

Origin of land plants and their evolution: From an ecophysiological viewpoint

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1. Land plants develop cuticle layer to suppress water loss. However, the cuticle is also resistant to diffusion of carbon dioxide. Stomata realize maximum ratio of carbon dioxide uptake/water loss.

2. Plants compete for resources. To absorb resources, it is necessary to expand body surface area. It is also necessary to be tall to intercept light efficiently. Mechanisms which enable these requirements are discussed

3. Primary carboxylation enzyme, Rubisco, catalyzes RuBP oxygenation and its product, glycolate, is an inhibitor of Calvin cycle. Land plants developed photorespiration cycle to detoxify glycolate. Because photorespiration cycle requires energy, plants minimize the use of photorespiration cycle in various ways.