

The mechanisms of protection of antioxidants on *Nostoc sphaeroides* against UV-B radiation

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UV radiation is one of space harmful factor for earth organisms in space exploration. In the present work, we studied on the role of antioxidant system in *Nostoc sphaeroides* Kütz (Cyanobacteria) and the effects of exogenous antioxidant molecules on its photosynthetic rate under UV-B radiation. It was found that UV-B radiation decreased the photosynthetic activity of cyanobacterium, but promoted the activity of antioxidant system to protect photosystem II (PSII) and exogenous antioxidant (sodium nitroprusside, SNP; N-acetylcysteine, NAC) had an obvious protection on PSII activity under UV-B radiation. The activity of SOD (Superoxide Dismutase, EC 1.15.1.1), CAT (Catalase, EC 1.11.1.6), POD (Peroxidase, EC 1.11.1.7) and content of MDA and ASC were improved by 0.5mM and 1mM SNP, but 0.1mM SNP decreased the activity of antioxidant system. Exogenous NAC addition decreased the activity of SOD, POD, CAT and the content MDA and ASC, but exogenous NAC addition increased the content of GSH. The results suggested that exogenous SNP and NAC may protect algae by different mechanisms, in which SNP maybe play double roles as sources of reactive free radicals or ROS scavengers in formation of algae's protection of PSII under UV-B radiation, while NAC does function as antioxidant reagent or precursor of glutathione, which could protect PSII directly from UV-B radiation.

Keyword: antioxidant system; exogenous or endogenous antioxidant; *Nostoc sphaeroides*; photosynthesis; UV-B radiation