



Basic concepts of plant growth

- Cell division and cell enlargement:

Plant growth is the result of cell division and cell enlargement. Cell division increases the number of cells that can expand, but cell expansion is what actually causes growth.

- Meristem:

Meristem is a type of plant tissue that contains undifferentiated cells that can divide and differentiate. Meristem is located at the tips of organs and between mature tissues.

- Phases of growth:

Plants have three phases of growth: meristematic, elongation, and maturation.

- Growth analysis:

Growth analysis can be done at the level of the cell, organ, plant, or community. The system variable is usually a metric for biomass or volume.

- Factors that impact plant growth

Water, light, and temperature interact with each other to impact plant growth. For example, more light increases temperature, which increases transpiration and can lead to water shortages.

- Photosynthesis

Photosynthesis is the chemical process that allows plants to eat and produce oxygen. Plants take in carbon dioxide through their stomata, which open and close throughout the day.

Growth is one of the most conspicuous events in any living organism. It is an irreversible increase expressed in parameters such as size, area, length, height, volume, cell number etc. It conspicuously involves increased protoplasmic material. In plants, meristems are the sites of growth. Root and shoot apical meristems sometimes along with intercalary meristem, contribute to the elongation growth of plant axes. Growth is indeterminate in higher plants. Following cell division in root and shoot apical meristem cells, the growth could be arithmetic or geometrical.

Growth may not be and generally is not sustained at a high rate throughout the life of cell/tissue/organ/organism. One can define three principle phases of growth – the lag, the log and the senescent phase. When a cell loses the capacity to divide, it leads to differentiation. Differentiation results in development of structures that is commensurate with the function the cells finally has to perform. General principles for differentiation for cell, tissues and organs are similar. A differentiated cell may differentiate and then re differentiate. Since differentiation in plants is open, the development could also be flexible, i.e., the development is the sum of growth and differentiation. Plant exhibit plasticity in development.



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Plant growth and development are under the control of both intrinsic and extrinsic factors. Intercellular intrinsic factors are the chemical substances, called plant growth regulators (PGR). There are diverse groups of PGRs in plants, principally belonging to five groups: auxins, gibberellins, cytokinins, abscisic acid and ethylene. These PGRs are synthesised in various parts of the plant; they control different differentiation and developmental events. Any PGR has diverse physiological effects on plants. Diverse PGRs also manifest similar effects. PGRs may act synergistically or antagonistically. Plant growth and development is also affected by light, temperature, nutrition, oxygen status, gravity and such external factors.

Flowering in some plants is induced only when exposed to certain duration of photoperiod. Depending on the nature of photoperiod requirements, the plants are called short day plants, long day plants and day-neutral plants. Certain plants also need to be exposed to low temperature so as to hasten flowering later in life. This treatment is known as vernalisation.