IV. GRASS
STRUCTURE AND MORPHOLOGY
• Morphology ~ structure and arrangement of plant parts.

• Morphology and growth process \(\Rightarrow\) essential for identifying plants and understanding management and environmental effects on forage yield, quality, and persistence.

• Morphological structure \(\Rightarrow\) dictates use and how specific plants respond to management
Forage Grass Identification

Growth habits and structure and how these affect their adaptation to environments and management practices.
Taksonomi tanaman

1. **Kingdom**: Plantae
2. **Division/ Phylum**: Spermatophyta
3. **Class**: Angiospermae
4. **Subclass**: Monocotyledonae
5. **Order**: Graminales
6. **Family**: Poaceae/ Graminaceae
7. **Genus**: Panicum
8. **Species**: *Panicum maximum* (rumput Benggala)
Grasses

- World: **10,000** Species
- US: **1400** Species

Grasses:

1. C₄: grow best under **warm** and often **dry** conditions (warm-season).
2. C₃: grow best under **cool** and generally **moist** conditions (cool-season).
3 Sub Family

1. Festucoid
2. Panicoid
3. Chloridoid
Struktur rumput

SHOOT

ROOT
Inflorescence/ karangan bunga:

Spikelets (basic reproductive unit)
Orientation offer identifying traits
• Spike (spikelets are attached directly to rachis)
• Raceme (spikelets connected to rachis by pedicels)
• Panicle (branched and pedicelled spikelets)
Spike
(A)

Raceme
(B)

Panicle
(C)

- Attached directly to the rachis
- Connected to rachis by short stalks (pedicels)

Branched, less

Structure and Morphology
**Fig. 2.1.** Mature grass floret showing the lemma, palea, and caryopsis. The caryopsis is technically a fruit because it is a mature ovary that adheres to the outside of the mature ovule, which is the true seed.
Lodicule

Filament

Anther

Stigmas

Style

Ovary

Lemma

Palea

smaller/inner bract

(F)

Monoeccious/dieccious

Seed

Synopsis

swelling by absorbing water to help force open the lemma & palea
Leaves

- Smooth
- Waxy
- Hairs
- Tip Shape
- Rolled vs. Folded
- Color
Leaves folded or rolled
Auricles

• Present, blunt, or absent
Ligule

- Absent, membranous.
Sheath

(B)

Open  Closed  Split-overlapping margins
Meristems

Where the action is on grass plants

Phytomer

- Basic repeating unit of growth of grass tiller
  - Leaf blade
  - Leaf sheath
  - Node
  - Internode
  - Axillary bud
    - Active shoot apex
    - Initiates phytomer components
Modifikasi Batang (stem):
Tipe rumput

1. Bunched (tanpa rhizome and stolon) membentuk open sod.
2. Rhizomatous $\rightarrow$ membentuk sod
3. Stoloniferous $\rightarrow$ membentuk sod.
Root/ akar

→ Akar serabut

1. Seminal roots: akar yang tumbuh dari embryo, dapat tetap ada pada rumbut setahun.

Developmental Stages

- Vegetative
- Elongation
- Boot
- Anthesis
- Mature seed
Orchardgrass  
*Dactylis glomerata* L.

These species perennate by producing new tillers. Orchardgrass is a bunchgrass and lacks either rhizomes or stolons. The inflorescence is a panicle made up of several short, thick tufts.
Orchardgrass

*Dactylis glomerata* L.

- Tip ends of leaf blades sharp pointed, V-shaped in cross section at base, sharply creased below, deep furrow over midrib, edges rough; lower surface dull, not glossy, no auricles present; large ligule
Kentucky bluegrass

*Poa pratensis* L.

Numerous tillers and prolific rhizome production make Kentucky bluegrass a good sod crop for heavy traffic situations such as horse pasture.
Timothy

*Phleum pratense* L.

No auricles, ligule is a white membrane with a distinct notch and tooth on each side. Flat, light-green, nearly smooth leaf blades.
Timothy

*Phleum pratense* L.

Inflorescence is a very dense, spike-like panicle. Onion-like bulbs or corms at the base of the stems.
Annual Ryegrass
*Lolium multiflorum* Lam.

Leaf blades of annual ryegrass are rolled in the bud (in contrast to those of perennial ryegrass, which are folded). The *ligule* is membranous and *Auricles* are narrow and hairless. Annual ryegrass heads typically have more florets per flower and usually have awns.
Perennial Ryegrass

*Lolium perenne* L.

V-shaped leaves with sharp-pointed tip prominently ribbed on the top and smooth and shiny on the bottom. The auricles are small, soft and claw-like. The ligule is a thin membrane that is toothed at the top. The stems are flat and short. Perennial ryegrass leaves are flattened in the bud, in contrast to annual ryegrass leaves, which come out rolled.
Smooth Bromegrass *Bromus inermis* Leyss.

The sheath is closed. The blade is 4-12 mm wide, 15-40 long and flat with a sharp, pointed tip. The collar is narrow and divided by the mid-rib. There are no auricles. The ligule is a very short membrane. Rhizomes.
Smooth Bromegrass
*Bromus inermis* Leyss.

Inflorescence is a large panicle with the branches spreading in all directions.
Tall Fescue

*Festuca arundinacea* Schreb.

- The inflorescence is a spreading panicle.
Tall Fescue

*Festuca arundinacea* Schreb.

The yellowish auricles are soft and wavy and have a few fine hairs along their margins. The ligule is a small membrane. The blade is 4-12 mm wide, 20-70 cm long and flat with a sharp-pointed tip. It is thick and leathery, very smooth and shiny on the under-surface but dull and deeply ridged on the upper surface. The edges are rough.
Reed Canarygrass
*Phalaris arundinaceae* L.

- This large, coarse grass has erect, hairless stems, usually from 2 to 6 feet.
- Leaf blades are wide, flat, and often harsh on both surfaces.
Reed Canarygrass
*Phalaris arundinacea* L.

- The compact panicles are erect or sometimes slightly spreading
- The ligule is prominent and membranous
Quackgrass

*Elytrigia repens*

- Membranous ligules that are less than 1 mm long and also have narrow auricles that clasp the sheath. Leaves are rolled in the bud and are approximately 1 1/2 to 12 inches long and usually 2 to 3 mm wide.
Quackgrass
_Elytrigia repens_

Rhizomes and a fibrous root system. Seedhead a long, narrow spike consisting of many individual spikelets arranged in 2 rows along the stem.
Tugas: Membuat gambar morfologi rumput & herbarium

- Kertas manila putih (A0)
- Tulis dan gambarkan tiap bagian morfologi rumput.
- Buat Herbarium rumput disertai taksonominya.
- Dikumpulkan tanggal 3 Oktober 2011.