

Lecture 1

BOTANY AND SYSTEMATICS OF GRASSES AND LEGUMES

Grasses belongs to family Gramineae (Poaceae). They are made up of two main parts: shoot or tillers (aerial parts) and roots (subterranean parts) with the reproductive parts included at flowering. They are MONOCOTYLEDONOUS i.e. possess one seed leaf. They are HERBACEOUS (non-woody), divergent in size, shape and growth habit, can be annual or perennial in life form.

A. VEGETATIVE ORGANS

1. AERIAL PARTS

The shoots consists of the stem (culm, haulm) and the leaves. The **stems** are cylindrical or rounded and jointed i.e made up of **nodes** separated by **internodes**. Internodes can be hollow (e.g. *Brachiaria mutica*) filled with white pith (e.g. *Zea mays*, *Sorghum vulgare* and *Hyparrhenia spp.*) or solid e.g. *Axonopus scoparius*). stems can be glabrous or pubescent. Shoots develop from buds found at the nodes and produce side branches.

The basal portion of tufted grasses is called CROWN. Stolons are creeping stems that grow above the surface of the ground and develop roots and shoots at the nodes. Examples of grasses with stolons are *Pennisetum clandestinum*, *Cynodon nlemfuensis* and *Digitaria pentzii*.

The leaves consists of the sheath, ligule and the leaf blade. leaf blades are borne on sheaths. Leaves are situated on stem in opposite rows alternatively. The leaf sheath have free edges and chlorophyll. Leaves could be smooth or rough

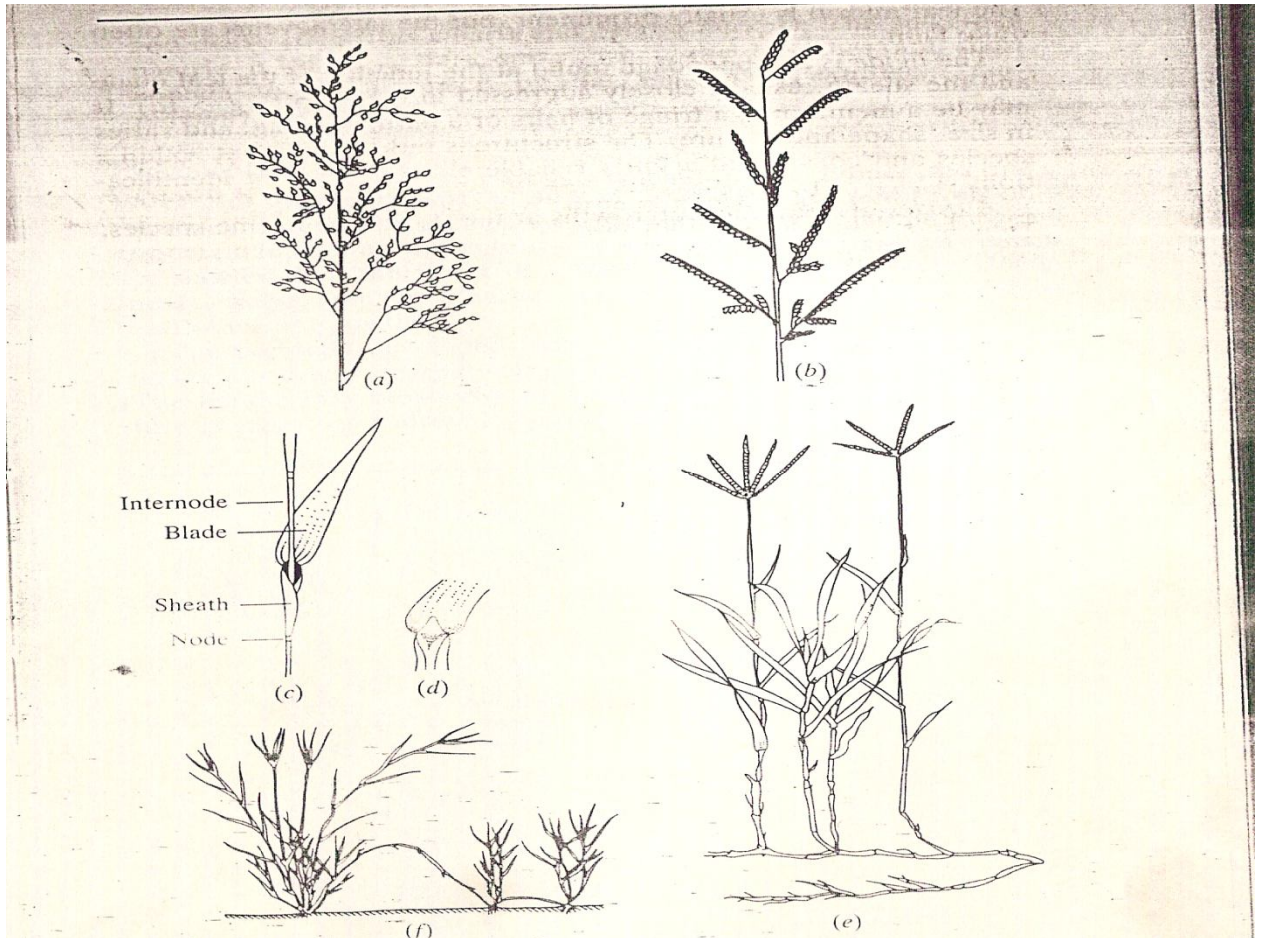
The Leaf blade can be setaceous (wiry and bristle) or filiform (thread-like). The midrib is usually prominent with faint lateral veins.

LIGULE is an appendage found at the junction of the leaf blade and the sheath, usually closely ad pressed to the culm. It may be a membrane, a fringe of hairs or a hardened ring and varies in size, shape and texture, can be used for identification.

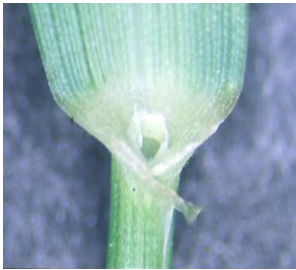
AURICLES are earlike outgrowths at the leaf base of some spp. They can be prominent and encircle the stem, minute and inconspicuous or absent, no chlorophyll, no function, but use in taxonomic identification.

COLLAR: marks the junction of the outer surface (upper region) of the sheath and leaf blade, usually discoloured, leaves breaks at the collar.

PROPHYLLUM: is a two-keeled organ (a reduced leaf) covering the bud in the axil of the sheath.



Auricles



Present



Blunt



Absent

Ligule



Absent



Membranous

Sheath

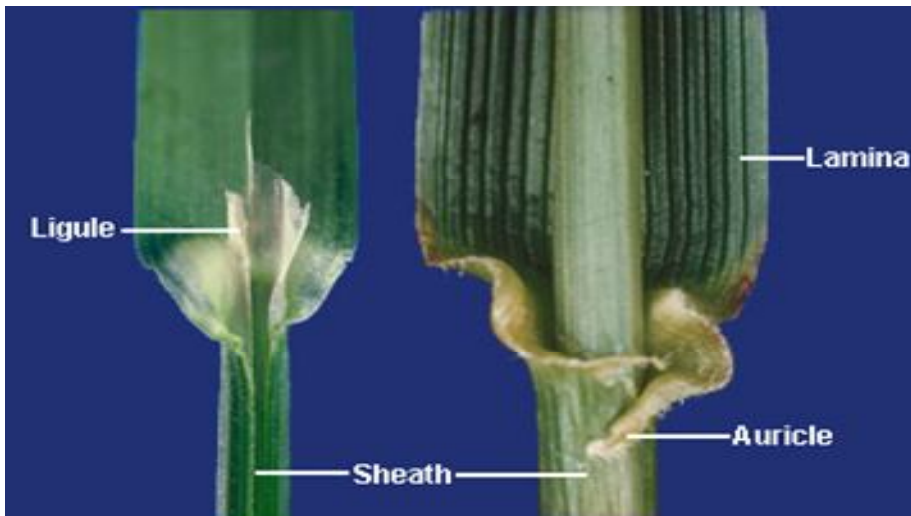
- Fused or overlapping



Fused



Overlapping



2. SUBTERRANEAN PARTS

Roots appear first from the germinating seed and are known as the PRIMARY ROOTS. Primary roots can branch and provide seedlings with water and mineral nutrients in the first stage of

growth. They are then replaced with secondary roots which can be very numerous, which 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

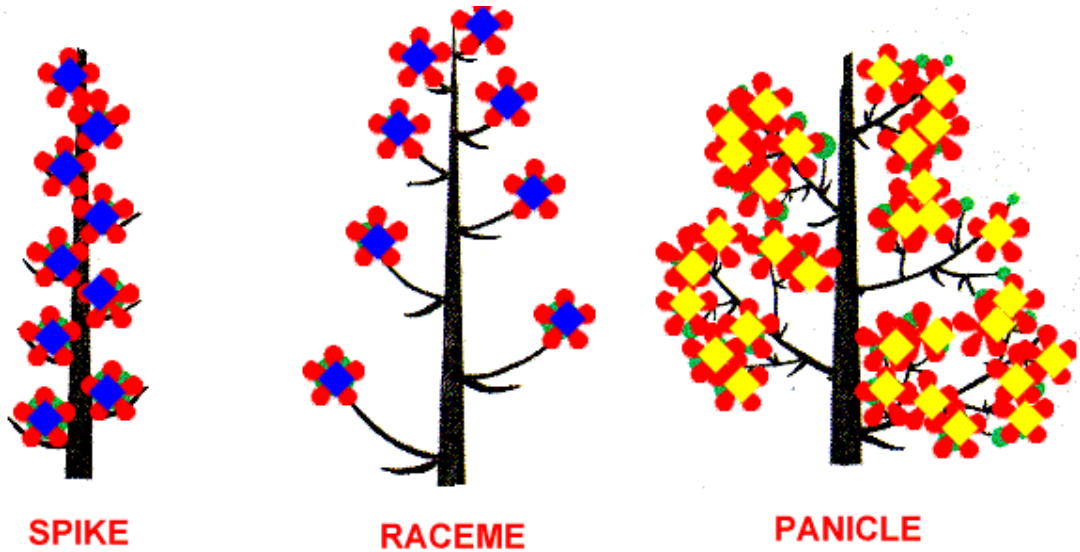
The Floral Organs are MODIFIED SHOOTS, consisting of STAMENS and PISTILS. The floral organs are called inflorescence.

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 lemma 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 and female separated on the same plant.

ture is such that...

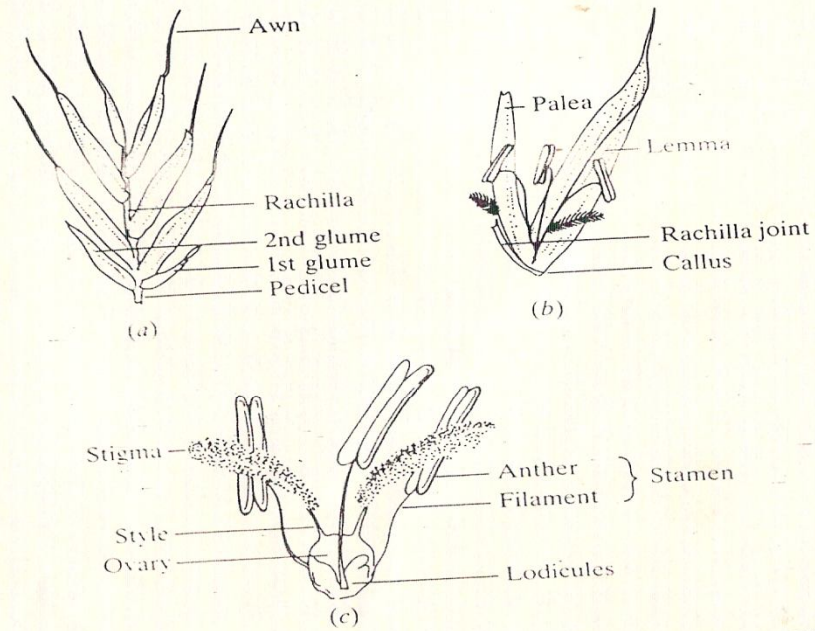


Fig. 3.2 Flowering of the grass plant: (a) Spikelet showing arrangement of florets; (b) Floret opening at blooming time; (c) Typical grass flower showing essential reproductive organs.

Grass plant

