Hello students.

In this module number one we will

going to study Unit 1 meristematic

and permanent issue module name,

root apical meristem myself suraksha,

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Outline. Meristematic tissue system

Significance and regulation of tissue differentiation in root apex.

Learning outcomes the student will be able

to define and classify meristematic tissue.

Explain the root apical meristem

outline different theories in

root apical meristem.

Now before going to meristematic

tissue we must know what are tissues.

Tissue is a group of cells with

similar or dissimilar shape with common

origin and perform common functions.

The term was given by an Carl Wilhelm von Nageli

tissues are broadly.

Classified into two types based

on their dividing capacity,

meristematic tissue and permanent issue,

meristematic tissues are made

up of undifferentiated cells.

That means the cells have the ability to

divide and permanent issues are made up of.

Fully differentiated cells.

That means the cells do

not have the ability to divide.

Now in this presentation we're going

to see about the meristematic tissue.

Meristematic in Greek means Meristos' – which means Divisible
According to Nageli

the meristematic tissue is defined

as the localized region in which the

cells have the capacity to divide.

Characteristic features one.

They are thin wall living cells which

continuously divide and hence they

are made up of undifferentiated cells.

Dense protoplasm.
cell wall thin, walled,

flexible and made up of conspicuous

nucleus because these maristematic

cells undergo continuous divisions.

And they have a very large nucleus.

Vacuole absent,

since the meristematic cells are

compactly arranged,

cytoskeleton absent because the

maristematic cell are dividing continuously

so they do not require a framework.

For the cell.

Classification of meristems.

There are certain criterias on

which the meristems are classified

first on the basis of origin,

we have pro meristem,

which is also called as

the embryonic meristem,

and which produce primary

meristem, secondary primary meristem,

which is actually developed

from the Pro meristems,

which further differentiates into primary

permanent issue which gives rise to

primary plant body and secondary meristem,

which is developed from the primary meristem.

This further differentiates into

secondary permanent tissue.

2nd on the basis of the position,

We have apical meristem.

Apical meristems are present

at the root and shoot apex

As you can see here in figure A.

And B is about the root apex

They further differentiates

into primary permanent tissue.

2nd is into Intercalary meristeml.

Meristem Appears between nodes on stem

It is the part of the apical meristems

which gets separated during the

growth of the permanent issue.

They are found in monocots.

They are short lived and become permanent,

and merges with the surrounding tissue.

Example Intercalary meristem

In grasses as we see

in this figure.Increases length of the plant
Just above nodes , so that is why

when grasses are grazed by the animals,

still they grows.

Another example is in The Pinus leaves.

If you see the Intercalary meristem

is present just below the leaf base.

3rd type is the lateral meristem.

As the name suggest,

lateral meristem is lateral in position.

It is not found in the monocots.

Lateral meristem differentiates

into secondary permanent tissue,

which helps to increase the thickness

or the girth of the plant.

Examples are fascicular cambium.

Inter fascicular cambium and the Cork cambium.

On the basis of functions,

again, meristematic tissues

are divided into three types.

Protoderm, ground meristem and procambium,

Protoderm,

differentiates into the epidermal

tissue system. Ground meristem

Is made up of thin walled cells and

differentiates into ground tissue

system and pro cambium made up of

narrow elongated cells differentiates

into the vascular tissue system.

In this particular

presentation will be dealing only

with the apical meristem and how

this apical meristem helps in the

formation of the root apex.

Now,

as we know that apical meristems are

present at the tip of the root and the shoot,

so here we will first see about

the root apex.

In the case of the root structure as
you see in this figure apical meristems

are present at the tip of the root.

They are sub terminal in position

due to the presence of a thimble

or a cap like structure,

which is called as root cap,

and this root cap actually

protects the apical meristem.

Later on these apical meristem

gets differentiated into different

regions of the root.

As you can see here in this figure,

the region with root hair is

called a zone of maturation region.

Without root hair is called a

zone of elongation.

At the tip we have the

presence of meristematic cells.

It is called as the zone

of meristematic activity,

and this in turn is covered by the root tip

Now there are many theories which

has been put forth to understand

how the meristematic cells helps in the

formation of root apex the most

important one is histogen theory,

which was given by Hanstein in 1870.

So According to him,

Root apex is composed of

meristematic cells.

These meristematic cells differentiates

and form into pro meristem and these

pro meristem further differentiates into

three histogens or three group of cells.

Dermatogen,

which is the outermost layer,

single layer which further differentiates

into the epidermis or epiblema of the root.

Then **Periblem**,

which is the middle layer which

differentiates into cortex

and endodermis and **Plerome**,

which is the innermost layer,

differentiates into pericycle,

pith and vascular tissue.

You see

It in this particular diagram,

schematic diagram

of the different layers which,

On further differentiation you get.

Dermatogen.

Which is the outermost single layer,

Periblem and Plerome center

Another concept which was given

by Clowse in 1956

in the maize plant.

He found that certain meristematic

cells they remain inactive at the

center of the root apex and this

center is called as Quiescent Center.

Which acts as
reservoir of active initials.

Some of the meristematic cells they cut off.

cells on the outer edge.

And which later on forms

into Calyptrogen,

which gives rise to Calyptra.

Or called a root cap.

Next theory is the Korper-Kappe theory

which was given by Schuepp in 1917.

According to him, Korper means

the body Kappe means cap.

According to this theory,

the central and peripheral part of

the root apex exhibit difference

in the cell division. Peripheral

cell undergo T shaped divisions called Kappe

and the central cells undergo

inverted T shape divisions,

called as the Korper.

Kappe further differentiates into

Protoderm and Root cap of the root.

Korper differentiates into

procambium and ground tissue.

In this concept,

root apex also has Quiscent Center.

you can see it in

this particular diagram,

this is the central part and this one

is the peripheral.
The central T shape which is

called as Kappe division further differentiates into protoderm and root cap

This is peripheral called as the Korper division,

which upon differentiation forms procambium and Ground tissue i.e. protoderm, cortex
And pith.

So students in this particular

presentation you have studied about

the meristematic tissues, its classification, different.

Types and how this meristematic tissue

helps in the formation of the root apex.

These are some of the references.

Thank you.