ABSTRACT

The Effect of Lightning on Anthocyanin Biosynthesis of *Capsicum annuum*

Dalli Sruthi Laya

Agricultural Engineering, Bachelor.

Institute of Genetics and Biotechnology, Department of Genetics and Genomics.

Insider subject leader: Zsófia Kovács, senior lecturer, Institute of Genetics and Biotechnology.

Light is one of the most important environmental factors that plays an important role in plant growth, development, metabolism and also regulates the biosynthesis of secondary metabolites like anthocyanins, which acts like antioxidants, helps in stress adaptation, colouration. This study's main aim is to investigate the effect of light on anthocyanin biosynthesis of *Capsicum annuum,* in which the selected leaves of the plants were covered to grow under dark, and the uncovered leaves are grown under light.

Total polyphenolic content (TPC), total flavonoid content (TFC), and ferric-reducing antioxidant power (FRAP) were measured to calculate antioxidant capacity. Epigenetic regulation was evaluated using a Methylation-sensitive amplification polymorphism (MSAP). The physiological role of anthocyanins was measured using detached leaf assays by inoculating *Botrytis cinerea* on both purple and green leaves.

TPC, TFC, FRAP revealed that light exposed leaves have higher content of phenolic compounds and showed greater antioxidant capacity than the leaves grew under dark. Darkness also increased the methylation at several loci, whereas light exposure has reduced the methylation which implies that light supports the anthocyanin biosynthesis. During detached leaf assays, histochemical staining revealed that in purple leaves, the superoxide and hydrogen peroxide levels in purple leaf were significantly lower than that of green leaves which indicates that anthocyanins reduce oxidative stress and promotes resistance to fungal infection.

These results indicate that light enhances the anthocyanin accumulation and increases antioxidant capacity while influencing the epigenetic control through DNA methylation. Anthocyanin rich leaves showed grater resistance to fungal infection implying their double role in plant defence as pigments and bioactive chemicals.