Course: B.Sc Botany
SEMESTER IV
PAPER CODE: BOT GE 404
PAPER: Plant Physiology and Metabolism
TOPIC: Crassulacean Acid Metabolism (CAM)
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Crassulacean Acid Metabolism (CAM)

- Some plants that are adapted to dry environments, such as cacti and pineapples, use the crassulacean acid metabolism (CAM) pathway to minimize photorespiration. This name comes from the family of plants, the Crassulaceae, in which scientists first discovered the pathway.
- Instead of separating the light-dependent reactions and the use of CO in the Calvin cycle in space, CAM plants separate these processes in time. At night, CAM plants open their stomata, allowing CO2 to diffuse into the leaves. This CO2 is fixed into oxaloacetate by PEP carboxylase then converted to malate or another type of organic acid.
- The organic acid is stored inside vacuoles until the next day. In the daylight, the CAM plants do not open their stomata, but they can still photosynthesize. That's because the organic acids are transported out of the vacuole and broken down to release CO2 which enters the Calvin cycle. This controlled release maintains a high concentration of CO2 around rubisco.
- The CAM pathway requires ATP at multiple steps so like photosynthesis, However, plant species that use CAM photosynthesis not only avoid photorespiration, but are also very water-efficient. Their stomata only open at night, when humidity tends to be higher and temperatures are cooler, both factors that reduce water loss from leaves. CAM plants are typically dominant in very hot, dry areas, like deserts.

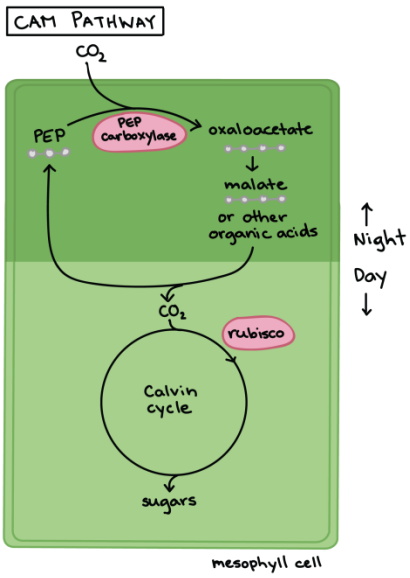

Fig: CAM Pathway