**Topic 9.3: Growth in Plants**

**Essential Idea: Plants adapt their growth to environmental conditions.**

**Statements & Objectives:**

**9.3.U1 Undifferentiated cells in the meristems of plants allow indeterminate growth.**

Define indeterminate growth and totipotent.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

State that most plants have indeterminate growth and have totipotent cells.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Define meristem.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Compare apical and lateral meristems.

(**Compare** Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.)

**9.3.U2 Mitosis and cell division in the shoot apex provide cells needed for extension of the stem and development of leaves.**

Outline role of mitosis in the growth of stem and leaves while maintaining a meristem.

(**Outline** Give a brief account or summary.)

**9.3.U3 Plant hormones control growth in the shot apex.**

State the generic function of plant hormones.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Outline how auxin concentrations regulate plant growth in the root and stem.

(**Outline** Give a brief account or summary.)

Outline the role of auxin in apical dominance.

(**Outline** Give a brief account or summary.)

**9.3.U4 Plant shoots response to the environment by tropisms.**

State two external factors that control the growth of roots and stems.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

Define tropism, phototropism and gravitropism.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

**9.3.U5 Auxin efflux pumps can set up concentration gradients of auxin in plants tissue.**

Outline how PIN-transport proteins can direct direction of auxin flow.

(**Outline** Give a brief account or summary.)

Explain how auxin concentrations allow for phototropism in the stem.

(**Explain** Give a detailed account including reasons or causes.)

Explain how auxin concentrations allow for gravitropism in the root.

(**Explain** Give a detailed account including reasons or causes.)

**9.3.U6 Auxin influences of cell growth rates by changing the pattern of gene expression.**

State that auxin influences cell growth rates by changing gene expression.

(**State** Give a specific name, value or other brief answer without explanation or calculation.)

**9.3.A1 Micropropagation of plants using tissue from the shoot apex nutrient agar gels and growth hormones.**

Define micropropagation.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

Outline how changing auxin and cytokinin ratios can lead to development of roots or shoots from the same explant tissue.

(**Outline** Give a brief account or summary.)

**9.3.A2 Use of micropropagation for rapid bulking up of new varieties, production of virus-free strains of existing varieties and propagation of orchids and other rare species.**

Outline three roles of micropropagation of plant species.

 ​(**Outline** Give a brief account or summary.)

**9.3.NOS Developments in scientific research follow improvements in analysis and eduction-improvements in analytical techniques allowing the detection of trace amounts of substances has led to advances in the understanding of plant hormones and their effect on gene expression.**

Outline role of microarrays in understanding role of plant hormones.

(**Outline** Give a brief account or summary.)

**Key Terms**

Meristem

​secondary growth

​hormones

​receptors

​indeterminate growth

gravitropism

​microarrays

​IAA

​in vitro

apical bud

​terminal bud

​auxin

​nastic responses

​apical meristem

​PIN-transport proteins

undifferentiated

​gibberellin

​genomics

lateral bud

​micropropagation

​phototropism

​efflux pumps

​lateral meristems

​cytokinin

​dicotyledonous

​positive tropism

cambium

​growth regulators

​tropism

totipotent

​mitosis​

explant tissue​

​leaf primordial

​negative tropism