Accepted Manuscript

Defence strategies adopted by the medicinal plant *Coleus forskohlii* against supplemental ultraviolet-B radiation: augmentation of secondary metabolites and antioxidants

Swabha Takshak, S.B. Agrawal

PII: S0981-9428(15)30120-0

DOI: 10.1016/j.plaphy.2015.09.018

Reference: PLAPHY 4292

To appear in: Plant Physiology and Biochemistry

Received Date: 29 July 2015

Revised Date: 30 September 2015 Accepted Date: 30 September 2015

Please cite this article as: S. Takshak, S.B. Agrawal, Defence strategies adopted by the medicinal plant *Coleus forskohlii* against supplemental ultraviolet-B radiation: augmentation of secondary metabolites and antioxidants, *Plant Physiology et Biochemistry* (2015), doi: 10.1016/j.plaphy.2015.09.018.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



ACCEPTED MANUSCRIPT

- 1 Defence strategies adopted by the medicinal plant Coleus forskohlii against supplemental
- 2 ultraviolet-B radiation: augmentation of secondary metabolites and antioxidants
- 3 Swabha Takshak, S.B. Agrawal*
- 4 Laboratory of Air Pollution and Global Climate Change, Department of Botany, Banaras Hindu
- 5 University, Varanasi-221 005, India

6 Abstract

- 7 Supplementary ultraviolet-B (ambient+3.6kJ m⁻² day⁻¹) induced changes on morphological,
- 8 physiological, and biochemical characteristics (specifically the defence strategies: UV-B
- 9 protective compounds and antioxidants) of Coleus forskohlii were investigated under field
- 10 conditions at 30, 60, and 90 days after transplantation. Levels of secondary metabolites increased
- under s-UV-B stress; flavonoids and phenolics (primary UV-B screening agents) were recorded
- to be higher in leaves which are directly exposed to s-UV-B. This was also verified by enhanced
- 13 activities of phenylpropanoid pathway enzymes: phenylalanine ammonia lyase (PAL), cinnamyl
- 14 alcohol dehydrogenase (CAD), 4-coumarate-CoA ligase (4CL), chalcone–flavanone isomerase
- 15 (CHI), and dihydroflavonol reductase (DFR). Antioxidants, both enzymatic (ascorbate
- 16 peroxidase, catalase, glutathione reductase, peroxidase, polyphenol oxidase, and superoxide
- 17 dismutase) and non-enzymatic (ascorbic acid and α-tocopherol) also increased in the treated
- organs of the test plant, higher contents being recorded in roots except for ascorbic acid. On the
- 19 contrary, protein and chlorophyll content (directly implicated in regulating plant growth and
- development) declined under s-UV-B. These alterations in plant biochemistry led the plant to
- 21 compromise on its photosynthate allocation towards growth and biomass production as
- evidenced by a reduction in its height and biomass. The study concludes that s-UV-B is a potent
- 23 stimulating factor in increasing the concentrations of defense compounds and antioxidants in C.
- 24 forskohlii to optimize its performance under stress.
- 25 **Key words**: antioxidants; *Coleus forskohlii*; oxidative stress; secondary metabolites; s-UV-B
- 26 Abbreviations: APX- ascorbate peroxidase; BSA- bovine serum albumin; CAD- cinnamyl
- 27 alcohol dehydrogenase; CHI- chalcone flavanone isomerase; CAT- catalase; C_i- internal CO₂;
- 28 DAT- days after transplantation; DCPIP- 2, 6-Dichlorophenol indophenol; DFR- dihydroflavanol

Download English Version:

https://daneshyari.com/en/article/8354389

Download Persian Version:

https://daneshyari.com/article/8354389

<u>Daneshyari.com</u>