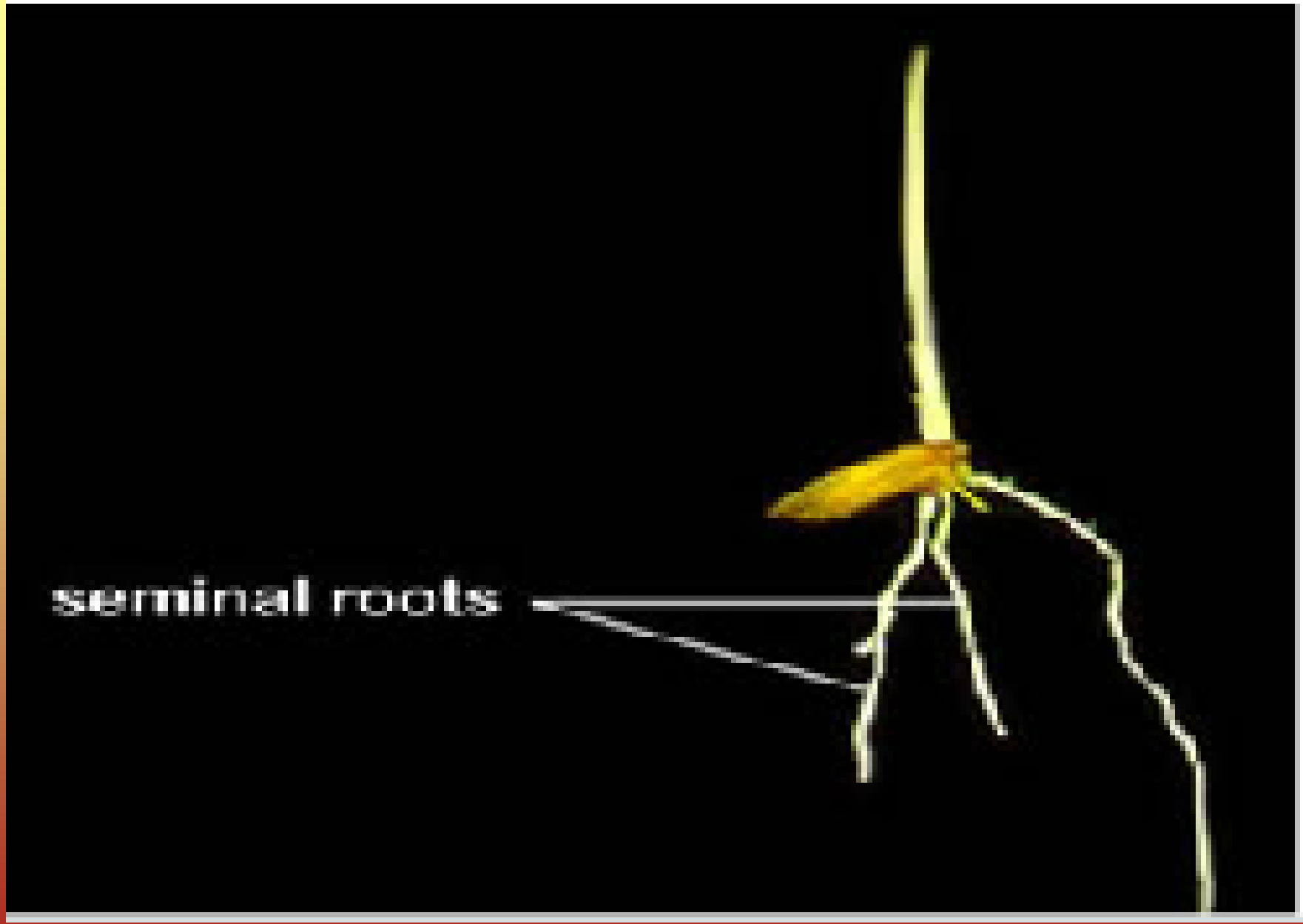
Chapter 2

2-Rice *Oryza sativa* L.

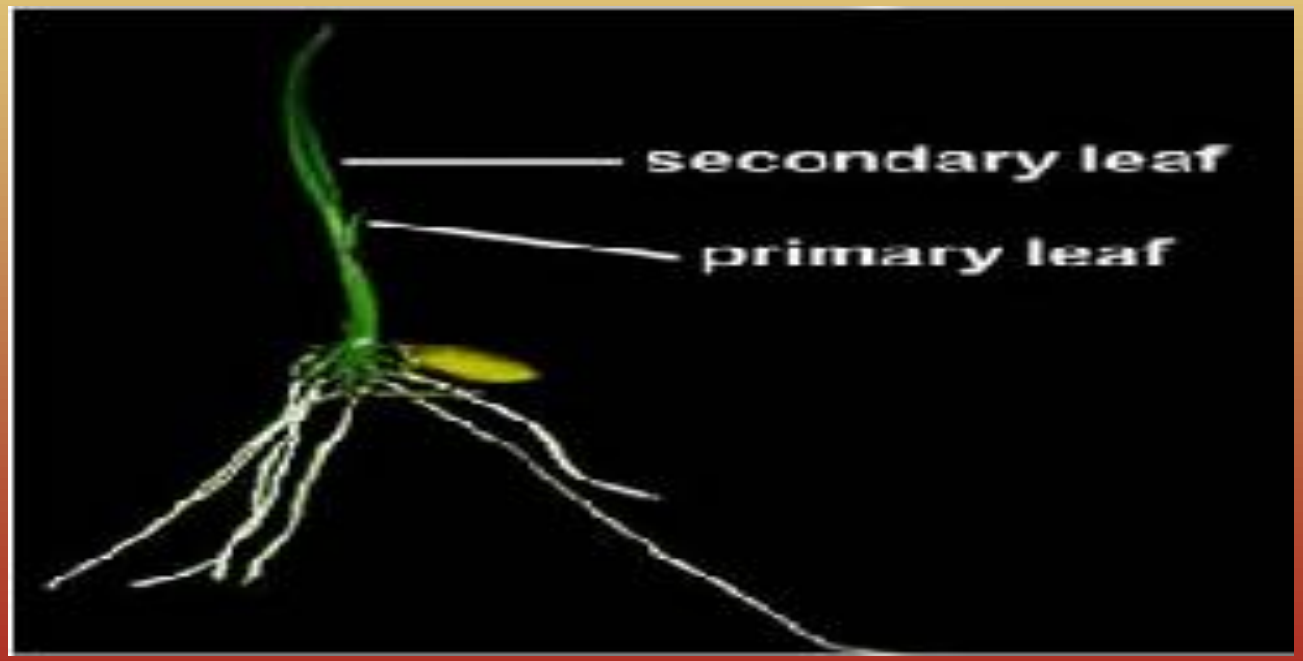
Prepared By

Prof. Dr. Ali Sharief

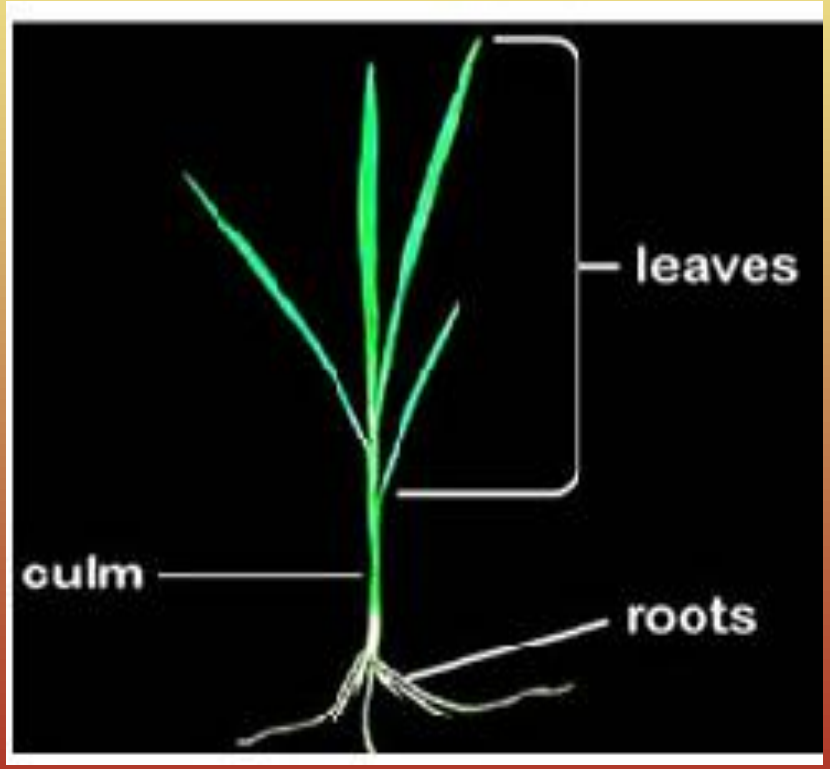
- **When the seed germinates in well-drained and well-aerated soil, the coleorhiza, a covering enclosing the radicle or primary root, protrudes first. Shortly after the coleorhiza appears, the radicle or primary root breaks through the covering. Two or more sparsely branched seminal roots follow.**

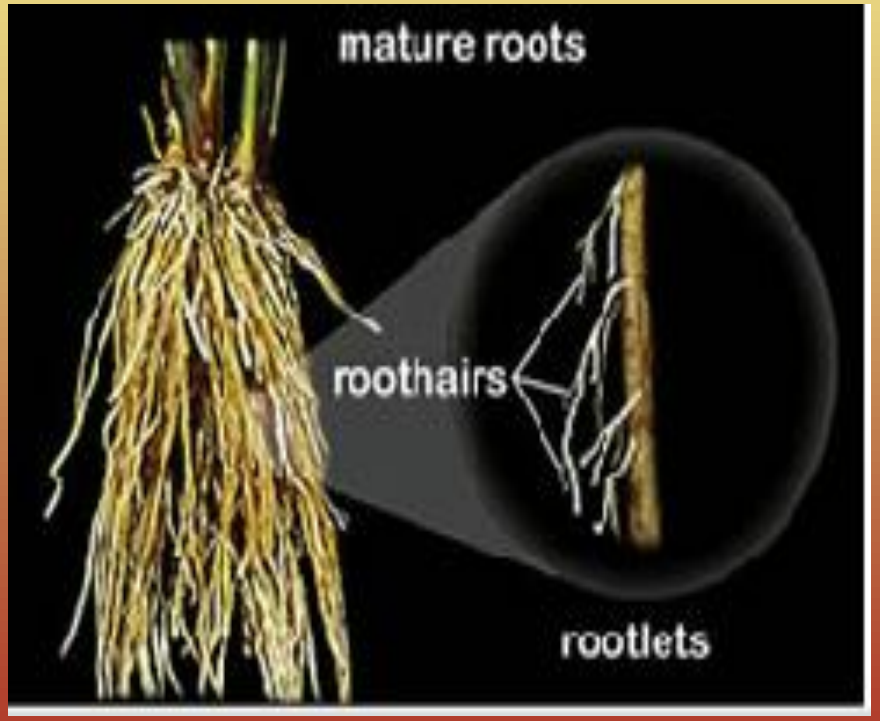

seminal roots

The first seedling leaf, or primary leaf, emerges from the growing seed. It is green and shaped like a cylinder. It has no blade. The second leaf is a complete leaf. It is differentiated into a leaf blade

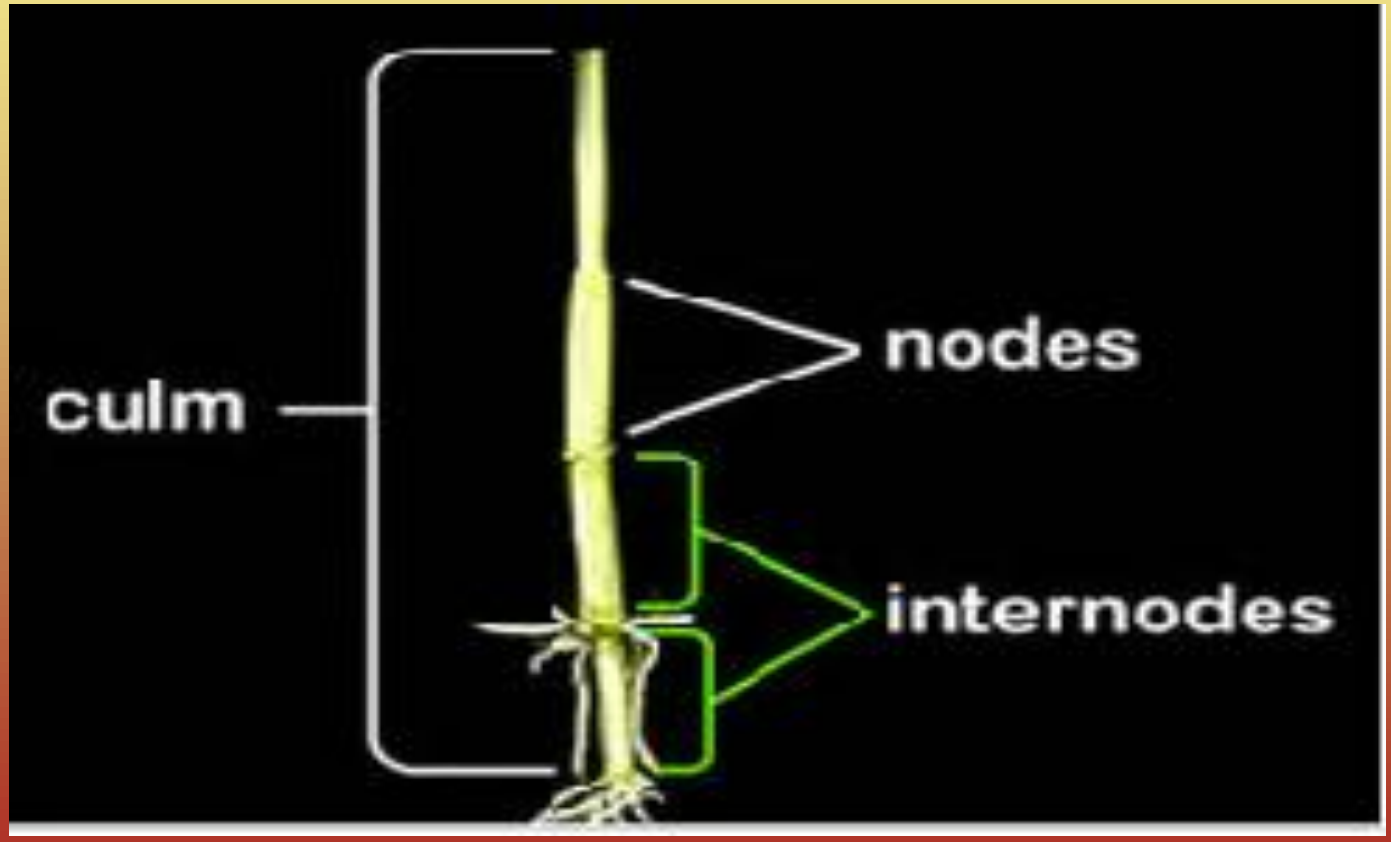


The seedling will grow and develop branched tillers. Parts of the rice tiller include the roots, culm and leaves. Mature roots of the rice plant are fibrous and produce smaller roots called rootlets.

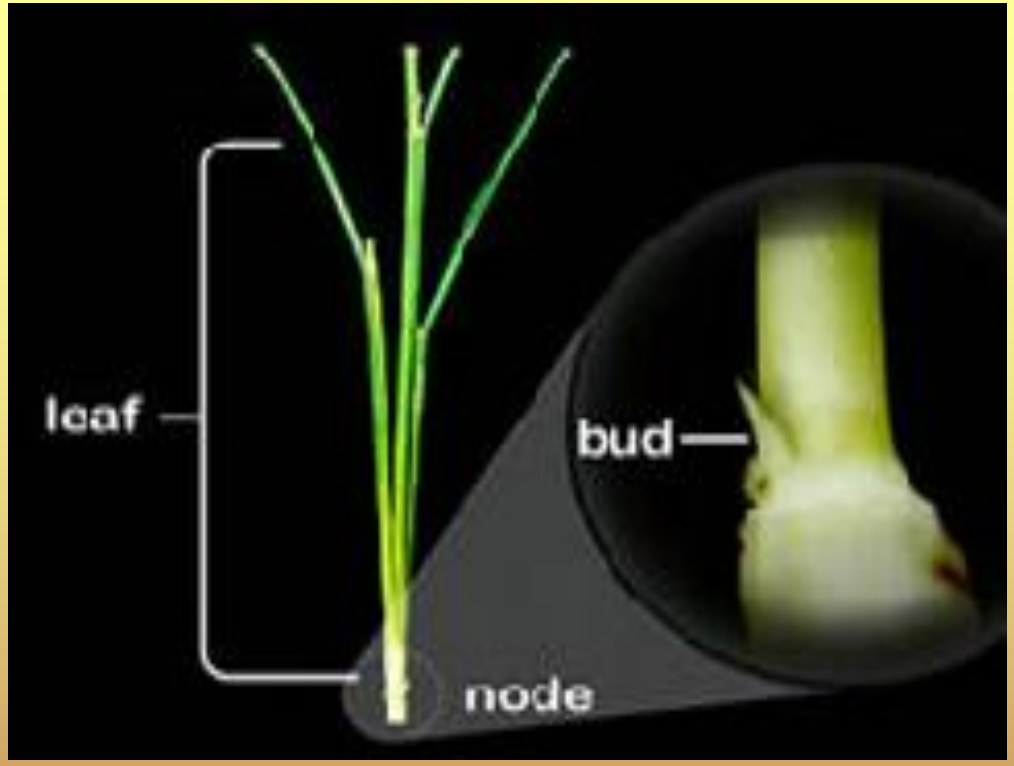


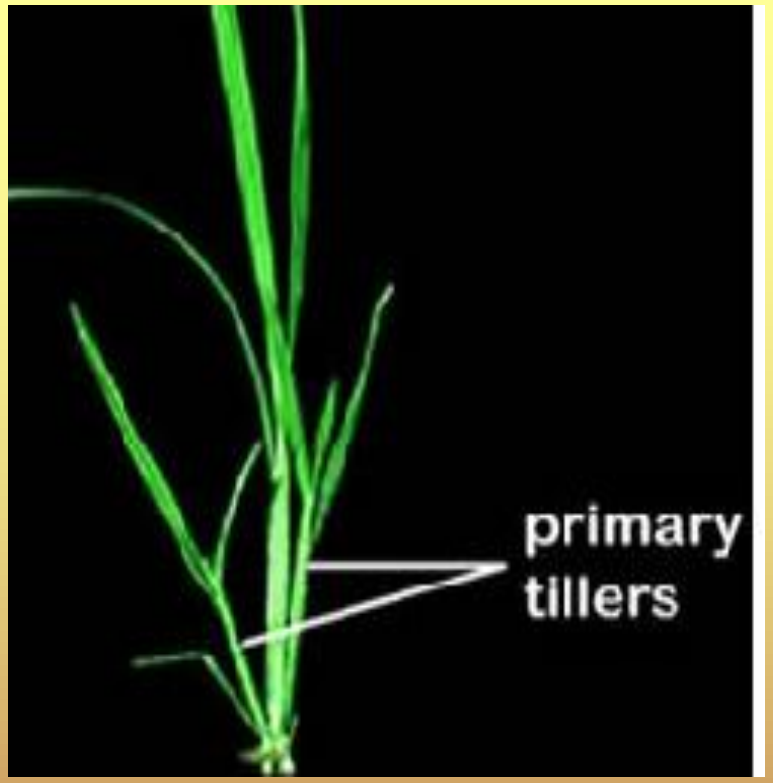


The culm, or jointed stem of the rice, is made up of a series of nodes and internodes.

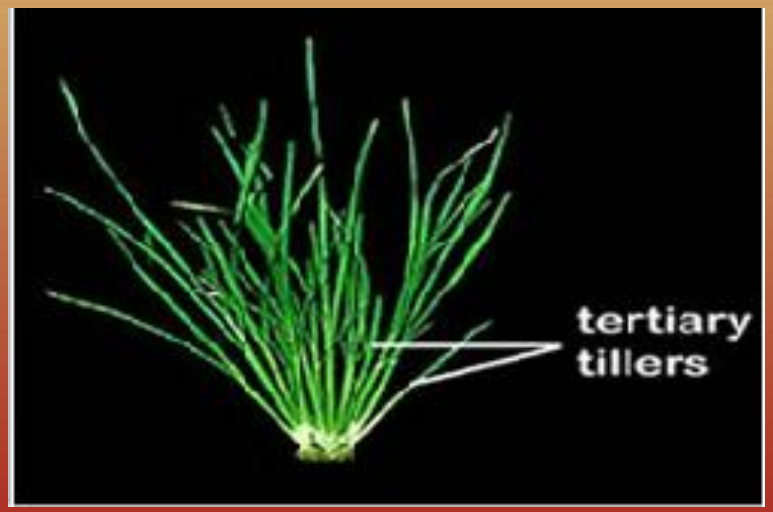


- **Young internodes are smooth and solid. Mature internodes are hollow and finely grooved with a smooth outer surface. Generally, internodes increase in length from the lower to the upper portions of the plant. The lower internodes at the plant base are short and thick.**
- **The node is the solid portion of the culm. The node or nodal region bears a leaf and a bud. The bud is attached to the upper portion of the node and is enclosed by the leaf sheath. Early tillers arise from the main culm in an alternate pattern. Primary tillers originate from the lowermost nodes and give rise to secondary tillers.**

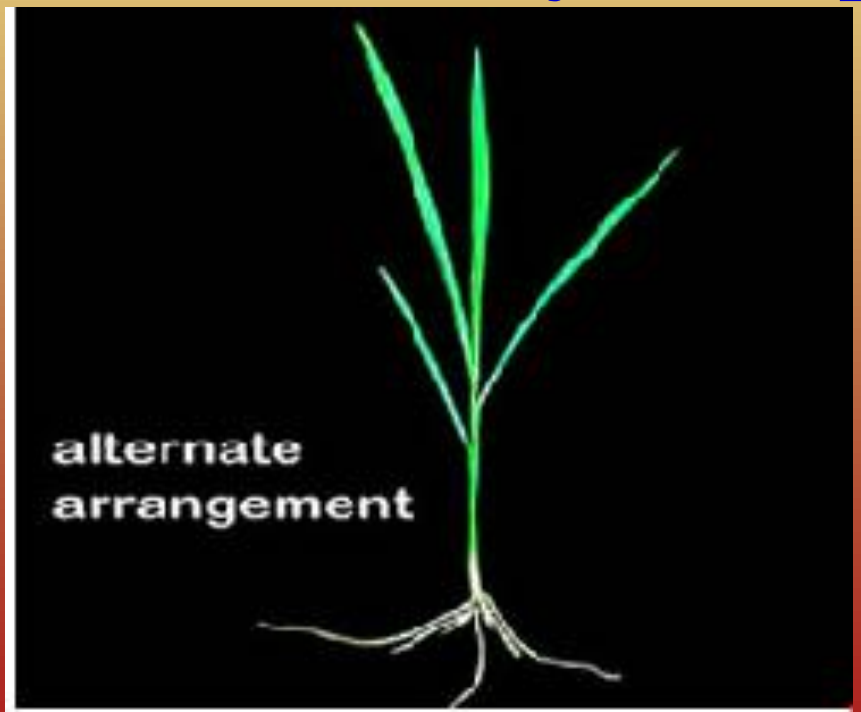

leaf
bud
node


primary
tillers

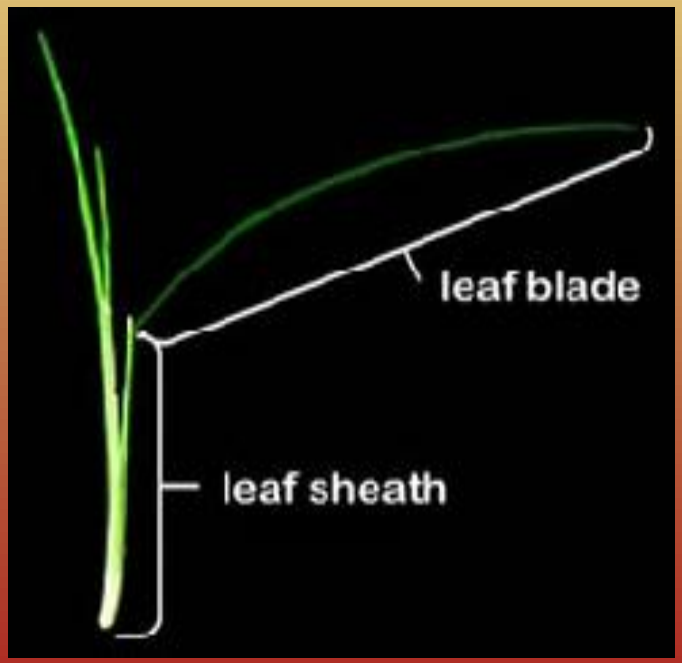

secondary
tillers


tertiary
tillers

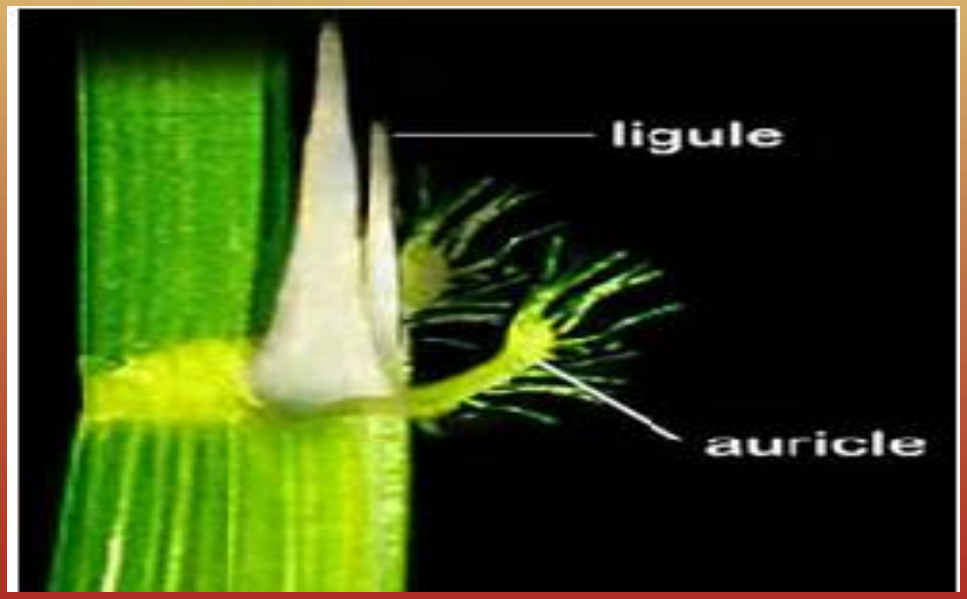
The node or nodal region of the culm will bear a leaf. Leaves are borne alternately on the culm in opposite directions. One leaf is produced at each The topmost leaf below the panicle is the flag leaf. The flag leaf contributes largely to the filling of grains because it supplies photosynthetic products, mainly to the panicle.



The leaf sheath and leaf blade are continuous. A circular collar joins the leaf blade and the leaf sheath. The leaf sheath is wrapped around the culm above the node. With many parallel veins on the upper surface of the leaf, the underside of the leaf blade is smooth with a prominent ridge in the middle; the midrib.

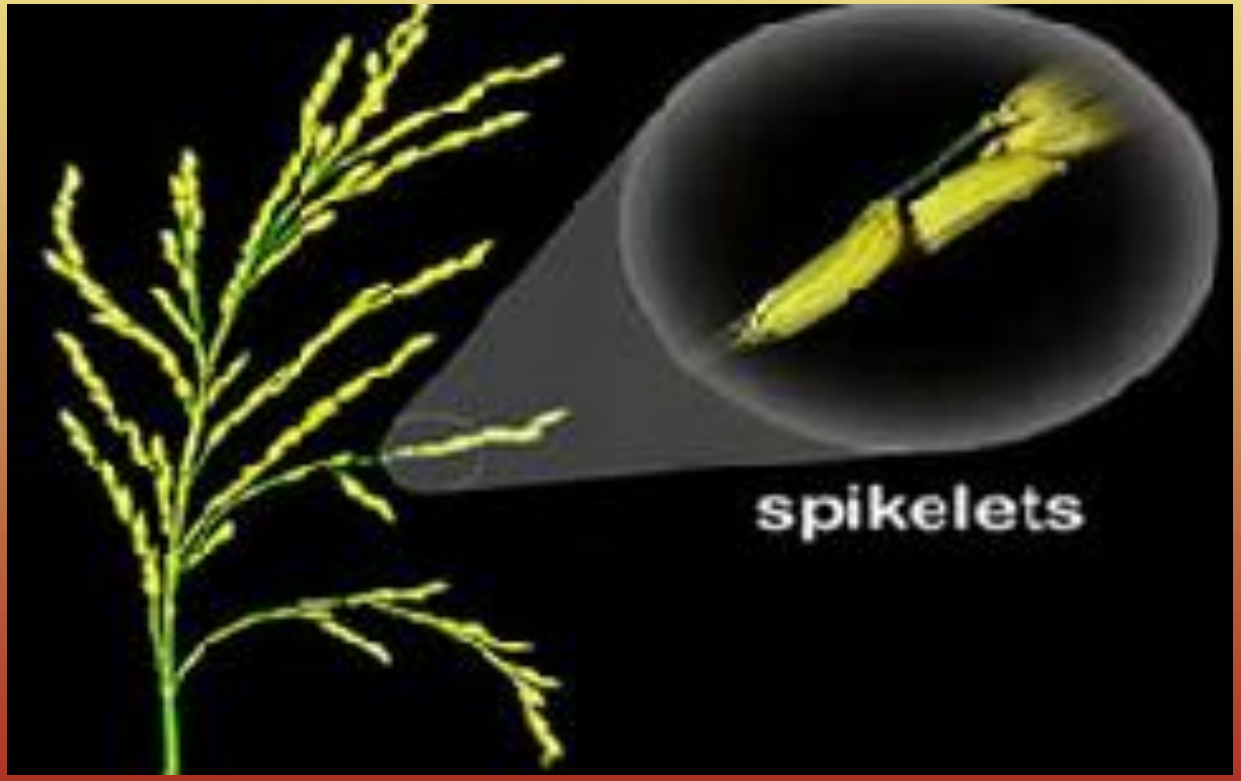


Most leaves possess small, paired ear-like appendages on either side of the base of the blade. These appendages are called auricles. Auricles may not be present on older leaves. Another leaf appendage is the ligule, a papery membrane at the inside juncture between the leaf sheath and the blade. It can have either a smooth or hair-like surface. The length, color, and shape of the ligule differ according to variety.



The terminal component of the rice tiller is an inflorescence call the panicle. The panicle is borne on the uppermost internode of the culm. The panicle bears rice spikelets, which develop into grains.

The panicles bear spikelets, most of which develop into grains. These spikelets are borne on the primary and secondary branches. The spikelet is the basic unit of the inflorescence and panicle. It consists of the pedicel and the floret.



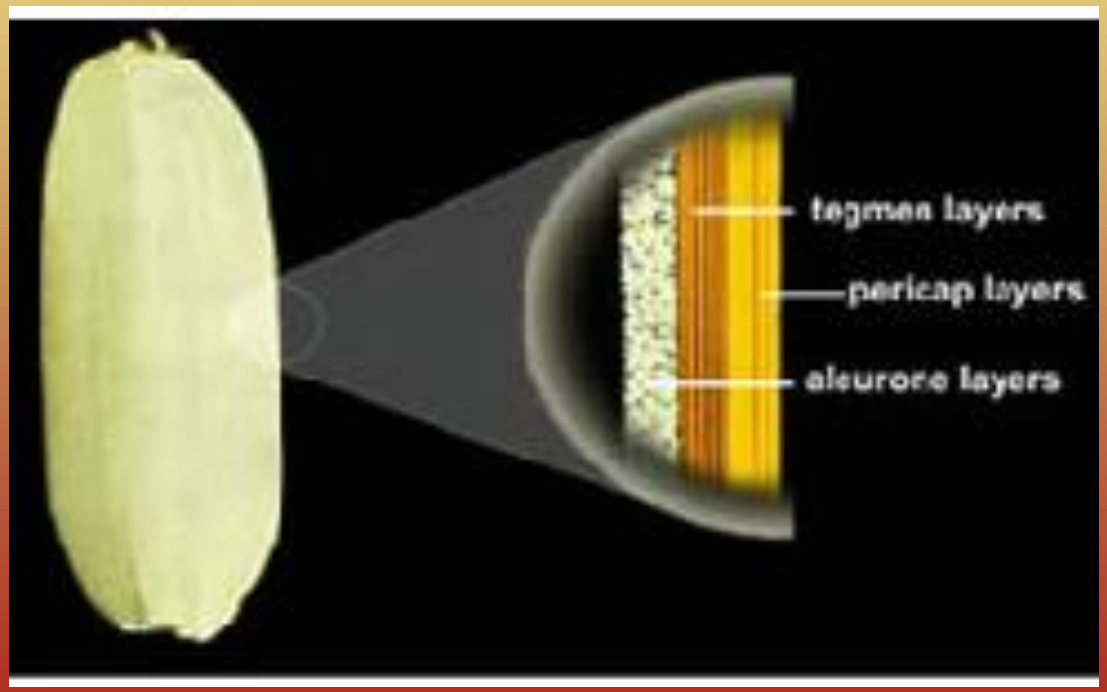
The rudimentary glumes are the laterally enlarged, cuplike apex of the pedicel. The rudimentary glumes are the lowermost parts of the spikelet. During threshing, the rudimentary glumes are separated from the rest of the spikelet. The sterile lemmas are small, bractlike projections attached to the floret.

The rachilla, sterile lemmas and the rudimentary glumes all support the floret. The floret includes the lemma, palea, and the flower. The larger protective glume covering the floret is called the lemma and the smaller one is referred to as the palea. Both the lemma and palea have ridges referred to as nerves. The lemma has five while the palea has three. The middle nerve of the lemma can be either smooth or hairy.

The floret contains a flower. The flower consists of a pistil (female organ) and six stamens (male organs).

The rice grain is the ripened ovary, with the lemma and palea firmly attached to it. The rice hull includes the lemma and palea and their associated structures – the sterile lemmas, rachilla, and awn.

The dehulled rice grain is called caryopsis, commonly referred to as brown rice because of three brownish pericarp layers that envelope it. Next to the pericarp layers are the two tegmen layers and the aleurone layers.



The remaining part of the grain consists of the endosperm and the embryo. The endosperm provides nourishment to the germinating embryo. The embryo lies on the belly side of the grain and is enclosed by the lemma. It is the embryonic organ of the seed.