

**EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]:**

Cold acclimation is the process in which plants exposed to low, non-freezing temperatures develop tolerance to subsequent freezing temperatures. The ability of plants to withstand freezing is a major factor regulating plant distribution and has critical implications for agriculture. Classical plant breeding has had limited success imparting cold tolerance to crop plants and why some plant species tolerate cold better than others remains poorly understood. The isolation of the genes responsible for cold acclimation, and the description of the regulatory pathways that control them, has been the focus of much recent biotechnology research, however, little is known about the processes that have governed the evolution of this important adaptive phenomenon. A better understanding of the molecular evolution of cold acclimation in plants will aid in the development of crop plant varieties engineered to tolerate freezing and may offer insights into the fate of natural plant populations in the face of global climate change. The proposed research will generate pilot molecular population genetics data for a long-term, collaborative study of the adaptive process of cold tolerance evolution in crop plants. This work will permit the establishment of an ongoing, externally funded research program in the laboratory of a new CSUCI faculty member and will provide undergraduate students with opportunities for meaningful participation in projects in bioinformatics, comparative genomics, molecular population genetics and plant biotechnology.