Title : Mechanisms of Drought Tolerance in Plant Growth–Promoting Actinobacteria Associated with Kale (*Brassica oleracea* var. *acephala*)

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ABSTRACT

Climate change has intensified drought conditions, which have become a major factor limiting plant growth. The use of plant growth–promoting microorganisms is one approach to enhance plant tolerance to stress. This study aimed to investigate the drought tolerance mechanisms of *Micrococcus yunnanensis* ORF15-23 and its potential to promote the growth of kale (*Brassica oleracea* var. *acephala*) under such conditions. The study encompassed genome analysis using the RAST server as well as laboratory-scale experiments. Genomic analysis revealed genes associated with osmotic and oxidative stress responses. Two mechanisms were identified from laboratory-scale experiments. (1) the action of antioxidative enzymes ascorbate peroxidase (APX); (2) ABTS antioxidant activity. The plant experiment consisted of four treatments: (1) kale grown under normal condition, (2) kale grown under drought condition, (3) kale inoculated with ORF15-23 grown under normal condition, and (4) kale inoculated with ORF15-23 grown under drought condition. Drought stress was applied by adding 10% PEG to 7-day-old seedling for 10 days, and plants were continued to grow for an additional 33 days. Plants inoculated with *M. yunnanensis* ORF15-23 exhibited increased accumulation of H_2O_2 and proline. These findings suggest that the *M. yunnanensis* ORF15-23 may promote accumulation of proline to mitigate H_2O_2 stress in kale.

Keywords : Kale, Plant Growth Promoting Actinobacteria, Drought stress

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