Overall Assessment of Intellectual Merit: Excellent
Explanation to the applicant:

This proposal addresses the effect of the interaction of increased carbon dioxide levels and drought on osmotic adjustment in Arabidopsis. The proposal is well written, and the applicant has a strong academic background. The applicant has a good record of communication of research results and has demonstrated the ability to work both as a member of a team and independently.

Overall Assessment of Broader Impacts: Very Good
Explanation to the applicant:

In order to understand how global warming and anthropogentic increases in CO2 will influence the ecology of the planet, it will be necessary to understand the effects of this interaction at the level of transcription products, whole-plant physiology, populations, and ecosystems. The applicant does a good job of articulating this. The applicant has a demonstrated record of public outreach that includes efforts at increasing inclusiveness. Although the applicant mentions how this will continue in the proposed project, more emphasis could have been placed on this aspect.

Overall Assessment of Intellectual Merit: Excellent
Explanation to the applicant:

The applicant writes a remarkable essay that nicely describes how his many outreach activities have helped to focus and mold his interests in science. His letters are outstanding, and importantly point to his hard work, his ready acceptance of new directions, and his inspiring approach. The proposal is also excellent, in that it tries to relate larger physiological effects of gas exchange with solute loading and gene expression. These are complicated studies, and there is one concern that the analysis of the transcript profiling is not well described and that many changes in genes expression, especially at the metabolic level, are not transcriptional but at the protein level. The proposal should a least address this isssue.

Overall Assessment of Broader Impacts: Excellent
Explanation to the applicant:

The applicant describes numerous activities here and abroad of educational outreach, that appear to be highly effective. His efforts are described as inspiring to others. The applicant indicates his desire to continue these outreach activities, and this is very believable. The work itself may also have an impact on our understanding of the effects of global warming on crops, although this is less defined.

Overall Assessment of Intellectual Merit: Excellent
Explanation to the applicant:

Robert proposes to continue some very interesting work that he started as an undergraduate at University of Illinois on the effects of increased carbon dioxide on plant physiology. To carry out this work he will use the soyFACE site. His initial work, which is in prep for publication, showed that increased CO2 caused osmotic adjustment in the plants and his proposed research is to further investigate the process. He is working with Arabidopsis ecotypes that vary in the natural moisture of their locations. The experimental plan is well thought out, employs excellent techniques and will generate valuable data. His record indicates a high likelihood of success with the project. The proposal could have been strengthened by describing some expected outcomes for the range of ecotypes.

Overall Assessment of Broader Impacts: Excellent
Explanation to the applicant:

Robert has a demonstrated interest in sharing his excitement about science with younger students and the public. He proposes to continue such activities. In addition, the nature of his topic of study, climate change, is of great value to society and agriculture.