

Introduction to the Flowering Plant Body

This laboratory is designed to introduce you to the structures of flowering plants. You will have the opportunity to observe many of the organs of flowering plants and relate these structures to how plants function. As you do this laboratory think about the ways plants deal with the problems of being alive, such as support, nutrition and internal transport. We will look closely at these structures in the next few weeks.

The body of a flowering plant consists of a **root system** and a **shoot system**. The root system, in most plants, is the below-ground portion. The shoot system, generally found above the ground, consists of stems and leaves. Flowers, which are the reproductive organs, are modified shoot systems.

Shoot systems branch through the formation of buds, which originate at nodes where leaves are attached to the stems. In many plants, buds develop protective scales and become dormant for a period of time. In others, buds develop directly into adult shoots, some of which produce flowers for reproduction. Roots, stems and leaves collectively comprise the vegetative parts of plants.

Bean plants or some equivalent plants have been grown in the greenhouse for today's observation. These plants will be used to help you become familiar with the external plant structures. Obtain a plant that has been grown in a flat of vermiculite. Remove the plant from the flat carefully to avoid damaging its root system. Wash off any clinging vermiculite in the bucket provided.

A. Root System

Note that the root system of the bean plant consists of one main root, called a **primary root**, or **tap root**, and many **lateral roots**, or branching roots. The primary root originates in the plant embryo. Lateral roots arise from within the tissues of the primary root. We will discuss and observe the internal root structure later.

B. Shoot System

The shoot system consists of the **stem** and its attached **leaves**, as well as any branching stems that may arise later at leaf nodes. The first leaves that you see above the surface of the soil are the **cotyledons**, or seed leaves. They are formed in the embryo, and are important in germination and seedling establishment. They may have already shriveled up and fallen off if your bean plant is well established. The cotyledons are "fleshy" in beans and some other legumes and store nutrients for the young seedling. The cotyledons of many plants look very similar to each other and it is often difficult to tell different plants apart when they have just germinated.

The foliage leaves attach to the stem above the cotyledons. Foliage leaves have a leaf stalk, or **petiole**, and the expanded portion called the **blade**. Some leaves (although not bean leaves) have projections of the petiole, called **stipules**. After the first leaves, the leaf blades of bean plants are divided; each part is called a leaflet. Such divided leaves are called compound leaves. There are many variations in leaf shape, dimension and vein patterns. Some of these will be observed in later laboratory exercises.

The place where one or more leaves attach to a stem is called a **node**. One, two or sometimes more leaves attach to the stem at one node. (It is a species characteristic: maple trees always have two leaves per node and alder trees one leaf per node). The regions of the stem between leaves are called internodes.

A shoot system branches at its nodes through the formation of **buds**. Buds arise in the axil of the leaf and its stem. Bean plants do not have dormant periods; and all buds directly develop into branching shoot systems. Some of these shoots produce flower buds rather than vegetative buds as the bean plant matures.

Roots, stems and leaves are commonly called the vegetative parts of the plant. Flowers, which are modified shoots, are the reproductive parts of plants. Flowers give rise to fruits and seeds. Older plants that have flowers and fruits may be available to observe. Based on your observations answer the following questions.

1. Label the primary root, lateral root, stem, cotyledon (or cotyledon scar), leaf, petiole, terminal bud, lateral bud, node and internode on the diagram of a bean plant shown.



2. What functions do you expect each of the following have for the plant?

Root _____

Stem _____

Cotyledon _____

Leaf _____

Flower _____

3. Why are the leaves and stems of the plant green? What function occurs in the green parts of the plant?

4. Why are the roots not green?