



Lecture No- 3

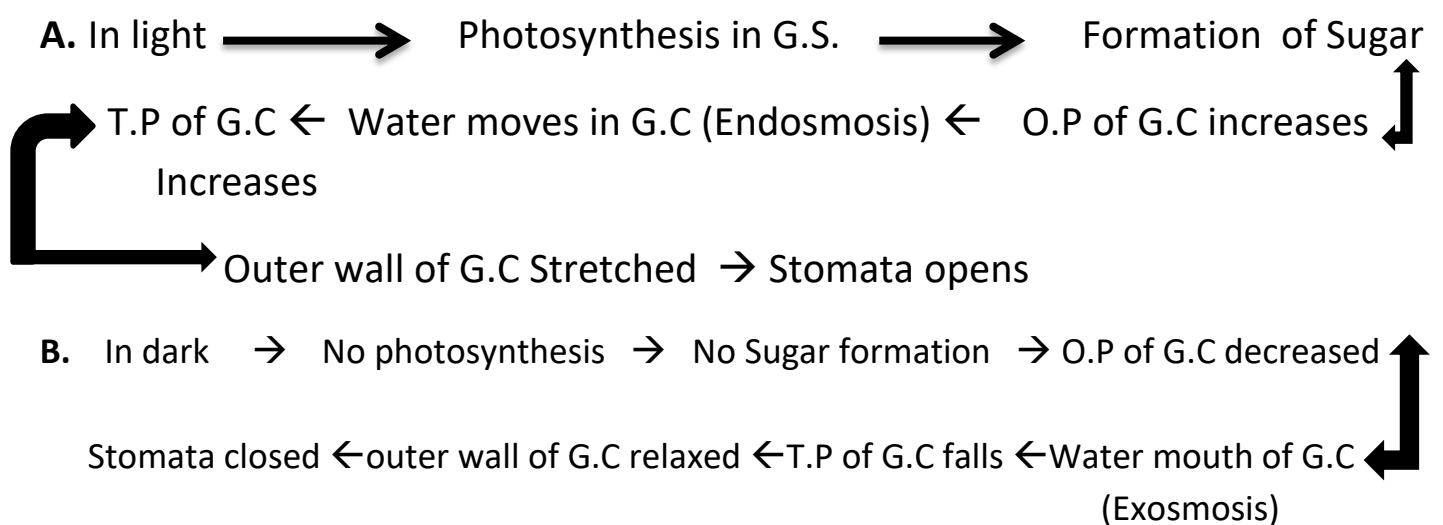
Date: - 06th Aug 20

TOPIC: - PLANT PHYSIOLOGY- Transpiration- III A

Subsidiary Part II, Group – C

MECHANISM OF STOMATAL MOVEMENT – The stomatal movement (opening and closing) is directly related to the osmotic behaviour of the guard cells. When water from surrounding cells enter the guard cells (endosmosis) the latter become turgid now the outer thin walls of guard cells are stretched outwards. As a result of this the inner wall being inelastic becomes concave and the stomatal pore opens contrarily when water moves out of the guard cells (exosmosis). They become flaccid and the pore closes thus in the opening and closing of stomata the turgor mechanism is directly involved. Following theories have been proposed to explain this turgor mechanism: -

Photosynthetic theory: - von mohl (1856) proposed that stomata open in the light and close in darkness. He explained stomatal movement in the light of photosynthetic activity of the chloroplast of guard cells. As-





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This theory has not been accepted on the ground that increase in CO₂ concentration around the leaf in presence of light should cause increased opening but the fact is that it causes partial closure of stomata more over it has been found that chloroplast of the guard cells are either totally incapable of photosynthesis or have only feeblest photosynthesis.

2. Starch \longleftrightarrow Sugar theory :- This theory was first formulated by Lloyd (1908) and was supported by J.D Sayre (1926) Scarth (1932) and Small & Clark (1942).

(a) According to the theory starch – sugar conversion in the guard cell is a reversible reaction, mediated by an enzyme, phosphorelase.

(b) Under light PH this enzyme converts starch into glucose – 1 - phosphate in presence of inorganic phosphate but the reaction become reversed with the decrease in P. by the same enzyme.

Starch + ip PH=7.0 Glucose – 1 - phosphate
PH=5.0 dark