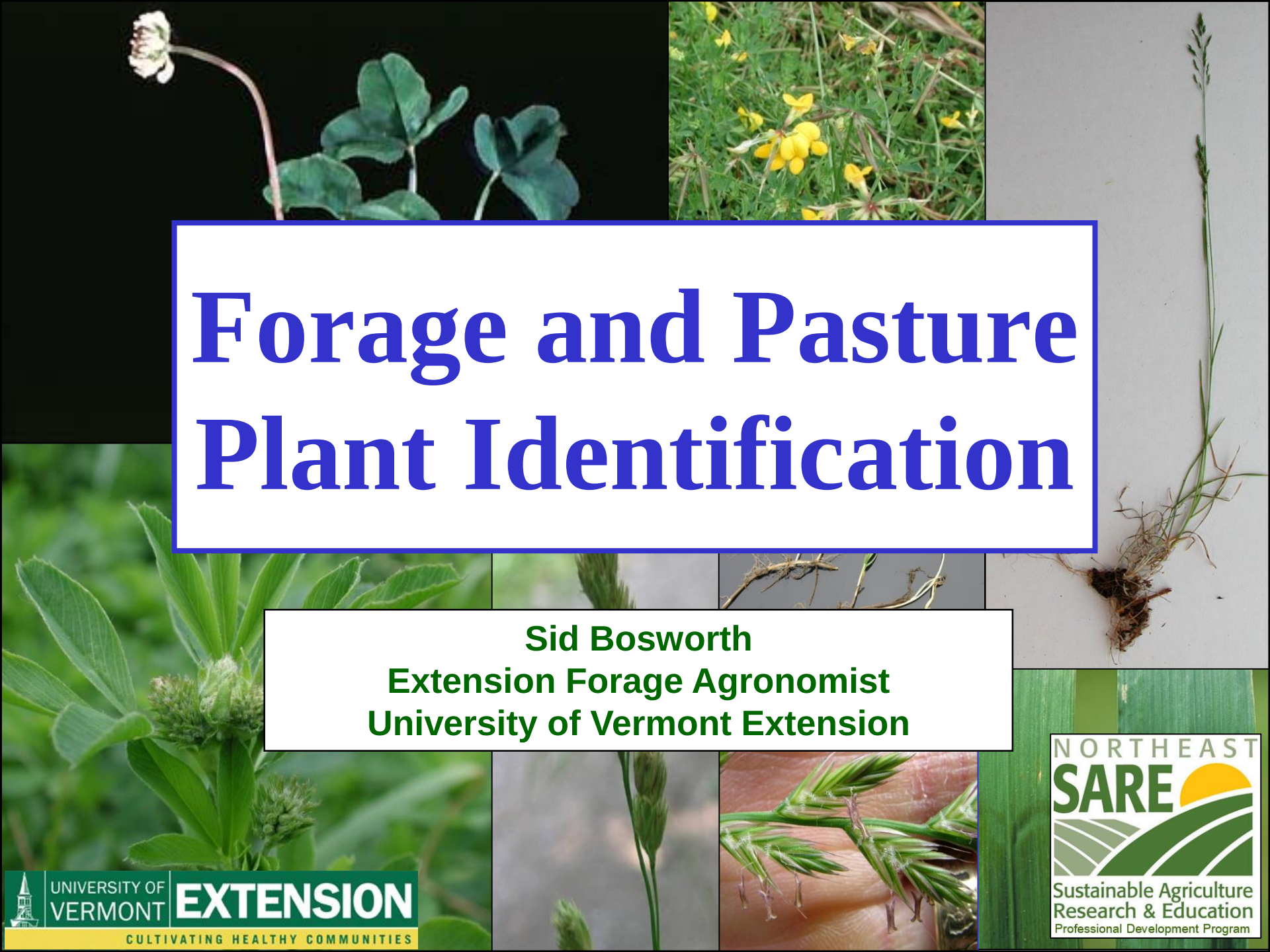




Forage and Pasture Plant Identification

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Extension Forage Agronomist
University of Vermont Extension

References for Identifying Pasture Plants

Websites for Pasture Plant Identification:

From The University of Vermont:

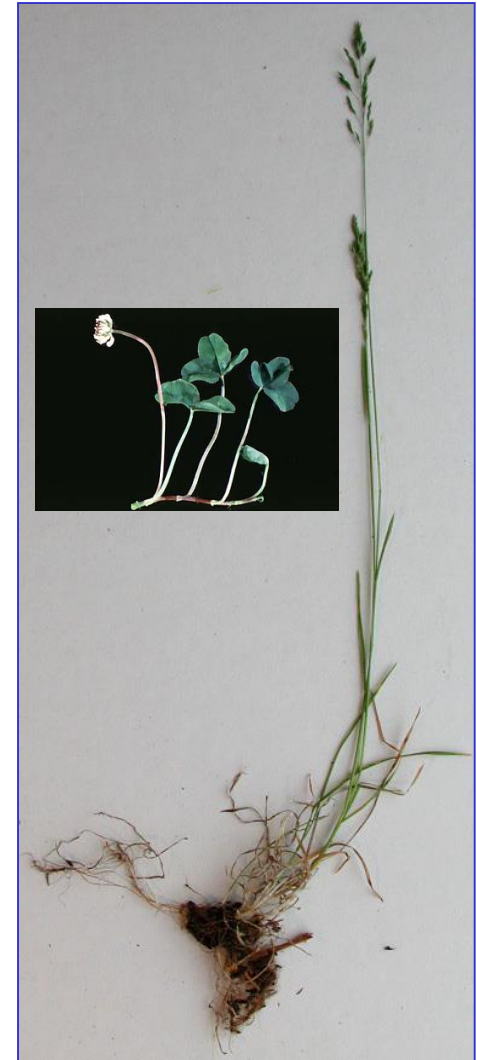
- Identification Guide for Forage Legumes Grown in the Northeast
<http://pss.uvm.edu/vtcrops/articles/ForageLegumeID.pdf>
- Identification Guide for Forage Grasses Grown in the Northeast
<http://pss.uvm.edu/vtcrops/articles/ForageGrassIDTable.pdf>

From Purdue University:

- Forage Identification Website
<http://www.agry.purdue.edu/ext/forages/forageid/forageid.htm>

From University of Wisconsin:

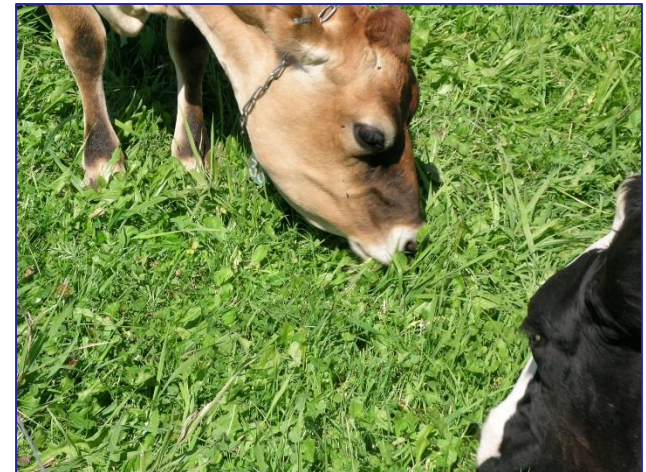
- Identifying Pasture Grasses
<http://learningstore.uwex.edu/pdf/A3637.pdf>
- Identifying Pasture Legumes
<http://learningstore.uwex.edu/Assets/pdfs/A3787.pdf>



Forage Plant Identification

What to look for in IDing plants:

- Plant Characteristics
 - Growth habit (morphology)
 - Vegetative characteristics
 - Reproductive characteristics
 - Seedhead (Inflorescence)
 - Flower type and color
 - Pods
- Site adaptation



Forage Grasses



Grass Adaptation

Species	Soil Moisture Adaptation	Soil Fertility Adaptation	Drought Tolerance	Periods Of Production	Relative Maturity ¹	Growth Habit	Height Classification
Cool-Season Grasses							
Kentucky Bluegrass	Well-drained to moist	Good to medium	Poor	Early spring and late fall	Early	Dense sod - rhizomatous	Short
Timothy	Well-drained to moist	Medium to fair	Poor	Late spring and fall	Medium-late to late ²	Bunch	Tall
Smooth Bromegrass	Well-drained	High to good	Good	Spring, summer and fall	Medium-late	Open sod - rhizomatous	Tall
Orchardgrass	Droughty to moist	Medium to fair	Good	Early spring, summer and fall	Early to medium ²	Bunch	Tall
Reed Canarygrass	Droughty to wet	Medium to fair	Very good	Early spring, summer and fall	Medium-late	Open sod - rhizomatous	Tall
Tall Fescue	Droughty to moist	Medium to fair	Good	Early spring, summer and fall	Medium-late	Bunch ³	Tall
Perennial Ryegrass⁴	Well-drained to moist	Good to medium	Poor	Early spring and late fall	Early to medium ²	Bunch	Short to medium
Festulolium⁴	Well-drained to moist	Good to medium	Poor	Early spring and late fall	Early	Bunch	Medium

¹ Maturity classification refers to the relative time of heading and depends not only on species but also on variety.

² There is a wide maturity range amongst varieties for timothy, orchardgrass and perennial ryegrass.

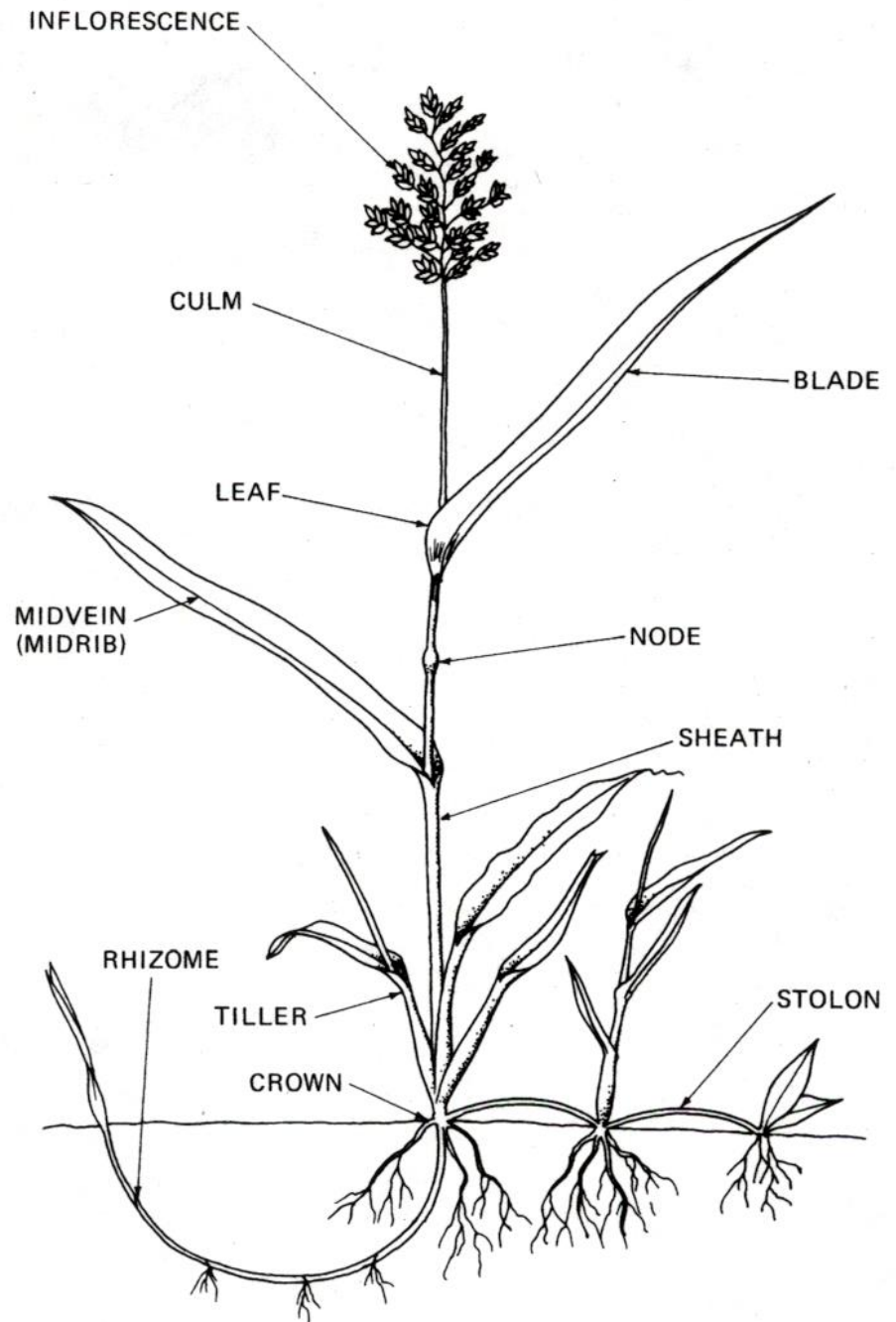
³ The growth habit of tall fescue is primarily as a bunchgrass but some varieties can produce short rhizomes under intense cutting or grazing management.

⁴ Best adapted to locations with mild winters or where snow cover is reliable, promoting longer stand life.

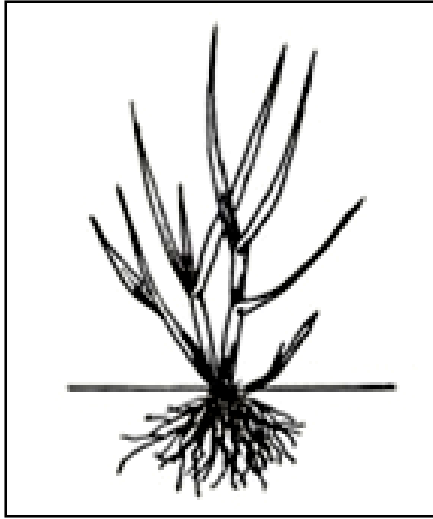
Grass Parts

Like most plants,
grasses are made up
of four basic organs

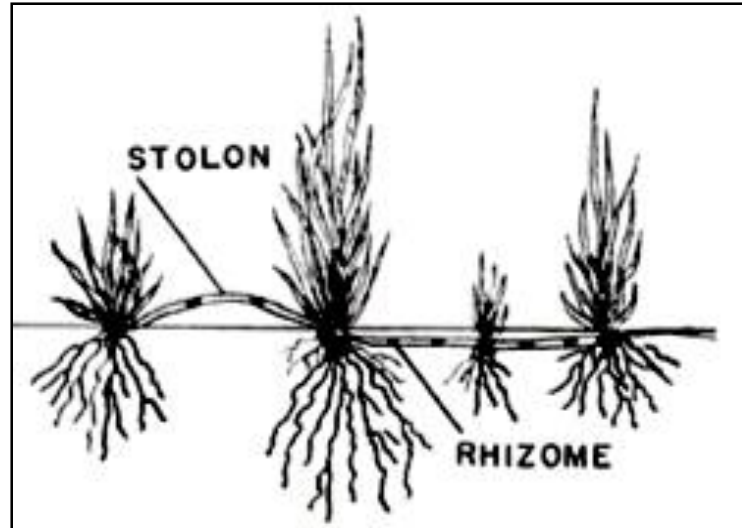
Roots
Stems
Leaves
Flowers



Growth Habit



**Bunch
grasses**



**Sod-forming
grasses**

Bunch Grasses

Grasses with basal tillers but no lateral stems are considered bunch grasses.



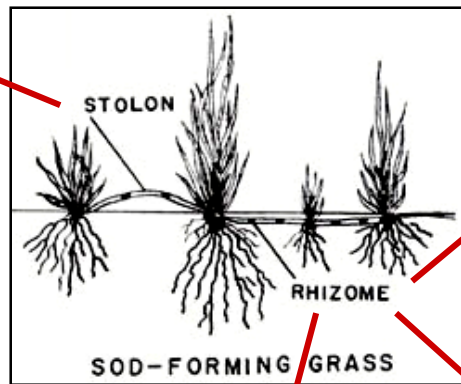
- Timothy
- Orchardgrass
- Tall and meadow fescue
- Ryegrasses
- Festulolium



Sod-Forming Grasses

Grasses with lateral stems are considered sod-forming grasses.

- Kentucky bluegrass
- Smooth bromegrass
- Reed canarygrass
- Quackgrass
- Bentgrasses

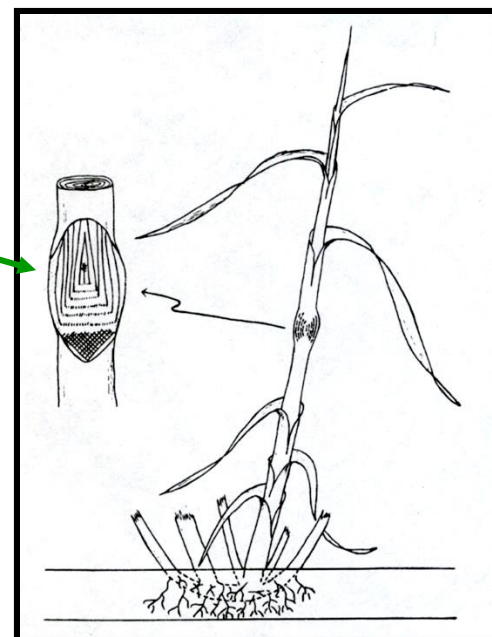


Regrowth Characteristics

- **Jointing grasses:**

(Growing point elevates at regrowth)

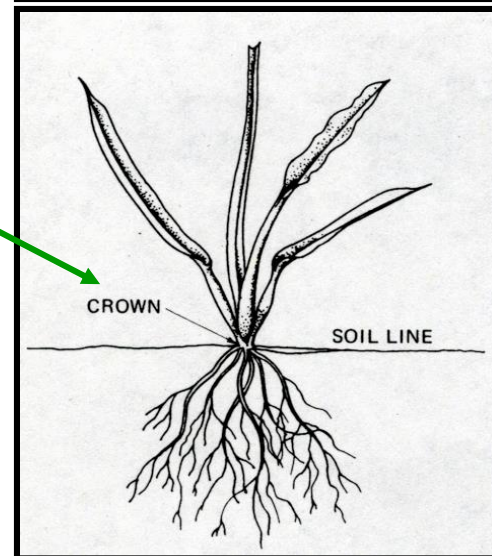
- Timothy
- Smooth bromegrass
- Reed canarygrass



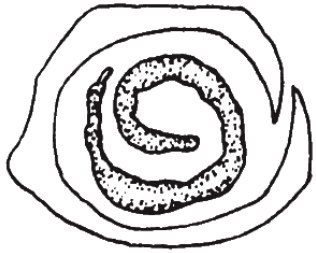
- **Non-jointing grasses:**

(Growing point stays at crown)

- Orchardgrass
- Tall fescue
- Perennial ryegrass/festuloliums
- Ky bluegrass

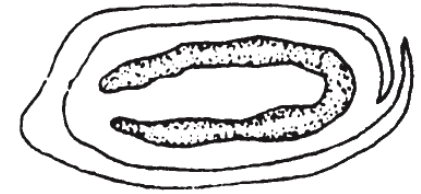


Grass Leafbud Shape (Vernation)



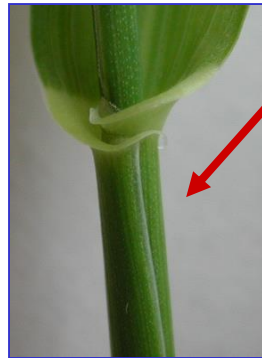
rolled

A cross section of
a grass leafbud
will be either:



folded

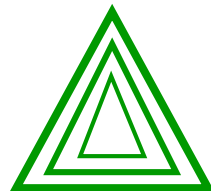
- Timothy
- Tall fescue
- Meadow fescue
- Italian ryegrass
- Festulolium
- Quackgrass
- Reed canarygrass
- Smooth brome grass
- Creeping bentgrass



Rolled
or
Folded



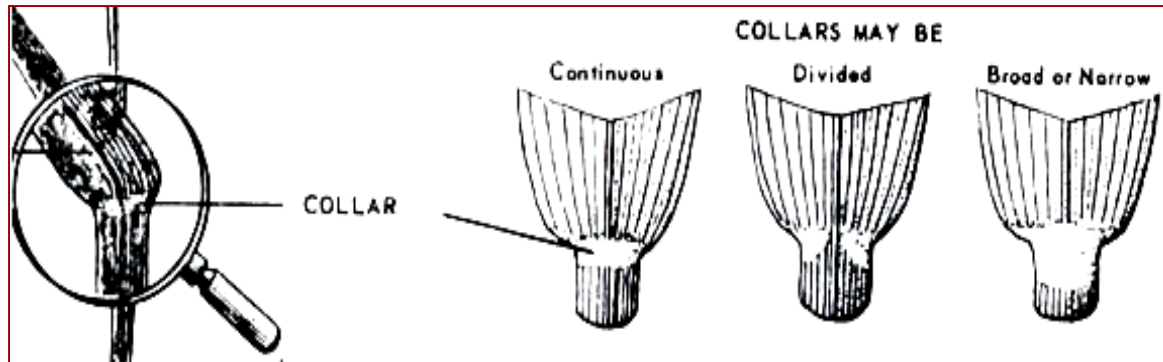
- Kentucky bluegrass
- Canada bluegrass
- Perennial ryegrass
- Orchardgrass
- Sheep fescue



If it is triangular,
then it is a sedge!



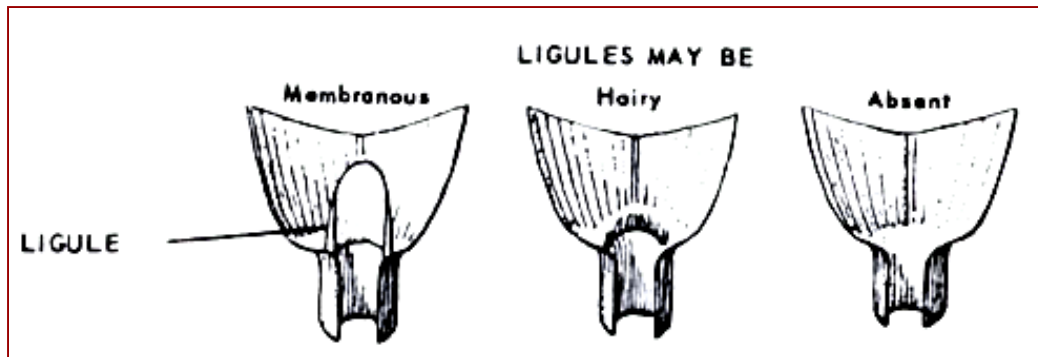
Leaf Characteristics - Collar



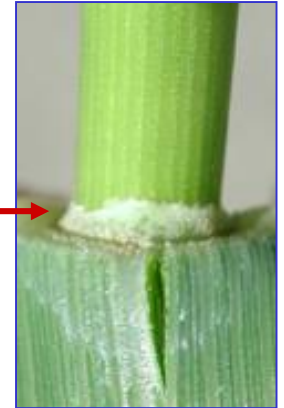
Tall and meadow fescue, perennial and Italian ryegrass and festulolium all have very distinct, whitish collar areas



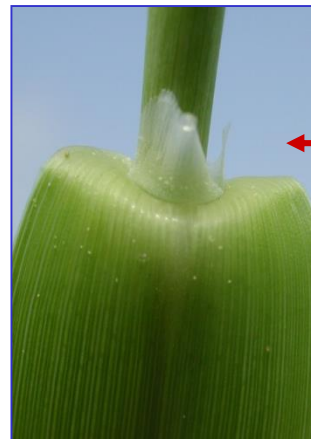
Leaf Characteristics - Ligules



Smooth
bromegrass
ligule is short,
truncate and
membranous



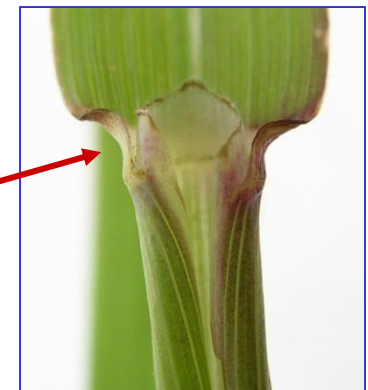
Reed canarygrass
ligule is medium long,
rounded and
membranous



Orchardgrass
ligule is long,
pointed and
membranous



Timothy ligule is
medium long, acute tip
notched on ends



Leaf Characteristics - Ligules



Perennial
ryegrass

Perennial
ryegrass
ligule is
membranous,
1 to 2 mm

Tall or
meadow
fescue ligule
membranous,
0.4 to 1 mm,
truncate



Tall Fescue



Creeping
bentgrass

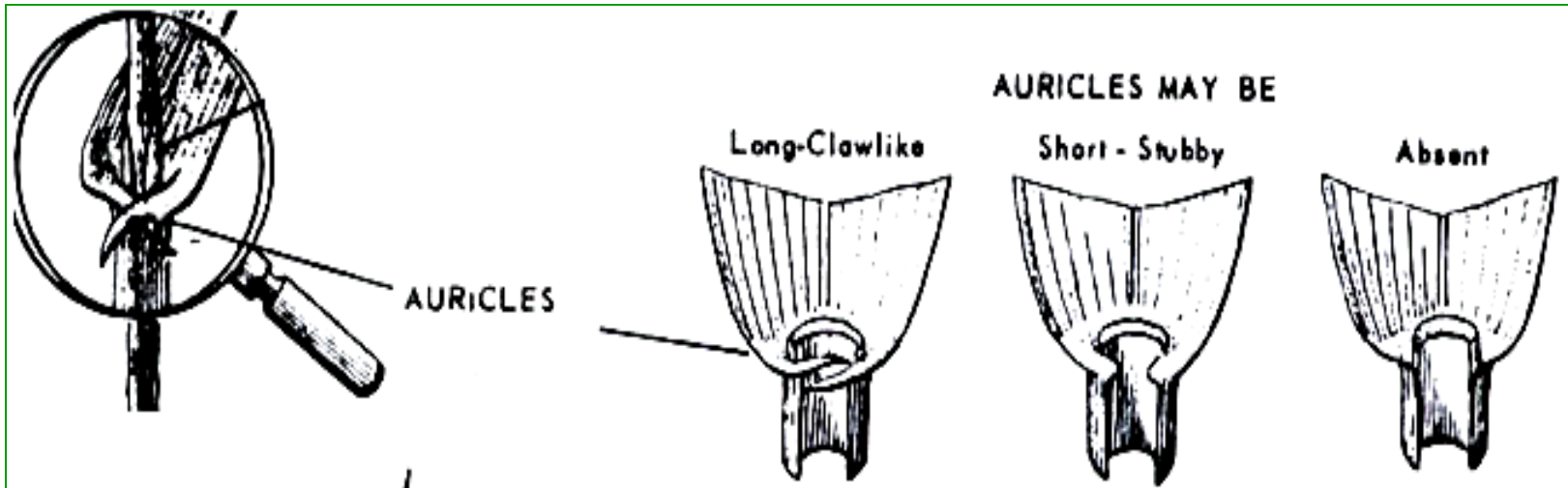
Creeping
bentgrass
ligule is
membranous,
1 to 3 mm,
rounded to
acute

Sweet vernalgrass
ligule is
membranous, mostly
1 to 2.5 mm, but up
to 9 mm
rounded, lacerate or
toothed or ciliate



Sweet
Vernalgrass

Leaf Characteristics - Auricles



Quackgrass
auricle is long
and clasping

**Forage grasses with
auricles include:**

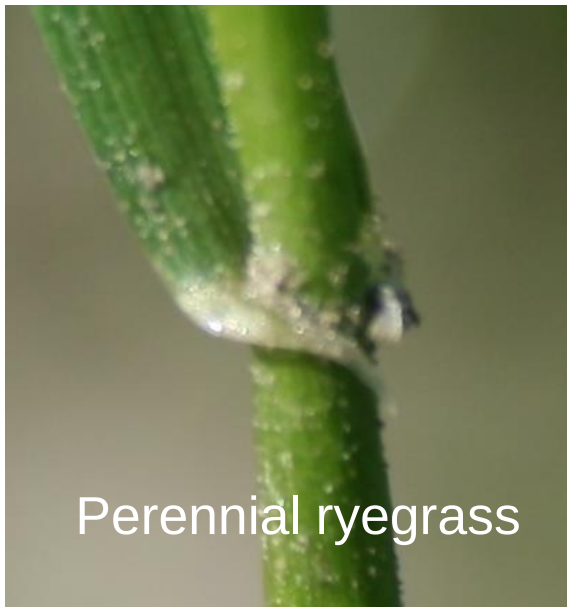
- Tall fescue
- Meadow fescue
- Perennial ryegrass
- Italian ryegrass
- Quackgrass

Leaf Characteristics - Auricles



Tall and Meadow fescue have short, stubby auricles

Edge is hairy on tall and smooth on meadow fescue



Perennial and Italian ryegrass have relatively small but clasping auricles



Other Leaf Characteristics

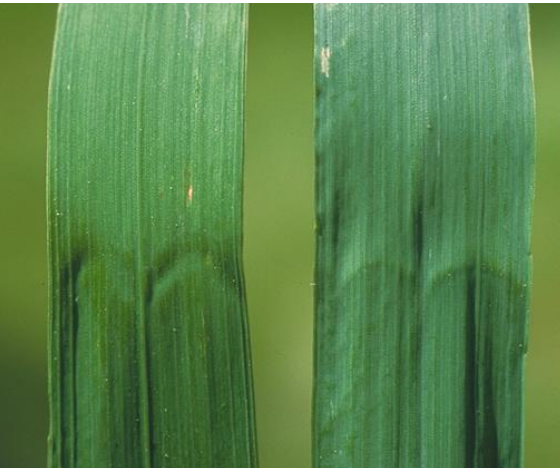
**Timothy tends to have
twisted leaves**



**“Corduroy”
shaped ridges in
adaxial (upper)
sides of fescue
and ryegrass
leaf blades**



**“M” shaped
crimps in
smooth
bromegrass
leaves**



**Abaxial (bottom) side of ryegrass
leaf blades have keel-like midribs
and a shiny surface**

Other Leaf Characteristics

Bluegrass species have a boat-shaped leaf tip



Bluegrass species have two parallel grooves adjacent to the midrib that are translucent when held in the light.



Fine fescues such as creeping red, hard or sheep fescue all have narrow leaves that tend to roll even under adequate moisture conditions

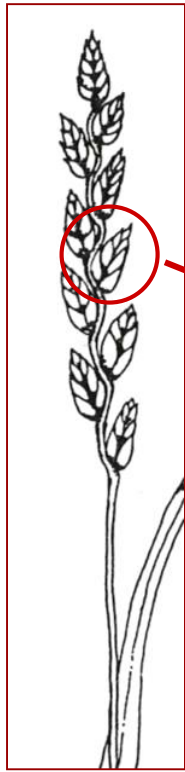
Annual bluegrass tends to have a large number of “crinkled” leaves



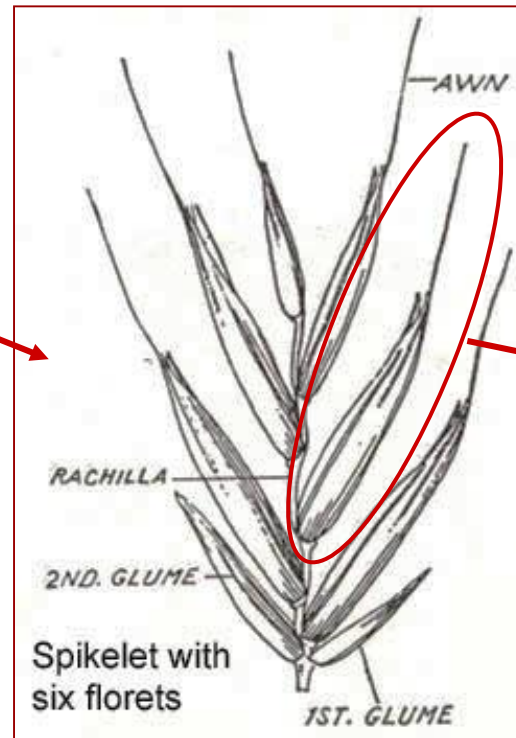
Grass Heads and Flowers

The basic unit of the inflorescence is the **spikelet** which consist specialized bracts (glumes) at the base and one or more **florets** above. The floret is the grass flower and is surrounded by specialized bracts called a palea and lemma. Some grasses have a pointed appendage at the top of the lemma called an **awn**.

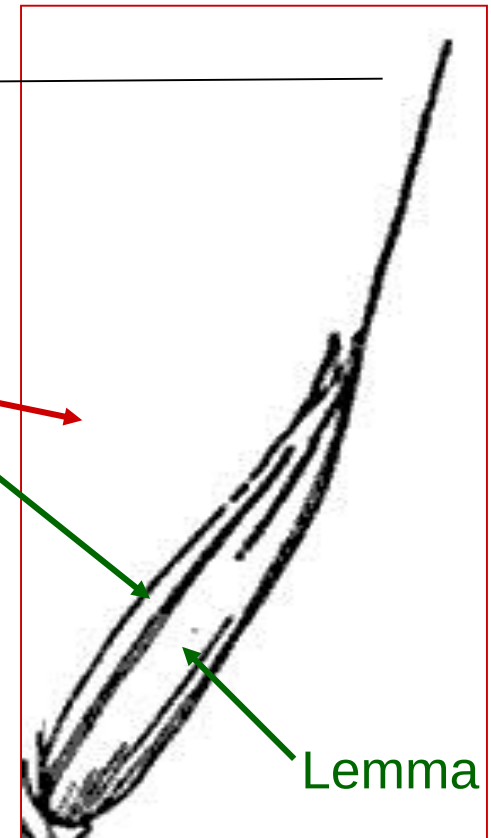
Example – ryegrass (Italian ryegrass has awns, perennial ryegrass has none)



This inflorescence with 10 spikelets.

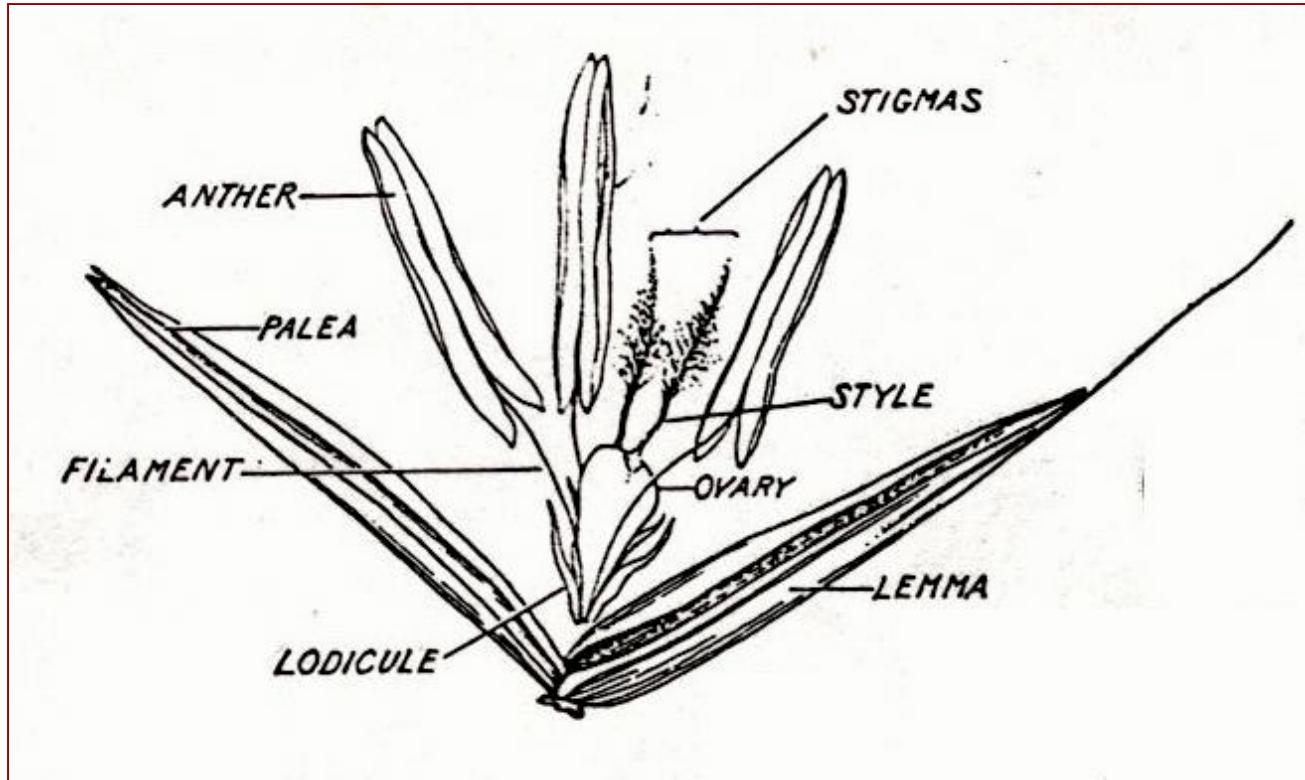


Most forage grasses have several florets per spikelet.



A floret (flower)

Grass Floret



This floret is a perfect flower containing staminate and pistillate parts.

Most cool season forage grasses are cross pollinated primarily by wind.

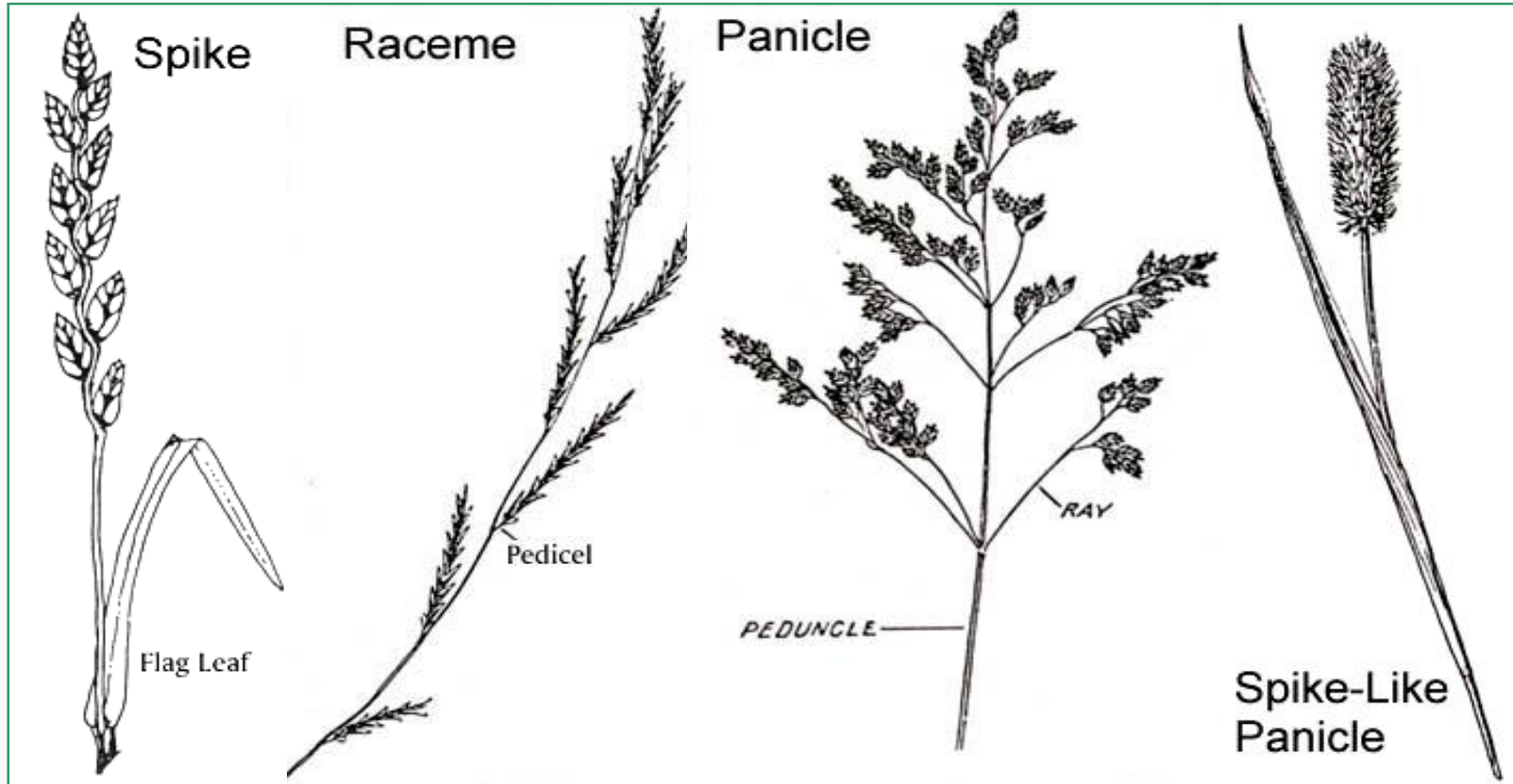
This Italian ryegrass inflorescence has eight florets per spikelet. Many of the florets are opened allowing the anthers and stigmas to be exposed providing for cross pollination.



Italian (Annual) Ryegrass

Grass Seedheads

There are four grass seedheads (inflorescence) types. For most forage grasses in the NE, we find mainly the spike, panicle and spike-like panicle.



A spike has the spikelets directly attached (sessile) to the peduncle

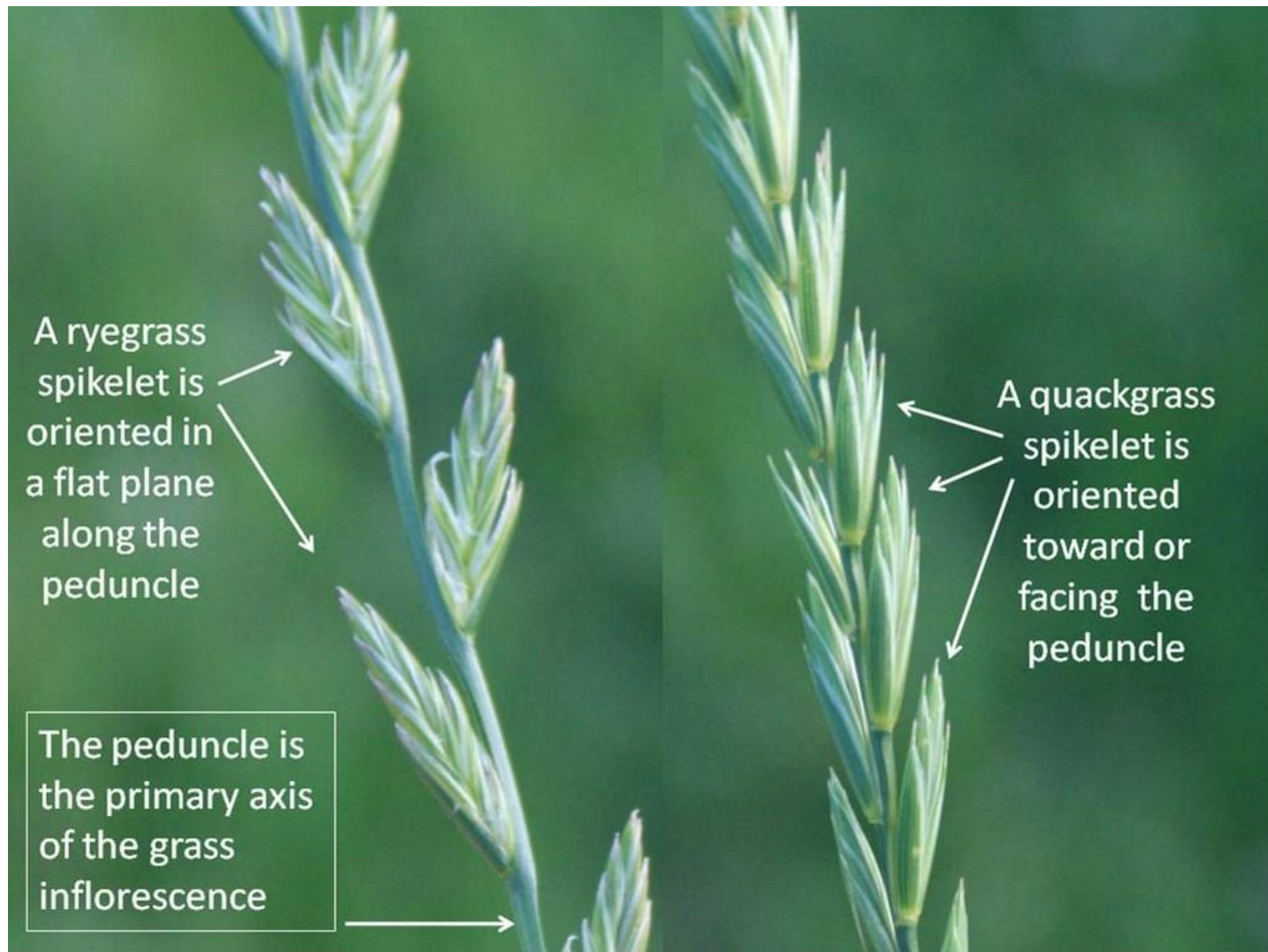
A raceme has the spikelets attached to a pedicel which is attached to the peduncle

A panicle has spikelets attached to multiple branches (rays)

A spike-like panicle is a panicle that has highly compressed rays giving a spike appearance

Spike Seedheads

The most common Northeastern grasses with spikes include the ryegrasses and quackgrass. Festuloliums may also have a spike.



Panicle Seedhead



Orchardgrass has a panicle of open but clumped spikelets



Bluegrasses have open panicles



Tall fescue



Meadow fescue

The majority of forage and pasture grasses in the NE have panicle type inflorescence

Smooth brome grass has a loose panicle



Condensed Panicle Seedhead

Reed canarygrass varies in shape as it matures. It emerges looking condensed but spreads out in a conical shape as it reaches full head. In late head stage, it can have a condensed, almost spike-like appearance.



Early emergence



Early head stage (early June)



Late head stage
(late July)

Spike-Like Panicle Seedheads



Timothy has a spike-like panicle that usually heads out late (mid to late June). The Spikelet has two "horns".



Meadow foxtail has a spike-like condensed panicle that usually heads out early (late April to May). Spikelet has a single awn.



These are the two most common grasses in the Northeast with spike-like panicles



Anthers protrude out of the florets to disperse pollen during anthesis (flowering)

Legumes



Legume Growth Habits



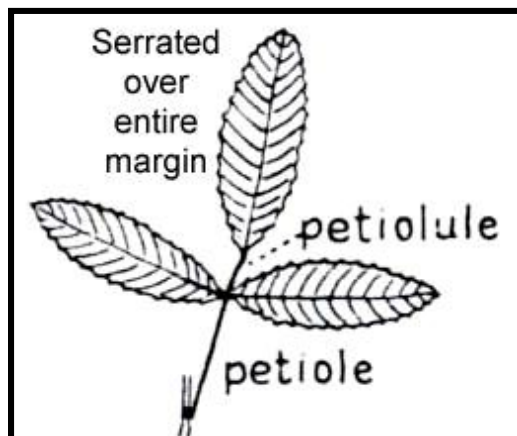
White clover has a creeping growth habit using stolons. Note the adventitious roots initiated from stolon nodes.



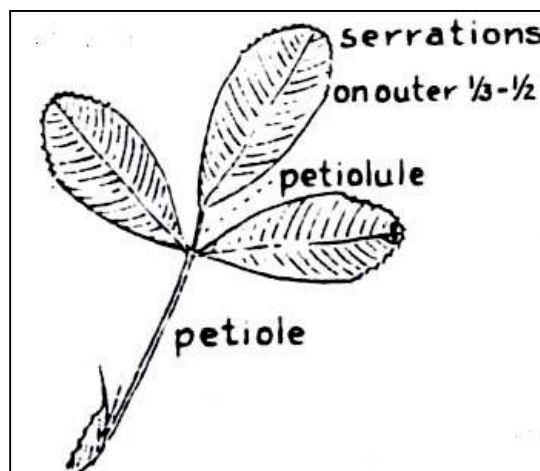
Many forage legumes regrow from a crown and are simple perennials that do not creep. They usually have taproots.

Legume Leaf Characteristics

Alfalfa, black medic and sweetclover have three leaflets but the terminal leaflet has an extended stem called a “petiolule”



Sweetclover



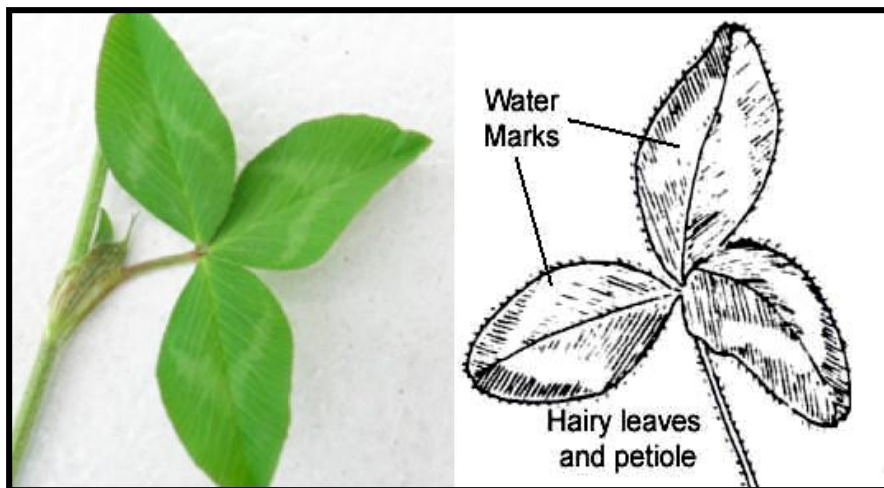
Alfalfa



Birdsfoot trefoil has five leaflets

Legume Leaf Characteristics

All three leaflets of “True” clovers come to the same point and do not have a “petiolule”



Red clover has hairs and water marks



Alsike clover has no hairs and no water marks



White clover has no hairs and usually, but not always, has water marks

Floral Characteristics

Racemes



Alfalfa



Sweetclover



Vetch

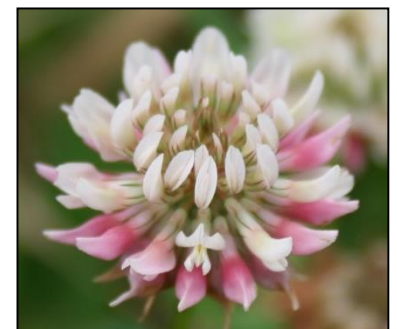
Umbels



Birdsfoot trefoil



Black medic



Alsike clover

Flower Heads



White clover



Red clover

Legume Growth Type

Determinant Growth



Plant development occurs in distinct stages generally one stage at a time

- **Alfalfa**
- **Red clover**

Legume Growth Type

Indeterminate Growth

Plant development occurs somewhat simultaneously so that parts of different stages (bud, flower, seedpods) occur at the same time.

- **Birdsfoot trefoil**
- **White clover**
- **Alsike clover**



Legume Adaptation

Species	Soil Moisture Adaptation	Soil Fertility Adaptation	Drought Tolerance	Periods Of Production	Relative Maturity ¹	Growth Habit	Height Classification
Legumes							
Alfalfa	Well-drained	High to good	Very good	Spring, summer and early fall	Medium-early	Bunch	Tall
Red clover	Well-drained	Good to medium	Fair	Spring, summer and fall	Medium	Bunch	Tall
Birdsfoot trefoil	Droughty to wet	Medium to fair	Good	Spring, summer and early fall	Medium-late to late	Bunch	Medium ³
White clover, common	Moist	Medium	Poor	Spring and fall	Medium	Spreading by stolons	Short
White clover, Ladino	Moist	Good to medium	Poor	Spring, summer and fall	Medium	Spreading by stolons	Short to medium
Alsike clover	Most to wet	Fair	Poor	Spring, summer and fall	Medium	Bunch	Medium to tall
Cicer Milkvetch	Dry to wet	Poor to fair	Very good	Spring, summer and fall	Medium-late to late	Spreading by rhizomes	Tall

¹ Maturity classification refers to the relative time of heading (grasses) or flowering (legumes) and depends not only on species but also on variety.

³ Height of BFT depends largely on variety (Empire types are short suited for pasture and Viking types are upright suited for hay or rotational pasture).