-
Tap root system and branched.

[2] **LEAVES**
Usually bipinnate paripinnate – means leaf lamina divided twice.
The stipule is modified into thorn as in **Acacia.**
Phyllode is found in Australian **Acacia.**
Most of the plants are xerophytes.

[3] **INFLORESCENCE –**
Two types of inflorescences are found in Mimosoidae family –

(i) CAPITATE (CYMOSE CAPITULUM)
The apical region of floral axis, becomes suppressed and swells up and bear sessile flowers e.g. Acacia.

(ii) SPIKE
This is a type of raceme inflorescence, but in which flowers are sessile.

[4] **GENERAL CHARACTER OF FLOWER**
Bracteate, bisexual, Actinomorphic symmetry, Perigynous/Hypogynous, tetramerous or pentamerous.

[5] **CALYX**
Sepals 4 or 5, gamosepalous, valvate aestivation.

[6] **COROLLA**
Petals 4 or 5, polypetalous or gamosepalous, valvate aestivation.

[7] **ANDROECIUM**
Many stamens , free, polypetalous.

* Monoadelphous stamens are present in **Albizzia.**
* 4 stamens which are free – found in **Mimosa.**
* In Prosopis 10 stamens are free

[8] **GYNOECIUM**
Monocarpellary, unilocular, half inferior/superior, marginal placentation.

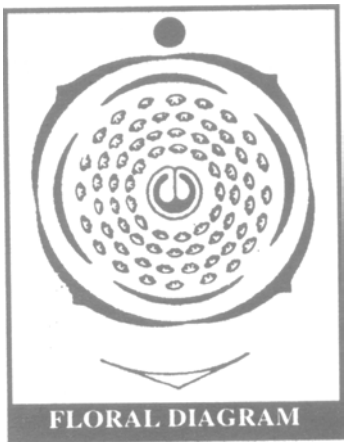
[9] **FRUIT**
Lomentum which is a type of Schizocarpic fruit, pericarp contract in between the seeds. It is divided into single seeded pieces during dehiscence. Each piece is known as **mericarp.** Single piece or unit is indehiscent.

(10)Seed :- Non endospermic

[11] FLORAL FORMULA

$$Br \oplus \delta\,♀\ K_{(4-5)}\ C_{4-5}\ A_{\infty}\ \underline{G}_{1}$$

[12]FLORAL DIAGRAM



[13]ECONOMIC IMPORTANCE

(A) Timber & fuel :-

(i)	**Acacia Arabica**	=	Deshi Babool. (Black wood)
(ii)	**Prosopis julifloraaa**	=	**Australian Babool.**
(iii)	**Xylia dolabini formis**	=	**Iron wood** (Jamboo)
(iv)	**Prosopis cinerariaaaaa**	=	Khejari (state tree of Rajasthan)
(v)	**Albizzia lebbek**	=	Siris
(vi)	**Acacia sundra**	=	Heaviest wood in India
(vii)	**Acacia julibrissi**n	=	Mimosa tree