X_Biology_ Life Processes (Transportation)_Handout 4

MODULE 4/4

TRANSPORTATION IN PLANTS Slide 1&2

- Transportation is a vital process in plants. Trees transport all the nutrients and water it needs for survival from its roots to the tips of the leaves.
- They also transport food prepared in the leaves for all parts either for storage or maintenance.
- Plants contain a vast network of vascular tissues which consist of xylem and phloem.
- Similar to the circulatory system in humans, the xylem and phloem tissues extend throughout the plant.

XYLEM Slide 3 & 4

- The water is absorbed by the root hair and undergoes cell to cell movement by osmosis until it reaches the xylem.
- This water is then transported through the xylem vessels to the leaves and is evaporated by the process of transpiration.
- The flow of water is unidirectional and in the upward direction.
- Xylem is a complex tissue that is composed of four basic types of cell (tracheid, vessel, xylem fiber and xylem parenchyma), **The only living component of xylem is xylem parenchyma.**
- The continuous supply of water to the xylem of the leaf, replaces the water which is lost by transpiration.
- The evaporation of water from the cells of the leaf through the stomata creates a **suction effect** that pulls the water up from the xylem cells of the roots. This loss of water from the stomata is called transpiration.
- Transpiration helps in absorption and upward movement of water and minerals.

FACTORS AFFECTING ASCENT OF SAP Slide 5

1. **Root Pressure** is the positive pressure created by the movement of water from the soil to the root for upward movement of water. The effect of root pressure in the transport of water is more important at night.

2. **Transpiration pull** is the pull of water as a result of tension created by transpiration in the aerial parts of the plant. It is the major driving force of water movement upwards in a plant during the day.

TRANSPORT OF FOOD/ TRANSLOCATION THROUGH PHLOEM

Slide 6 & 7

- The transport of food and other substances from the leaves to the different parts of the plant body is called TRANSLOCATION.
- Translocation takes place in the phloem and it sends substances to storage organs like roots, fruits etc and to growing parts.
- Phloem is a complex tissue that is composed of four basic types of cell (sieve tubes, companion cells, phloem fiber and phloem parenchyma), **The only dead component of phloem is phloem fibre.**
- **Translocation is bidirectional ie both in the upward and downward directions and takes place in the sieve tubes with the help of the companion cells.**
- Translocation in phloem is achieved by utilising energy.
- Materials like Sucrose that is formed in the leaf is transferred into the phloem using energy from ATP, so increasing the osmotic pressure.
- Water from the neighbouring xylem now moves into the sieve tube via the companion cells.
- The bulk pressure increases in the sieve tubes and the material moves in the phloem to tissues which have less pressure.
- This allows the phloem to move materials according to the plants needs in both directions, upwards and downwards.
- So, sugars stored in root or stem tissues may move to growing buds in spring as these growing buds need energy.

Source: NCERT Text book and GOOGLE