Grasses are monocots

**MONOCOTS**
- One cotyledon
- Veins usually parallel
- Vascular bundles usually complexly arranged
- Fibrous root system
- Floral parts usually in multiples of three

**Dicots**
- Two cotyledons
- Veins usually netlike
- Vascular bundles usually arranged in ring
- Taproot usually present
- Floral parts usually in multiples of four or five
Basic grass morphology

- **Inflorescence**  
  *or seedhead*
- **Leaf**  
  *or lamina*
- **Culm**  
  *or stem*
- **Root crown and roots**

Culm

- **Culm**  
  - hollow or pithy jointed stem on grasses, sedges and rushes
- **Nodes**  
  - joints along stem where leaves are borne
- **Internode**  
  - portion of stem between two successive nodes
Modified Stems

• **Adventitious stems**
  – either rhizomes or stolons

• **Stolons** (runners)
  – above ground, horizontal stems with nodes, internodes and leaves

• **Rhizomes**
  – underground, horizontal stems; will grow a plant and roots at a node

Leaf

• **Leaf Blade**
  – part of leaf the bends away from stem, usually flat to facilitate photosynthesis

• **Sheath**
  – tubular, lower part of leaf that encloses stem
Leaf

• Flag Leaf
  – The upper most leaf of a grass often sticks out perpendicular to the stem and is called the “flag leaf”

Leaf

• Sheath
  – tubular, lower part of leaf that encloses stem
  – 3 general types:
Leaf

• Collar
  – outer side (abaxial) of leaf at junction of sheath and blade
  – two structures found inside collar
    – ligules
    – auricles

Leaf

• Ligule
  – membrane-like tissue (or line of hairs)
  – on adaxial (inner) side of collar
  – extends from junction of sheath and blade

• Auricles
  – small appendages at junction of blade and sheath
Leaf

Ligules can be:

- Hairy
- Absent
- Membrane-like

Leaf

Auricles can be:

- Short - Stubby
- Long-Clawlike
- Absent
Inflorescence

• The group of flowers or seeds in a grass.
• Arranged on the stem: spike, raceme or panicle

Types of Inflorescence

• Spike
  – flowers sessile (without a stalk) along the rachis

Bottlebrush squirreltail
(*Elymus elymoides*)

Crested wheatgrass
(*Agropyron crestatum*)

Bluebunch wheatgrass
(*Elymus spicatus*)
Types of Inflorescence

- **Panicle**
  - primary axis bears branched secondary axes with pedicellate spikelets
  - “branching branches”
  
  ![Switchgrass (Panicum virgatum)](image1)
  ![Cheatgrass (Bromus tectorum)](image2)

Types of Inflorescence

- **Raceme**
  - unbranched axis bearing spikelets
  - not very common in grasses
  
  ![Little bluestem (Schizachyrium scoparium)](image3)
**Inflorescence**

Made up of spikelets which are groups of flowers, called florets

- **Spikelet**
  basic unit of inflorescence
  usually consisting of:
  - 2 glumes
  - 1 or more florets
    – Made of palea & lamma

- The branch at the base of the spikelet is a pedicel and any branches inside the spikelet are called rachilla

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**Inflorescence**

- **Glumes**
  – pair of bracts at base of spikelet

[Diagram of inflorescence with annotations]
**Inflorescence**

**Floret = Palea + Lamma**

- **Palea**
  - Inside bract of floret (above lemma)

- **Lemma**
  - Outer bract of floret (subtends flower & palea)

- **Awn**
  - Slender bristle
  - Extension of lemma
**Inflorescence**

- First (only) floret
- Second glume
- Spikelet (Aveneae)
- Palea
- Dorsal awn
- Lemma
- Rachilla
- Floret (Aveneae)
- Spikelet (Poaceae)
- Lemma awn
- Rachilla
- Floret (Poaceae)

**Growth Habits**

**Caespitose**
- growing in a dense clump
- bunchgrass

**Rhizomatous**
- Spreads by rhizomes
- Sod forming

**Stoloniferous**
- Spreads by stolons
- sod-forming

- **Crown**
  - persistent base of perennials