Hello students From this module we are going to cover up

the next unit that is of the paper

BOC 103. The name of the course is Plant Anatomy and

Embryology. This will be covered up for Bachelors of Science

second year program

I am Dr Jyosna Gawas Assistant Professor in

Government College Sanquelim and I'll be presenting to you

a module that is activity of vascular cambium in stem which

is included under the unit secondary growth.

In this particular module, I'm going to tell

you about the overview of primary structure of stem,

Interstellar and extra Stelar Secondary growth in stem,

detailed process of secondary growth in stem due to the

activity of cambium.

At the end of this module the person who views this module will be able to define primary

and secondary growth in stem. Discuss the process of secondary

growth in stem, list the changes that occur during secondary

growth, compare the differences between primary and secondary

growth in stem, and explain how the stem becomes thicker.

In plants growth is an ongoing process, and this growth

initially is the primary growth which results into the

lengthening of stem and root. Woody axis formation in stem and roots is due to secondary growth. The growth of stem in thickness due to activity of cambium is called as secondary growth which occurs in gymnosperms, dicots and monocots like examples of which include Yucca and Dracaena. Secondary Growth in plants takes place due to the action of secondary meristem, which includes vascular cambium and the cork cambium. The primary structure of stem includes the cuticle which forms the outermost layer, followed by a layer of epidermis, epidermis is followed by cortex. This is followed by Endodermis and Pericycle, and within the stele you find vascular bundles which are arranged in the form of a dissected ring and in the center you will find a large pith.

The secondary growth in stem takes place in two different places. One in the cortical region and the other in the stelar region. The growth which occurs in the cortical region is called as extra Stelar Secondary growth and the growth which takes place in the stelar region is called as the intra stelar secondary growth.

Interstellar secondary growth: In dicot plants the vascular

Cambium is present between phloem and Xylem.

This cambium is called as the fascicular cambium.

During the later part of the secondary growth, the cells in between the vascular bundles, of medullary rays, they undergo a process which is called as dedifferentiation and forms a strip of cambium. As the growth advances, the interfascicular cambium and the vascular cambium joins together to form a cambial. ring.

The activity of cambium can be explained with the following diagram wherein you consider a single cell of cambium. This cambial cell in the Fascicular region as well as the Interfascicular region undergoes mitotic division to form two daughter cell. One of these cells, retain its, meristematic activity and the other cell undergoes the differentiation process to form a Xylem element.

Same way the cycle repeats wherein the cambial cell will divide further to produce two mitotic cells which are having similar in size shape.

This particular cambial cell undergoes mitotic division to form two daughter cells wherein one retains meristematic activity, the other one gets transformed into a phloem element

of phloem cell and similarly as

growth advances different layers of Xylem and phloem are

produced within the plant stem.

In this particular picture, you can see that the cambium

forms secondary xylem towards the inner side and secondary

phloem towards the outer side. As secondary growth advances,

the formation of secondary tissues that is secondary Xylem

and secondary phloem pushes primary Xylem towards the inner

side and primary phloem towards the outer side. As secondary

growth advances, the cambium cell produces most secondary

Xylem towards the inner side pushing the primary Xylem

towards the pith and towards the outer side it produces less

quantity of secondary phloem. As a result there is increase in

diameter of the stem

As a result new cells are formed

because the epidermal layer which was existing in the

primary stem, gets replaced by a new protective covering which is

called as periderm. So the growth in this particular region

which occurs outside the stele is called as extra Stelar

secondary growth. In this the outermost cortical layers undergo dedifferentiation to

form cambium which is called as.cork cambium or phellogen. This layer of cells forms

Parenchymatous tissue towards the outer side as well as

towards the inner side. The cells which are formed towards

the outer side are called as phellem. The cells which are

formed towards the inner side is called as phelloderm.

During the course of growth the cells of the outer layer that is phellem gets deposited

with suberin. As a result, water cannot pass from

the inner layers to the outer dermal layer that is epidermis.

And as a result, the epidermis gets detached from the plant.

So as secondary growth advances the outermost layer which was earlier epidermis is replaced by

a new protective layer which is called as periderm, endodermis

pericycle as well as primary cortex get disappeared. This

Periderm layer is followed by secondary phloem. This periderm,

along with secondary phloem constitutes the bark of the

stem. Secondary phloem is followed by secondary Xylem and

towards the inner side you will find traces of primary Xylem and

Few cells of pith which are parenchymatous in nature.

This are the list of references which I've used in

compilation of this module.

Thank you.