

# Effect of light stress on peroxidase, succinate dehydrogenase and total chlorophyll content in *Andrographis paniculata*

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## SUMMARY

*Andrographis paniculata*, a medicinal herb was grown in two different light intensities *i.e.*  $1.44 \times 10^3$ - $2.24 \times 10^3$  imole.photons.m<sup>-2</sup>sec<sup>-1</sup> and  $0.24 \times 10^3$ - $0.96 \times 10^3$  imole.photons.m<sup>-2</sup>sec<sup>-1</sup> for a period of three different growth stages *i.e.* vegetative, flowering and fruiting to evaluate its response towards peroxidase (POD), succinate dehydrogenase (SDH) activity and total chlorophyll content. Increased activity of POD was observed in the plants grown in higher light intensity. On the contrary higher light intensity proved to be detrimental for the activity of SDH and total chlorophyll content which was recorded higher in lower light intensity. From the present study it can be suggested that higher light intensity is acting as a stressful condition for *A. paniculata*.

## Key words :

*Andrographis paniculata*, Peroxidase (POD), Succinate dehydrogenase (SDH), Total chlorophyll content, Light stress

Higher plants have the ability to respond towards the amount of light available during their growth. Light plays an important role in the environment, controlling the process associated with dry matter accumulation and thus contribute to the plant growth (Vilela and Ravetta, 2000). Different environmental stresses like light, high temperature, salinity and many other cause oxidative effect and high production of different oxygen reactive species (ROS) in plants which is dangerous for membrane lipids, proteins, chloroplasts, enzymes and nucleic acids (Asad, 1994,1992, Shah *et al.*, 2001). The plants have a defense system against oxidation which includes catalase, peroxidase, superoxide mutase and many other components (Sairam *et al.*, 2002). Peroxidases (POD) that trigger the conversion of H<sub>2</sub>O<sub>2</sub> to water and oxygen are part of the enzymatic defense of the plant cells (Gulen and Eris, 2003). Succinate dehydrogenase (SDH, Succinate: ubiquinone oxidoreductase) is a part of complex II of the electron transport chain (ETC) in mitochondria. It converts succinate to fumarate and ubiquinone to ubiquinol. SDH activity has often been used to determine the senescent tissues as well as damaged plant tissues induced by environmental stresses (Kang *et al.*, 1996). Many plant species exhibit acclimatization of their photosynthesis apparatus to varying light intensity. Several external and internal factors affect chlorophyll metabolism. Light is considered one of the factors associated with

chlorophyll metabolism (Brand, 1997). Excessive light intensity has a destructive effect on photosynthetic pigments leading to inhibition of photosynthesis (Ferus and Arokosiova 2001). Hence, the quantitative determination of chlorophyll in different experimental plant material is specially recommended as a valuable characteristic of light harvesting capacity under stress.

*Andrographis paniculata* (Family: Acanthaceae) grown widely in tropical area of Asia and commonly known as Kalmegh is medicinally important crop. It has been extensively used for the treatment of fever, diarrhea, inflammation, sore throat and hepatitis (Shah *et al.*, 2007). The plant has been studied for its antifertility, antidiabetic and hypotensive activity (Kumaran *et al.*, 2003). *A. paniculata* was reported to contain pharmacologically active diterpene lactone like andrographolide, neoandrographolide and deoxydihydroandrographolide (Shah *et al.*, 2007). Andrographolide is the main component and is believed to be the active constituent for biological activities and represents as an identity indicator for the plant (Aromdee *et al.*, 2005).

The present study deals with the effect of light stress on metabolism of the plant in field condition, as they are often subjected to fluctuating light intensities at its different growth stages which have a profound effect on the plant metabolism.

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