# Susceptibility Of Lettuce Seed Thermo-Inhibition In Changing Environments And Its Genetic Cause + Novel QTLs For Seed's Weight, Seed Yield And Seed Photo-Dormancy

**Mohan Niroula, Fei-Yian Yoong and Kent J. Bradford**
Seed Biotechnology Center, University of California, Davis, CA 95616 USA
Email: mniroula@ucdavis.edu

Temperature-induced seed dormancy is known as thermo-inhibition whereas photo-dormancy is induced by dark. **Susceptibility to seed dormancy is influenced both by genotype and maternal environment during seed development**. To investigate the nature of environmental susceptibility of seed thermo-inhibition and its genetic cause, lettuce (*Lactuca sativa*) parental lines were selected that varied not only in their thermo-inhibition but also in their susceptibility to the changing seed maturation environments. One accession (PI251246, a primitive lettuce landrace) could germinate at high temperatures (>35°C) only when the seeds had developed at high temperature. In contrast, production of seeds of cv. Salinas at high temperature only slightly increased the threshold temperature for germination (to 30°C). A recombinant inbred line (RIL) population derived from PI251246 and Salinas was used for quantitative trait locus (QTL) analysis of these traits. Seeds of the entire RIL population from multiple production environments were phenotyped for seed germination characteristics at different temperatures. Quantitative trait analysis revealed a major QTL for the thermo-inhibition trait on chromosome 9. Using the standard deviations of germination percentages of each RIL from different production environments as the environmental sensitiveness for QTL analysis we identified a major environment sensitive QTL on chromosome 9. Interaction of this QTL with environments was highly significant. This QTL co-localized with the one obtained for thermo-inhibition, suggesting that this QTL may itself be environmentally sensitive during seed development. **Our result shows that the main trait QTL not only determine the seed thermo-inhibition trait but also senses the environment and defines the trait outcome**. In addition, we utilized RIL population derived from Salinas and UC96US23 to look at Quantitative trait loci (QTL) for lettuce seed's weight, seed yield and seed photo dormancy. We found significant and novel QTL on Chromosome 9, 2 and 7 for seed weight, seed yield and seed photo-dormancy respectively. Long-term goal of this research is to find molecular markers that can be used in marker assisted plant breeding in selecting high yielding lettuce varieties with better germination traits that are stable across multiple environments.