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## Molecular Characterization of *Deschampsia antarctica* and *Colobanthus quitensis* and their Prospect in Sustainable Agriculture and Food Security

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### Abstract

The Antarctic ecosystem is characterised by extreme unfavourable climatic conditions. Despite the unfavourable climatic extremities, some flora species still emerged with high adaptations and tolerance affinities for such environments. Among such flora species are the two vascular plants species: *Deschampsia antarctica* Desv. and *Colobanthus quitensis* (Kunth) Bartl, which are adapted to severe physiological stressors such as desiccation, low soil water availability, and high irradiance. The rare adaptive behaviours of these species triggered scientific interest on their morphological, physiological, and molecular mechanisms that confer such adaptive properties. The current climate dynamics is fast evolving and resulting in constant ecosystem modification with its adverse impact of harsh abiotic stress on agricultural crops. In such constantly changing climatic conditions and unpredictability of global climate dynamics, agricultural sustainability requires smart and resilient breeding approaches. Scientific studies in *D. antarctica* and *C. quitensis* morphological, physiological, and molecular mechanisms is a vital research goal for resistant and resilient plant breeding and sustainable agriculture. This study reviewed the molecular characteristics of the vascular plants in the Antarctic ecosystem. It also reviewed their application and prospect for resistant and resilient crop breeding for sustainable agriculture and food security. It is revealed that *D. antarctica* and *C. quitensis* are characterized by wide morphological and anatomical ecotypic variation and the possession of a unique ability to adapt to both the local mosaic microhabitats and to general climatic fluctuations in an unfavourable environment, being able to photosynthesize through their vascular system, with *C. quitensis* having a wider geographical distribution than *D. antarctica*.

