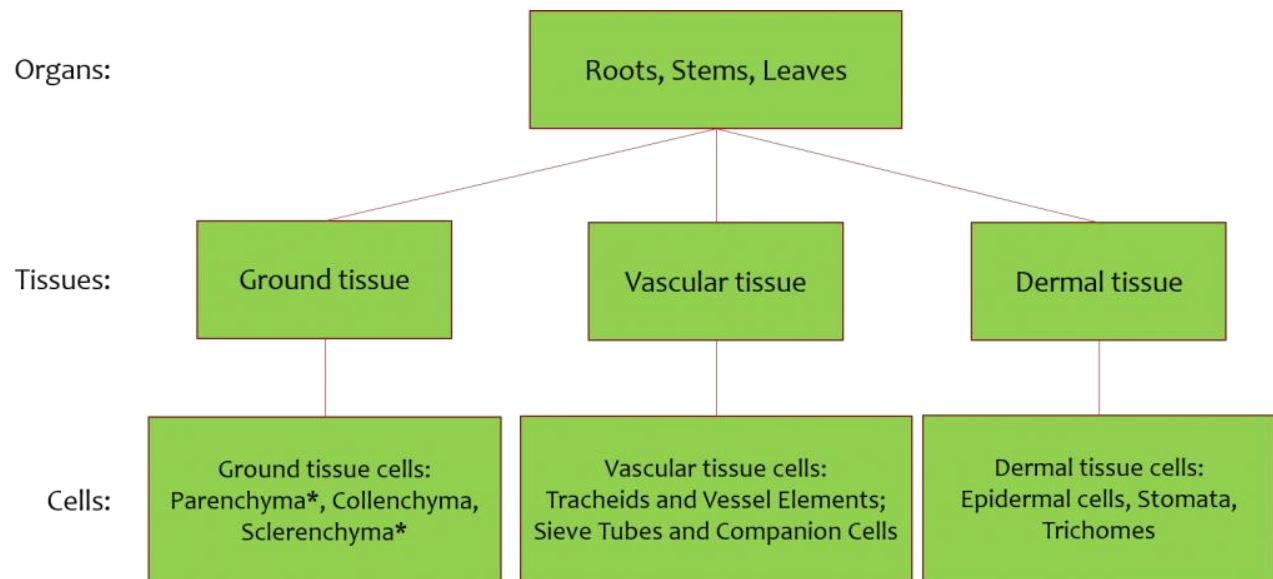


Plant Tissue

Plant tissue is a collection of similar cells performing an organized function for the plant. Each plant tissue is specialized for a unique purpose, and can be combined with other tissues to create organs such as leaves, flowers, stems and roots. Plant tissue systems are broadly divided into three types: plants are multicellular eukaryotes whose bodies are composed of organs, tissues, and cells with highly specialized functions. The relationships between plant organs, tissues, and cell types are illustrated below.

- Dermal Tissue System
- Vascular Tissue System
- Ground Tissue System



*Parenchyma and sclerenchyma are also associated with xylem and phloem (vascular tissue)

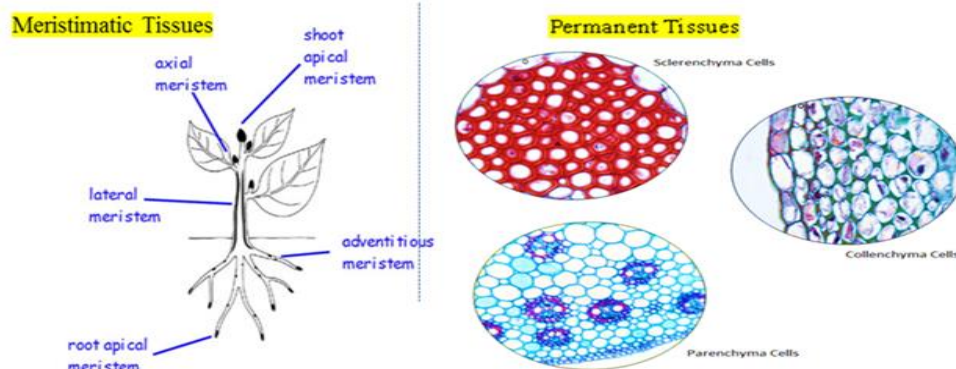
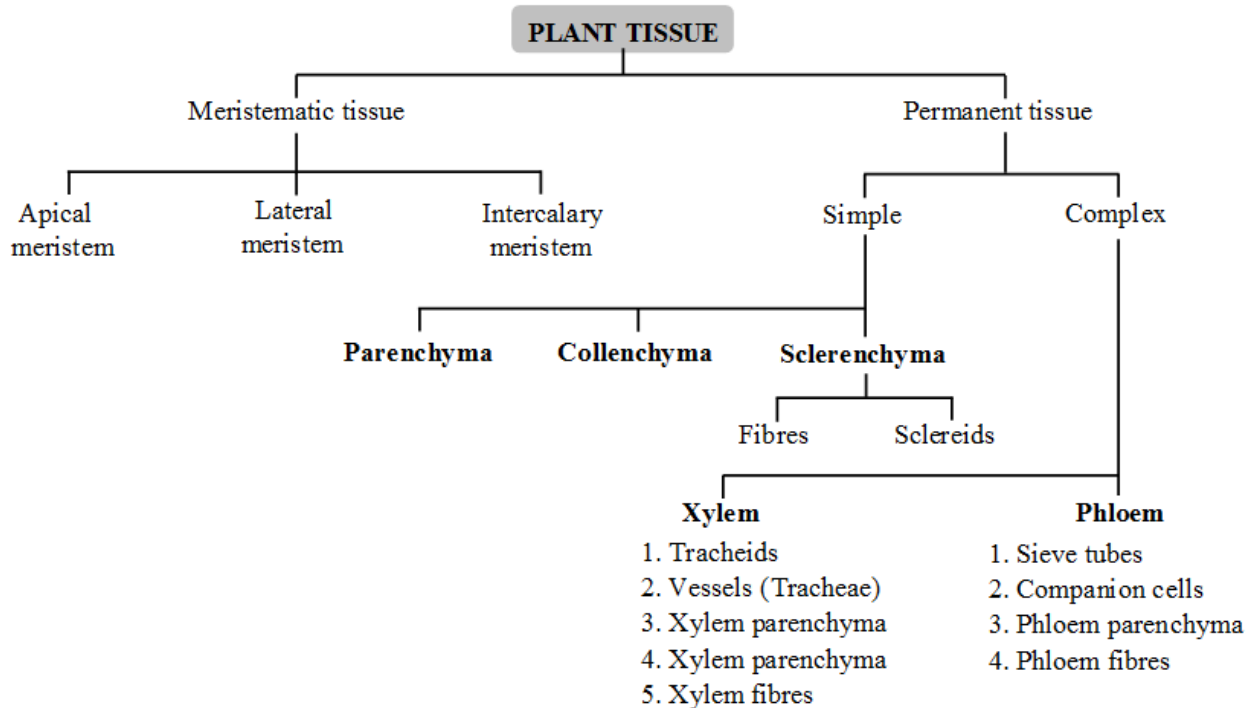
Tissue	Cell Types	Function	Locations
Vascular tissue	Xylem is made up of vessels and tracheids Phloem is made up of sieve cells and companion cells	Xylem transports water Phloem transports sugars	In stems, leaves, and roots
Epidermal tissue	Parenchyma	Protect plant tissues and prevent water loss	Outer layer of stems, roots, and leaves
Ground tissue	Parenchyma Collenchyma Sclerenchyma	Makes up bulk of plant mass	Stems, roots, leaves
Meristematic tissue	Parenchyma	Divide to produce new growth	Tips of shoots Tips of roots In buds In a ring around the stem in woody plants

Types of Plant Tissues

Meristems produce cells that quickly differentiate, or specialize, and become **permanent** tissue. Such cells take on specific roles and lose their ability to divide further. They differentiate into three main tissue types: **dermal, vascular, and ground tissue**. Each plant organ (roots, stems, leaves) contains all three tissue types:

- **Dermal tissue:** It covers and protects the plant, and controls gas exchange and water absorption (in roots). Dermal tissue of the stems and leaves is covered by a waxy cuticle that prevents evaporative water loss. Stomata are specialized pores that allow gas exchange through holes in the cuticle. Unlike the stem and leaves, the root epidermis is not covered by a waxy cuticle which would prevent absorption of water. Root hairs, which are extensions of root epidermal cells, increase the surface area of the root, greatly contributing to the absorption of water and minerals. Trichomes, or small hairlike or spikey outgrowths of epidermal tissue, may be present on the stem and leaves, and aid in defense against herbivores.
- **Ground tissue:** It carries out different functions based on the cell type and location in the plant, and includes parenchyma (photosynthesis in the leaves, and storage in the roots), collenchyma (shoot support in areas of active growth), and sclerenchyma (shoot support in areas where growth has ceased) is the site of photosynthesis, provides a supporting matrix for the vascular tissue, provides structural support for the stem, and helps to store water and sugars.
- **Vascular tissue :** Transports water, minerals, and sugars to different parts of the plant. Vascular tissue is made of two specialized conducting tissues: xylem and phloem. Xylem tissue transports water and nutrients from the roots to different parts of the plant, and also plays a role in structural support in the stem. Phloem tissue transports organic compounds from the site of photosynthesis to other parts of the plant. The xylem and phloem always lie adjacent to each other in a vascular bundle

Plant tissues can be broadly classified based on the ability of the cells to divide into Meristematic tissue and Permanent tissue.



Meristematic Tissue : It consist of group cells that have the ability to divide. These tissues are small, cuboidal, densely packed cells which keep dividing to form new cells. These tissue are capable of stretching, enlarging and differentiating into other types of tissue as they mature. Meristematic Tissue gives rise to permanent tissue. Meristematic Tissue can be different types on the basis of their classification

Permanent Tissue: They are derived from the Meristematic Tissue and have lost their ability to divide. They have attained their mature form. They are futher classified into two types: simple and complex permanent tissue