

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

State **in layman's terms** the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project relevant to California.

Cold stress is one of the most adverse stresses which negatively affects growth and yield of many crop species. Although a large number of plants can deal with sudden chilling and freezing stress through a process called cold acclimation, many tropical plants such as rice, maize and tomato do not have the ability to acclimate to cold temperatures and are thus subject to freezing and chilling damage, which results in huge amount of dollar loss each year. The identification of novel genes and proteins which play important roles in protecting plants from sudden chilling and cold damage have significant biotechnological applications in food as well as medical industries. As compared to traditional molecular genetic approaches, this proposal aims to identify genes and proteins by combining powerful, high-throughput functional genomic approach with the natural variation approach using different Arabidopsis ecotypes, which grow in either extremely hot, or extremely cold environments. The adaptation mechanisms developed by these plants should provide new insights into plant cold stress signaling pathways. The knowledge gained from this study will be used improve crop plants by expanding their cold and freezing tolerance.