

Lecture 09

Pulses

Fabaceae

(Subfamily – Papilionaceae, caesalpinaceae, mimosaceae.)

Distinguishing characters

Often climbers, bisexual flowers, generally Zygomorphic, sepals 5 with odd sepal anterior, generally more or less united. 5 petals and papilionaceous, stamens mostly 10, mono or diadelphous, carpel one with ventral suture posterior. Fruit mostly a legume.

Habit: Mostly herbs, shrubs or climbers wild as well as cultivated

Root: Taproot, which are branched and bear nodules containing nitrogen-fixing bacteria.

Stem: Erect herbaceous or woody, climbing by means of tendrils.

Leaf: Leaves may be simple or compound. Mostly alternate with leafy stipules. The leaves may be modified into tendrils.

Inflorescence: Usually racemose but may be Carymbose raceme.

Flower: Bracteate, bisexual, complete, Zygomorphic, irregular papilionaceous, and hypogynous.

Calyx: Five sepals, gamosepalous, odd sepal anterior with valvate aestivation inferior.

Corolla: 5 petals, polypetalous unequal with a descending imbricate aestivation papilionaceous, the outermost (posterior) petal is largest and forms the broad free standard (vexillum). The lateral pair of the side petals, which are also free and generally long clawed, forms the wings, while the anterior pair are closely appressed and often more or less coherent and forms the keel (carina) in which essential organs are closed.

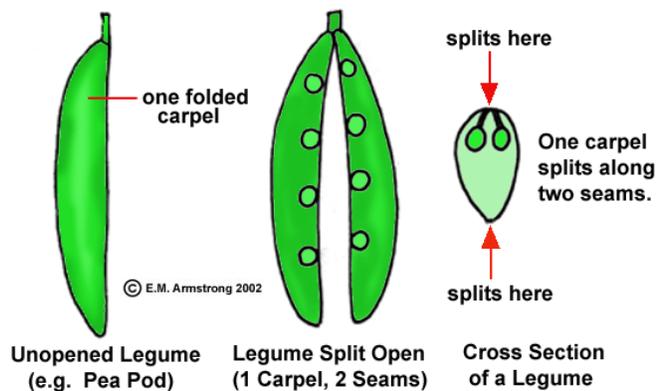
Androecium: 10 stamens, diadelphous 9+1

Anthers 2 celled dehiscence by longitudinal, inferior.

Gynoecium: Monocarpellary, superior, unilocular with marginal placentation. Style flattened

and hairy with a simple stigma.

Fruit: A legume (It develops from a monocarpellary superior ovary with marginal placentation. It dehisces along both the sutures)



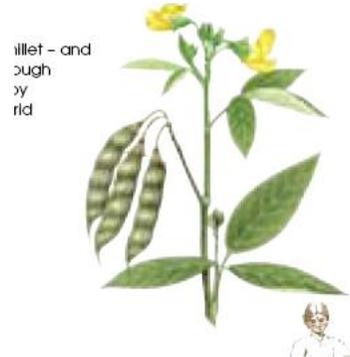
Seeds: Usually non-endospermic

1. **Legume or Pod:** Composed of one carpel.

Note: Some legumes are indehiscent and do not split open.

Red Gram - *Cajanus cajan* (2n=22)

There are two types of redgram varieties. 1) *Cajanus cajan* var, bicolor (Arhar). It is cultivated extensively in N. India. The Plants are woody tall and perennial in habit, large pod, bold grain. 2) *C. cajan* var, flavus. (Tur). It is cultivated in peninsular India. (S. India) Annual crop, medium tall to dwarf type, Medium grain pod. **Fruit** is a **pod**, which is variable in shape size, constriction color texture, and pubescence. Pods, which have deep constriction, are known as beaded while others are flattish. Seeds may be rounded or lens shaped and varying in color, size and shapes.



and

Bengal gram - *Cicer arietinum* (2n= 16)

In India it is one of the important pulse crop grown throughout the country. It is grown as a cold weather crop both in north and south India. It is drought resistant. There are two races Desi smaller grain and Kabuli bigger grain.

Fruit turgid pod normally containing one or two seeds which vary in size and shape and color. The seed coat may be smooth or puckered and wrinkled or roughly granulate. Cotyledons thick and yellowish.



Green gram *Vigna radiata* (2n = 22)

Green gram is indigenous to India and has been in cultivation since prehistoric times. Erect or semi erect herbaceous annual with slight tendency for twining in the upper branches. Leaves trifoliate with long petioles, stipules with basal appendage, stipules minute and leaflets entire ovate, flowers 10 – 20 crowded in axillary racemes on long pedicels, keel spirally coiled, stamens diadelphous (9+1) ovary with long bearded style. Pod longer than in black gram with short hairs.

Seeds globular with many five and wavy ridges on the surfaces, hilum flat cotyledonus yellowish. Pod seed as food for human being, green and dry plant as fodder.

Black gram *Vigna mungo* (2n = 24)

Black gram is cultivated in many tropical and subtropical countries in several parts of Asia Africa and C&S America. It is a twining herb, annual plant, densely hairy, stem slightly ridged, leaves alternate, stipulate, petiolate, Pinnately trifoliate. Inflorescence axillary raceme with flowers congested at the top of the peduncle. Flowers 5-6. Shortly pedicelled bisexual, hypogynous, Zygomorphic, Complete. Sepals 5 gamosepalous, imbricate corolla papilionaceous, petals five, polypetalous keel in the form of spiral beak. Androecium diadelphous (9+1) filament alternately long and short. Gynoecium superior ovary, monocarpellary unilocular marginal placentation. Fruit – Legume densely hairy seeds, generally black.

Soybean - *Glycine max* (2n=40)

Soybean is one of the most important legume food of the people of far eastern countries like China and Japan and are chiefly used as a pulse. The seeds are rich in protein and are of high biological value. It is also rich in fat and vitamins, being good source of calcium and phosphorus. It has oil content upto 20 % and protein 40 %.

Cowpea *Vigna unguiculata* (2n=22)

It is grown in warm parts of the world. Tender leaves are used as greens from the vegetable type cowpea. Sprouted seed as vegetables. Grain as pulses. Whole plant as green fodder. Cow pea and maize green fodder mixture is excellent for cattle. *Vigna unguiculata* sub species *unguiculata* grain cowpea

Vigna unguiculata sub species *sinensis* grain cowpea

V. unguiculata sub species *sesquipedalis* yard long bean- vegetable cowpea

Dolichos group of pulses

The dolichos are twining herbs with stipulate, trifoliate leaves. Flowers are racemose or axillary, calyx tube short, corolla is much exerted petals equal in length keel is obtuse not spiral, stamens are diadelphous. Ovary nearly sessile. The pod is flat linear or oblong.

Lab-Lab: *Lablab purpureus* 2n=22, 24 (var. *typicus*)

Garden or pandal avarai is perennial, but cultivated as annual. The pods are long tapering. It was no oil glands and no smell. Entire pod is edible. *Lablab purpureus* var *lignosus* (Field bean, Mochai) it is a semi bushy type. Podes relatively shorter, oblong, and fibrous seeds. Plant give a mochai odour

Gingelly - *Sesame indicum* (2n= 26) Pedaliaceae.

Botany of Pedaliaceae.

They are Annual or perennial, leaves opposite or upper alternate, simple, exstipulate, flowers hermaphrodite, Zygomorphic, calyx 5 cleft, corolla gamopetalus 5 lobed, 2 lipped, stamens 4, anthers convenient in pairs, 2 celled, disc hypogynous, ovary superior, 1 celled with 2 intensive parietal placentas, the cell again often divided by superior septa, fruit a capsule or nut. Seeds without endosperm, embryo. Straight with flattened cotyledons

Distinguishing characters

Stem quadrangular in shape, Basal leaf opposite, upper leaf alternate. Presence of extra floral nectary gland as peduncle base. Corolla bell shaped, biliped and five lobed. Androecium-epipetalous didynamous stamens. Ovary bicarpellary, by presence of false septa appear as four loculed. Seed color varies from pure white to various shades of brown and gray to black. Seed coat may be rough or smooth.