PRM 505
PRINCIPLES OF PASTURE AND RANGE SCIENCES

COURSE LECTURER
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- BOTANY AND SYSTEMATICS OF PASTURE PLANTS
- IDENTIFICATION AND CLASSIFICATION OF TROPICAL FORAGE SPECIES
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- PHYSIOLOGY OF PASTURE PLANTS
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- VEGETATION BELTS OF NIGERIA AND ADAPTATION OF FORAGE SPECIES
- SOIL – PLANT – ANIMAL INTERRELATIONSHIPS
- SOME TERMINOLOGIES

TEXTBOOKS

- 1. WHITEMAN, P.C. 1980: TROPICAL PASTURE SCIENCE. PUBLISHED BY OXFORD UNIVERSITY PRESS.
- 2. HOGSON, J. AND ILLIUS, A. W. 1996: THE ECOLOGY AND MANAGEMENT OF GRAZING SYSTEMS. CAB INTERNATIONAL WALLINGFORD, USA.
- 3. MICHEAL, B. JONES AND ALEC LAZENBY, 1988:THE GRASS CROP. THE PHYSIOLOGICAL BASIS OF PRODUCTION CHAPMAN AND HALL LTD USA.
- 4. PEARSON, C.J. AND ISN, R. L. 1987: AGRONOMY OF GRASSLAND SYSTEMS. CAMBRIDGE UNIVERSITY PRESS NY.

- 5. CROWDER, L.V. AND CHHEDA, H.R. 1982. TROPICAL GRASSLAND HUSBANDARY. TROPICAL AGRICULTURE SERIES. LONGMAN LONDON.

- 6. HUMPHERYS, L.R. 1991: TROPICAL PASTURE UTILIZATION. PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE NY.

- 7. BOGDAN, A.V. 1977: TROPICAL PASTURE & FODDER PLANTS (GRASSES & LEGUMES). TROPICAL AGRICULTURE SERIES. LONGMAN LONDON

INTRODUCTION

- **WHAT THE COURSE ENTAILS**
- **1. WEEKLY PRACTICALS**
- **2. TEST AT INTERVALS STATED IN THE MANUALS.**
- **3. LIVELY LECTURES**
- **4. DRAWINGS**

BOTANY AND SYSTEMATICS OF GRASSES AND LEGUMES

- **GRASSES BELONGS TO FAMILY GRAMINEAE (POACEAE)**
- **MADE UP OF TWO MAIN PARTS: SHOOT OR TILLERS (AERIAL PARTS) & ROOTS (SUBTERRANEAN PARTS). AT FLOWERING THE REPRODUCTIVE PARTS ARE INCLUDED.**
- **MONOCOTYLEDONOUS**
- **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

- **SHOOTS** CONSISTS OF STEM (CULM, HAULM) AND THE LEAVES.
- **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.

BOTANY OF GRASS PLANT (CONTINUED)

- **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. E.g. *Pennisetum clandestinum*, *Cynodon nlemfuensis* and *Digitaria pentzii*.**

- **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.**

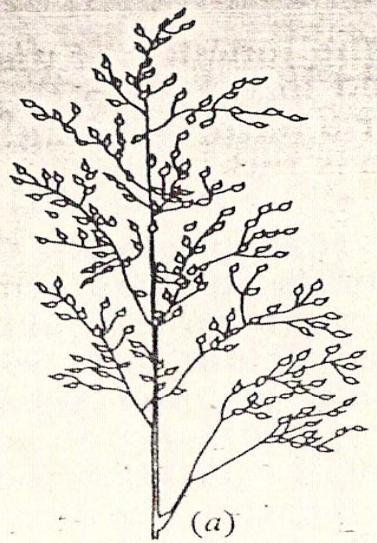
SHEATH: edges are free, have chlorophyll.
Leaf blade can be setaceous (wiry and bristle) or filiform (thread-like)
Leaves could be smooth or rough
Midrib is usually prominent with faint lateral veins

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 & varies in size, shape & 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 & 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.



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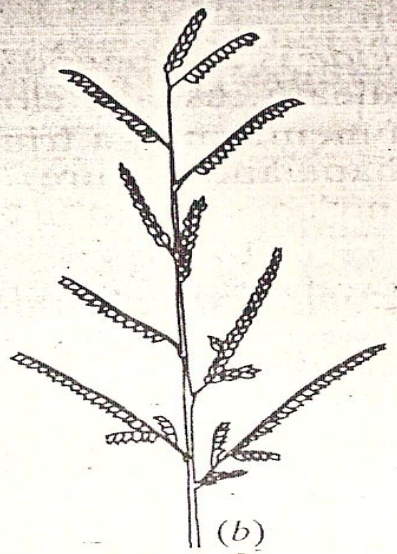

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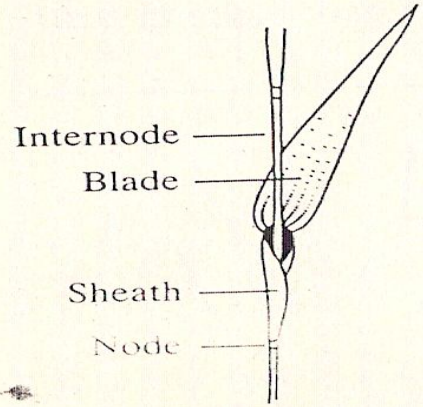

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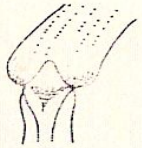

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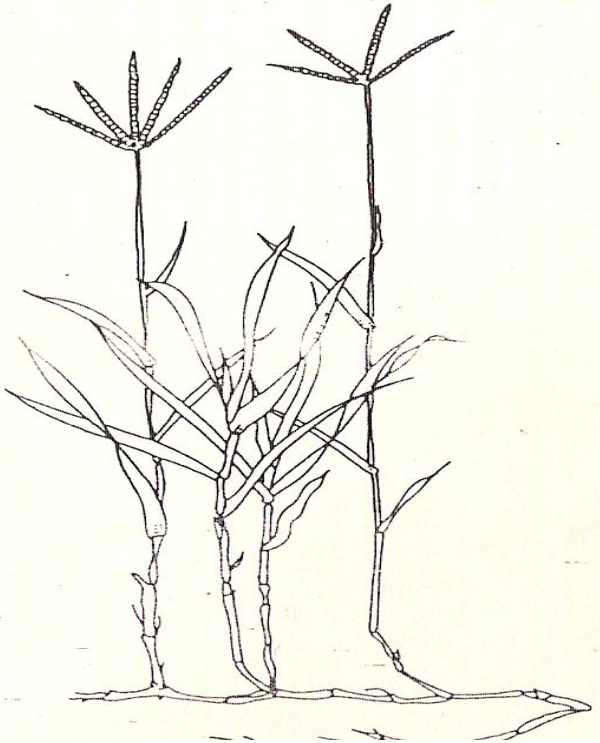
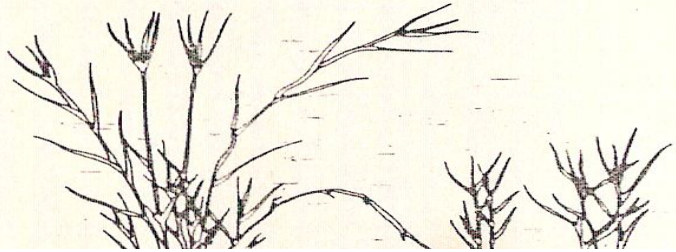
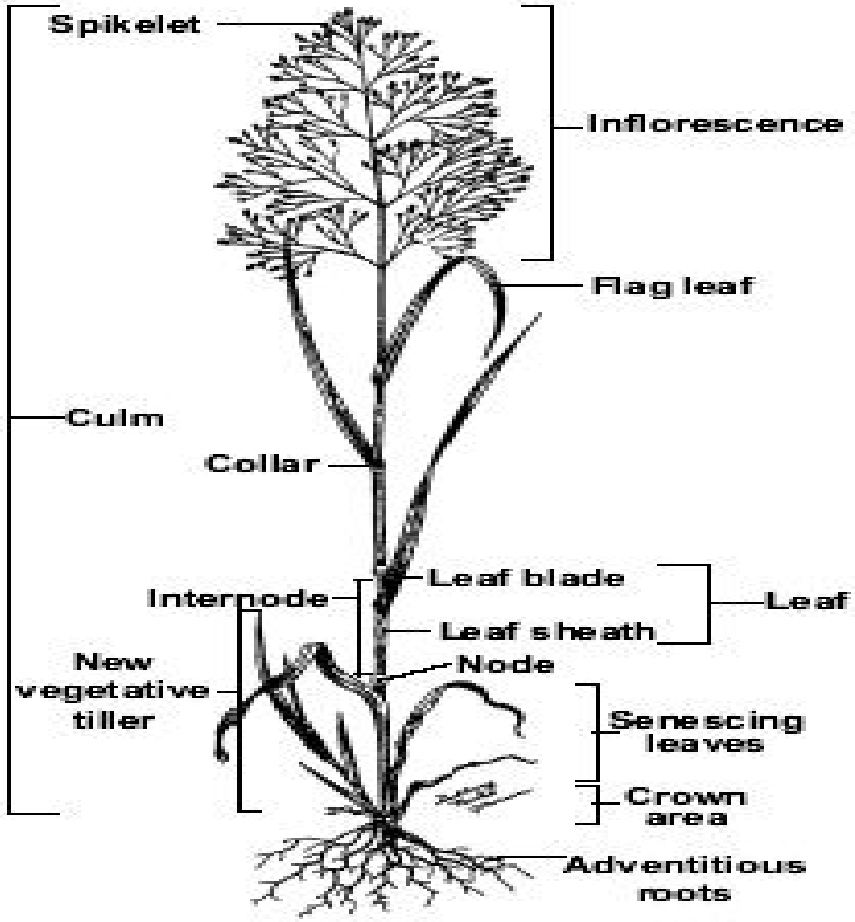
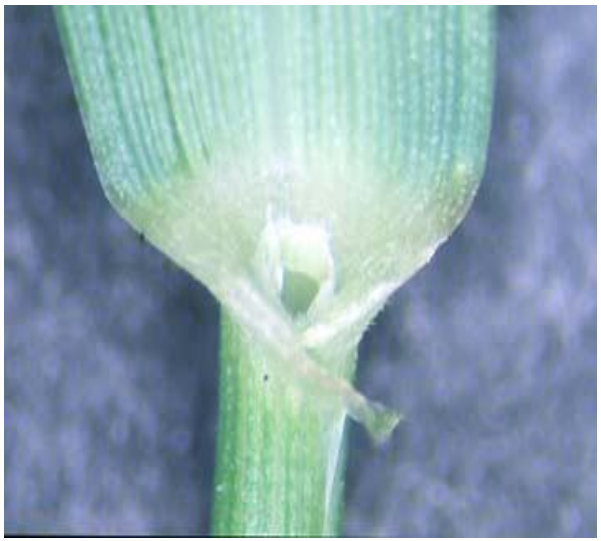




Grass plant


Spikelet
Inflorescence
Flag leaf
Culm
Collar
Leaf blade
Internode
Leaf
Leaf sheath
New vegetative tiller
Node
Senescing leaves
Crown area
Adventitious roots

Auricles



Present

Blunt

Absent

Ligule

Absent

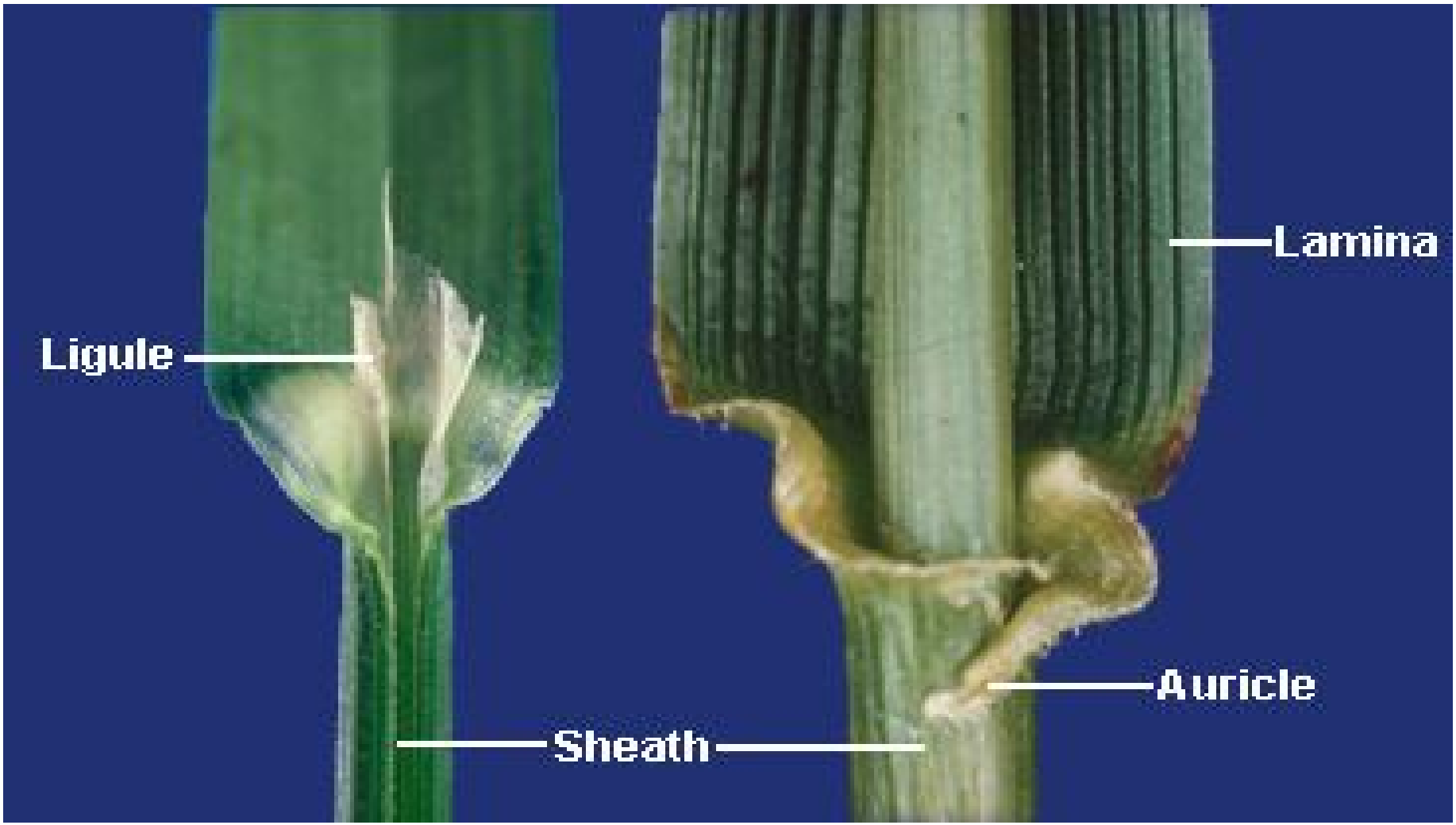
Membranous

Sheath

- Fused or overlapping

Fused

Overlapping


Lamina
Ligule
Auricle
Sheath

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 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.

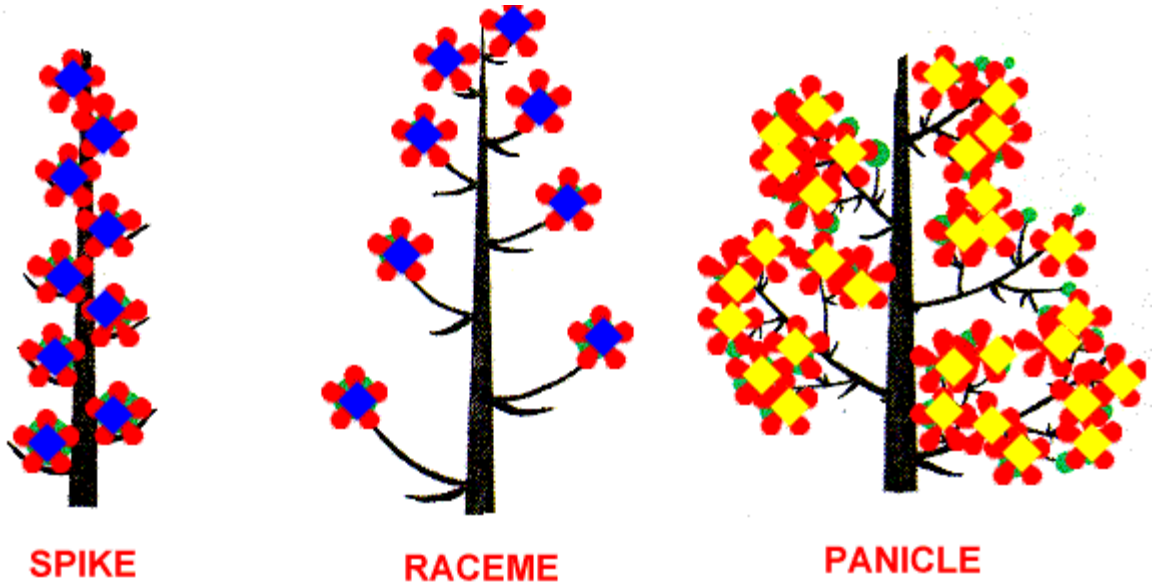
Inflorescence types are classified as:

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*).

Grass Inflorescence



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.**

ture is such that

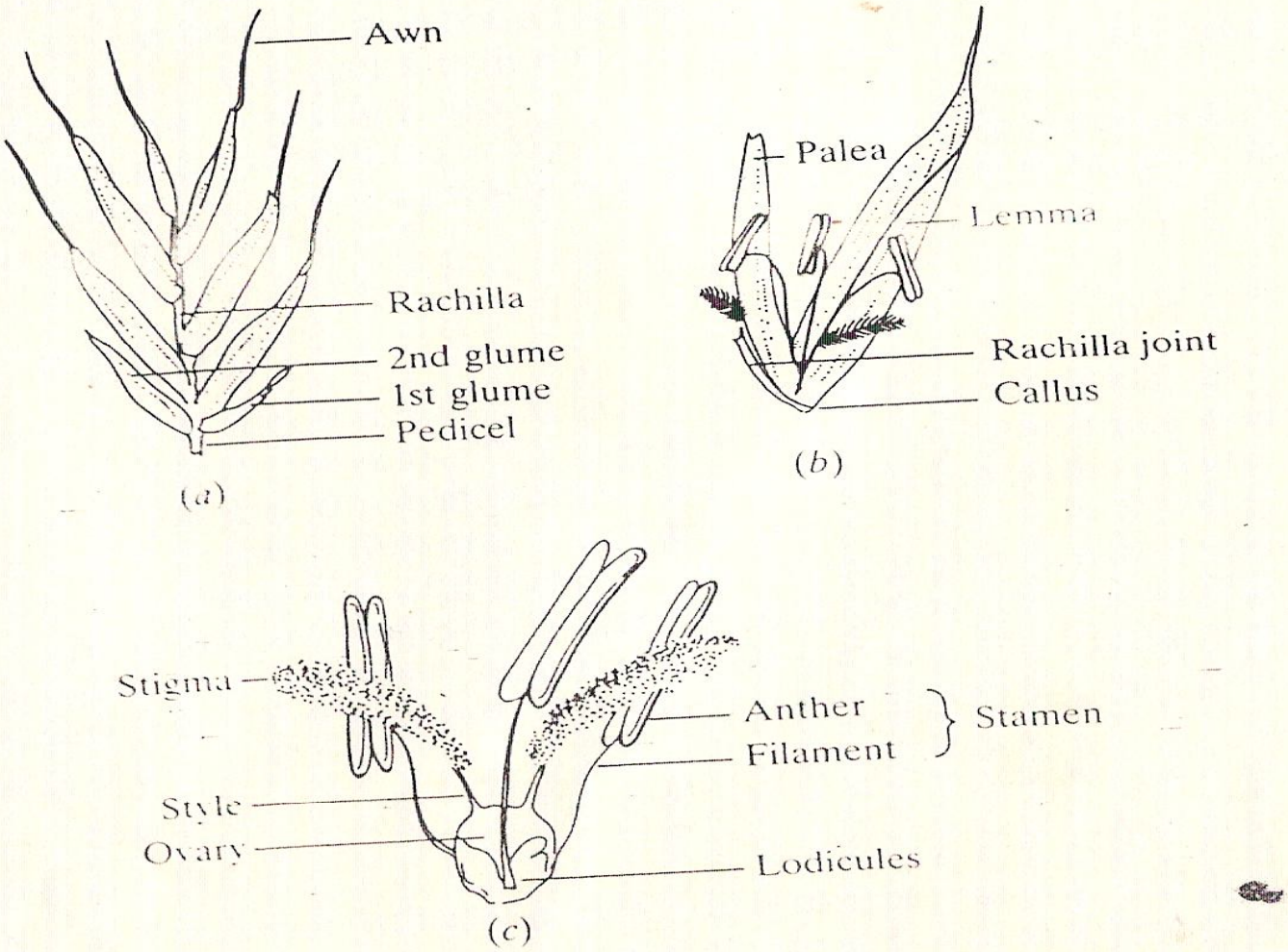


Fig. 3.2 Flowering of the grass plant: (*a*) Spikelet showing arrangement of florets; (*b*) Floret opening at blooming time; (*c*) Typical grass flower showing essential reproductive organs.