Program Bachelor of Science Second year subject botany semester 3 paper code BOC103 paper title, plant anatomy and Embryology. Unit 2 primary structure of organs. Module name structure of dicot leaf.

I am Miss Pratiksha Dabolkar, Assistant Professor Botany.

This module focuses on the parts of a dicot leaf. The transverse section of a dicot leaf.

By the end of the session, the learner would be able to interpret the cross section and longitudinal section of dicot leaf. Would be able to visualize the components and functions of a dicot leaf.

Leaf is a primary producer in which the basic physiological processes such as photosynthesis occur. I'm sure all of you must have seen a leaf, but do you know the structure of the leaf?

Well a typical dicot leaf consist of a leaf stalk Which is the petiole.

The leaf base

Prominent midrib

veins.

And the finer network of veins which are called as the venules from the leaf base to the leaf tip. This region we call it as a leaf lamina or a leaf blade.

Now let us have a look at the internal structure of a dicot leaf.

When you take a section of a dicot leaf passing through the midrib you will get to see the

following layers.

Upper epidermis, the mesophyll tissue, which is differentiated into palisade and spongy vascular bundles and the lower epidermis.

Now let us see the first layer that is the upper epidermis.

You must have seen a condition wherein a water drop floats on the leaf. This is possible Because of a waxy layer which is called the cuticle.

Cuticle is a thin, transparent waterproof layer which makes the plant resistant from insect and pathogen attack. The cells of this upper epidermis are single layer brick shaped rectangular and they are parenchymatous in nature. Since they are parenchymatous in nature, they help in storage of food.

The cells of the upper epidermis show the presence of stomata and trichomes stomatas are the minute openings present on the leaf surface. They help in gases exchange. Trichomes are fine hair like structure present on the upper epidermis which acts as defence to plant. This region is devoid of chloroplast.

The function of this region is to protect the underlying tissues.

Now let us move onto the next region or the next layer. That is the mesophyll.

In Greek, meso means middle and phyll or Philo means the leaf.

This tissue is enclosed between the two epidermal layers. That is the upper epidermis and the lower epidermis. Therefore, we call this tissue as the Mesophylll tissue. Mesophyll is differentiated into two that is Upper Palisade and the lower spongy.

When the leaf is differentiated into Upper Palisade and lower spongy, we call such leaves as bifacial or dorsiventral leaf.

Now let us see the first layer of the mesophyll tissue, that is the palisade mesophyll.

This region lies below the upper epidermis. The cells are at right angles. They are cylindrical and the space is very, very less.

This region contains chloroplast. Palisade is usually single layered, but depending on the light it can go up to four layers. Since these cells contain chloroplasts, the main function becomes photosynthesis.

When I say Chloroplast when these cells contain chloroplasts, we call such cells as chlorenchymatous cells.

Now moving on to the mesophyll tissue. Second layer of the mesophyll tissue that is the spongy

tissue. They are situated below the palisade tissue. The cells here are round to polygonal, inshape. They are loosely arranged. They have a large intercellular space. The number of chloroplasts in this region is less than that of the palisade, since the number of chloroplasts is less in the lower region. The lower side of the leaf appears to be light green and the upper side appears to be dark green.

Moving onto the next layer of the dicot leaf that is the vascular bundle. Vascular bundles are also called as conductive tissue.

This tissues makes the survival of the plant possible.

They are present in the mid rib, in the veins and these are further embedded in the mesophilic region. The other vascular bundles shows the presence of bundle sheath or border parenchyma.

These cells are parenchymatous in nature. When the leaf is young, but as the leaf maturesthey turn sclerenchymatous

When they're sclerenchymatous ,they give mechanical support to the plant. Vascular bundles has Xylem on the upper side,and phloem on the lower side. That is the upper epidermis and the lower epidermis.

The main function of the Xylem tissue is to transport water dissolved mineral ions from the roots to the different parts of the stem. The vascular bundle in Dicot leaf is conjoined, collateral and closed. When I say conjoined Xylem and phloem are together, collateral means Xylem and phloem are on the same radii and closed. Meaning they do not have a functional cambium.

Xylem consists of protoxylem and the metaxylem vessels. This can be easily distinguished based on their sizes as seen from the picture. Protoxylems are smaller in size, whereas the metaxylems are larger in size.

The Protoxylem lies towards the upper epidermis and the metaxylem towards the lower epidermis. That is it lies towards the lower side. That is the lower epidermis, the main function of phloem is to transport food to the different parts of the plant.

Moving on to the last layer of the dicot leaf that is the lower epidermis. The cells here are tabular. They're arranged compactly. They have got a thin layer of cuticle. Most of the stomatas are present on the lower epidermis, therefore be designated as hypostomatic, hypo means below stomata mean stomata, a distinct substomatal cavity is found just below the stomata.

This substomatal cavity helps in the rapid diffusion of gases. The main function of both the epidermal layer is to check the rate of transpiration and the entry of gases for photosynthesis.

Let us summarize the entire concept. Now, when we take a section of a dicot leaf we get the following layers. The upper epidermis consisting of thin layer of cuticle and trichomes.

The middle layer, which is called as the mesophyll, is differentiated into upper palisade and the lower spongy and the last layer, that is, the lower epidermis consists of the stomata and cuticle.

These are the references for and the books which you can refer for your study.