

2. SUBTERRANEAN PARTS

- Roots appear 1st from the germinating seed known as the **PRIMARY ROOTS**.
- Can branch and provide seedlings with water & mineral nutrients in the 1st stage of growth.
- Replace with secondary roots which can be very numerous, helps retain soil particles to prevent erosion.
- **SECONDARY OR ADVENTITIOUS ROOTS** are those that developed from the nodes of tillers or creeping stems.

B. REPRODUCTIVE ORGANS

The Floral Organs are **MODIFIED SHOOTS**, consisting of **STAMENS** and **PISTILS**.

INFLORESCENCE: The flowers or inflorescences may be terminal, or axillary. The basic unit of the inflorescence is the **SPIKELET**, which consists of flowers usually occurring in groups or clusters.

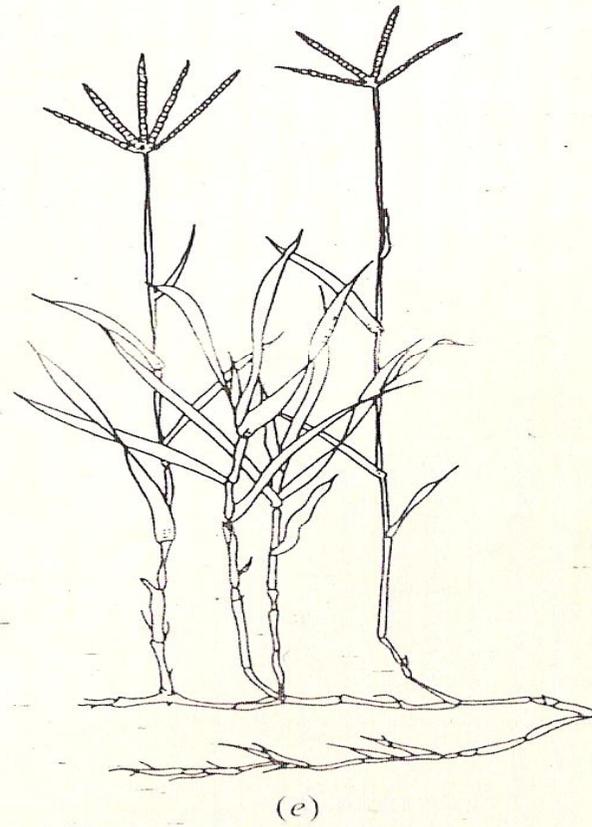
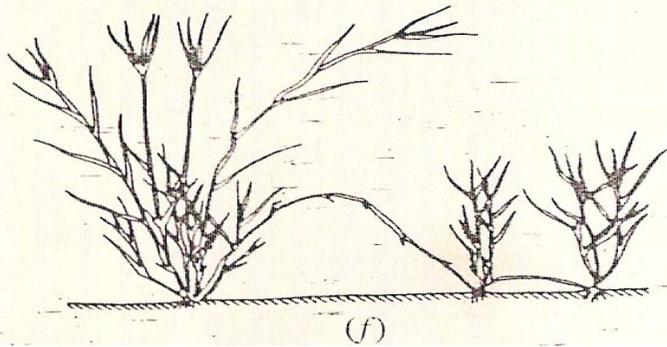
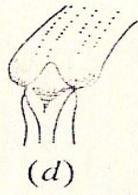
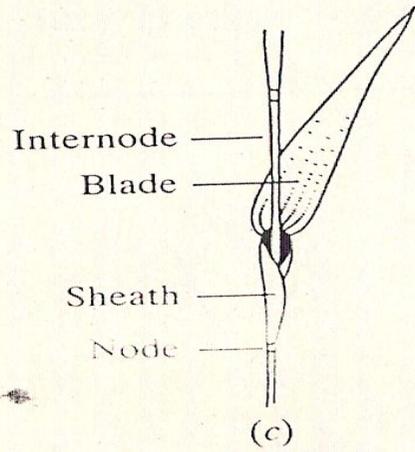
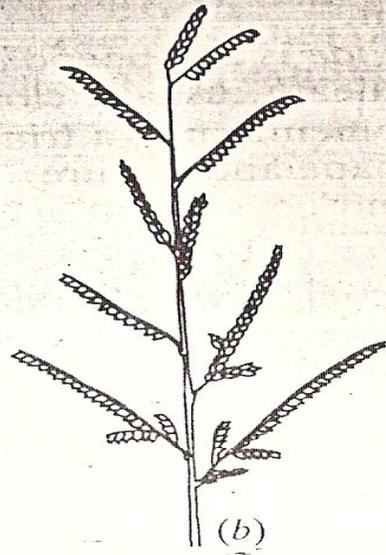
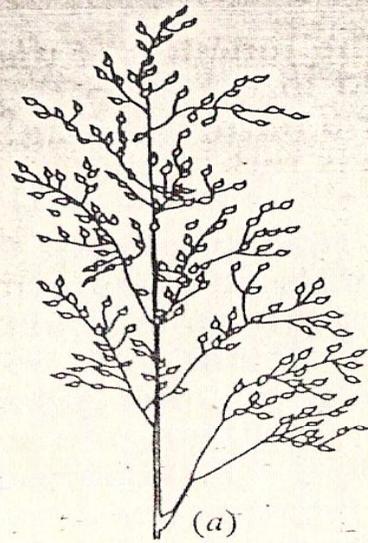
SPIKELET: A typical spikelet consists of an axis (rachilla), two glumes and one to many florets. The perfectly developed floret has a glumes and a palea (lower and upper bracts, respectively) which enclose the flower. The structure of the lamina is such that it provides protection for the seeds and perhaps means of dispersal. The palea is shorter than the lemma and thinner.

Inflorescence types are classified as:

- 1. SPIKE:** the spikelets are sessile (without stalks) or nearly so, on an UNBRANCHED axis (rachis) eg. *Lolium*, *Triticum*, *Secale*, *Hordeum*, *Agropyron* or be ONE-SIDED eg. *Ctenium elegans* or DIGITATE (finger like) as in *Chloris* and *Cynodon* Spp. or RACEMOSE on a central axis as in *Dactyloctenium* and *Leptochloa* spp.
- 2. RACEME:** spikelets have pedicels along the axis, eg. *Digitaria*, *Paspalum* and *Brachiaria* spp. Racemes are more frequent than spikes.
- 3. PANICLE:** spikelets have short stalks on a branched inflorescence with a central axis and a number of side branches. The panicle may be open and loose (*Panicum maximum*), contracted (*Sporobolus* and *Sorghum* spp.) or spike-like and dense (*Cenchrus ciliaris* and *Setaria anceps*) or 'false-spike' when the branches of spike-like panicle are concealed by the spikelets (*Pennisetum purpureum*).

THE FLOWER

- The floral organs consists of the gynoecium (female parts), androecium consists of three or one to six, stamens. Each stamen has a slender filament supporting a two celled slender filament supporting a two-celled anther, which consists of the pollen grains. Anther are coloured yellow, purple reddish or may be mottled.
- The lodicules base of the flower, outside the stamens.
- The flowers of most grasses are perfect (hermaphrodite) i.e the florets have both stamens and pistils except members of the tribe maydese. Zea mays-male & female separated on the same plant.



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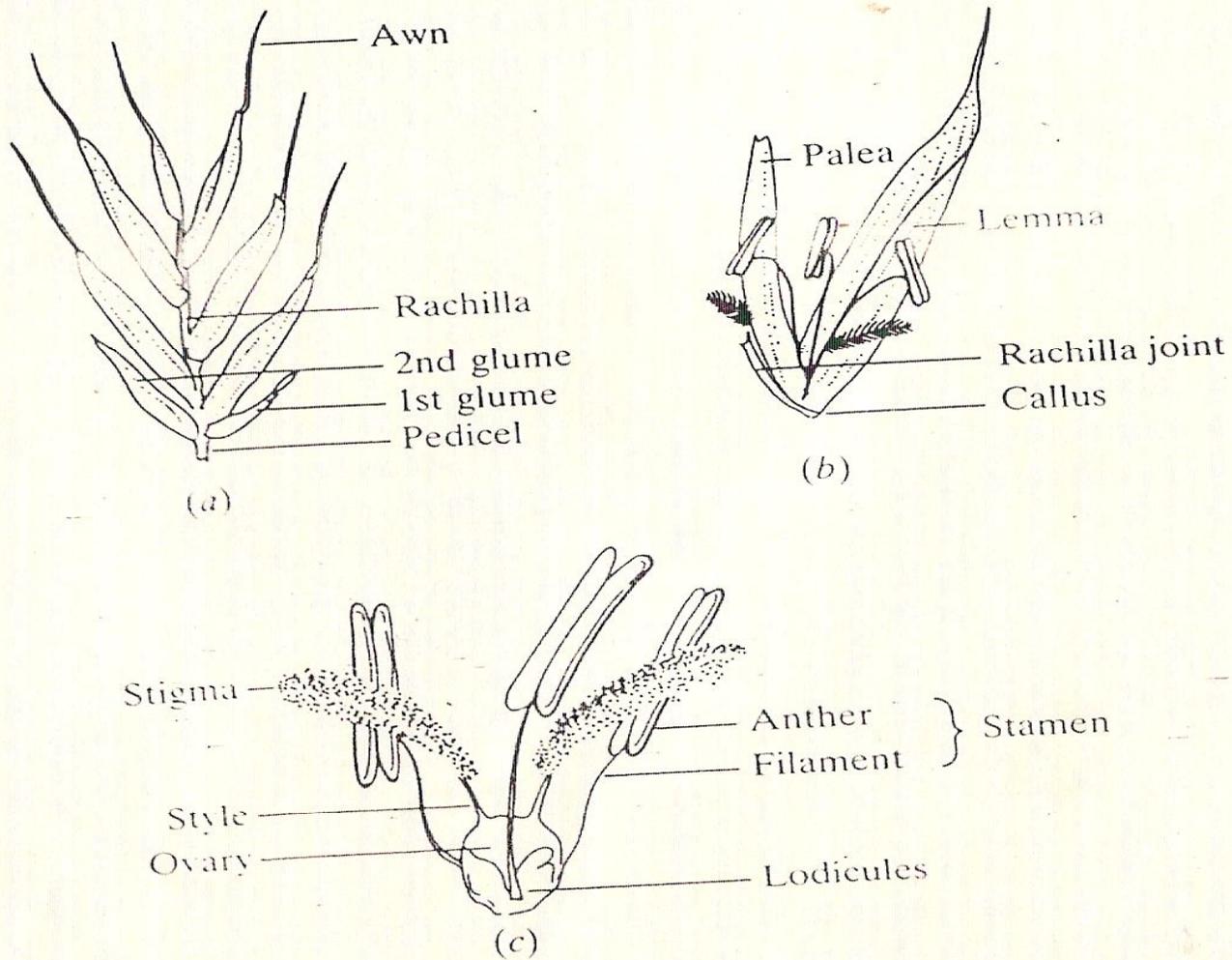


Fig. 3.2 Flowering of the grass plant: (a) Spikelet showing arrangement of florets; (b) Floret opening at blooming time; (c) Typical grass flower showing essential reproductive organs.

Botany of legumes

- Legumes are dicotyledonous, i.e. the embryo consists of two cotyledons or seed-leaves). The legume family is sometimes divided into three groups or subfamilies: Mimosoideae, woody plants and herbs with regular flowers; caesalpinoideae, plants with irregular flowers; papilionaceae, herbaceous and woody plants with a distinctive papilionate or butterfly shaped flower. Most of the forage and economically important legumes belongs to papilionaceae family. Legumes may be annuals, biennials or perennials.
- Vegetative organs
- Aerial parts
- There are distinct morphological differences among the legumes but general characteristics of some plant are similar and rather uniform. The above ground portion consists of a main stem with axillary branches, usually compound leaves, stipules and inflorescences.

Tillers sometimes arise from the basal portion of the stem (crown) and stems also develop axillary branches. The stems are jointed, with nodes and internodes, and are usually hollow, except at the nodes. They may be covered with hairs or may be glabrous. Herbaceous stems contain chlorophyll. The leaves contain a common leaf stalk (petiole), with 3 or more leaflets, each with its own stalk (petiolule). The leaves could be 'palmately' compound i.e. leaflets directly attached to the end of the petiole e.g. *Centrosema pubescense* or 'pinnately'

Compound when the petiole extends into a long slender structure with leaflets e.g. *Clitoria ternatea*. Some have leaflets modified to tendrils e.g. *Lathyrus spp.* Presence of *pulvinus* is the characteristic feature of legume family.

Stipules are leaf-like outgrowths at base of the main leaf stalk, vary in shape and size and used for identification of species. The leaflets and stipules may be smooth or possess hairs. The veins on the leaves are netted pattern unlike parallel venation of grasses.

Reproductive organs

Inflorescence

- The Mimosoideae produce flowers in dense heads or small globular, spike – like inflorescences, and commonly has the floral parts arranged in the sets of four, They are rendered conspicuous by the long, coloured filaments of the numerous stamens. e.g *Leucaena leucocephala* and *Acacia spp.*
- The caesalpinoideae flowers appears in clusters or racemes, with overlapping petals .The stamens are usually separated e.g *cassia spp.*, *Ceratonia spp.* and *Gleditschia*.
- The flowers of papilionaceae are arranged in racemes as in *Desmodium spp.* in heads as in *Trifolium spp.* or spike-like racemes as in *Medicago sativa*. There is a central axis, along with the individual flowers develop. Each flower has its own short stalk or peduncle. The inflorescence may be terminal or auxiliary.