Karki, L., K. Mathiason, G. Djira, C. P. Saunders, A. Fennell. *Isotonic sequential regression modeling on the budbreak of grapevines*. First Annual SDSU Symposium on Biological Research Computing, Brookings, SD, March 8, 2013.

Longitudinal designs with ordinal response variables are ubiquitous in the biological, medical, and social sciences. Sometimes, the repeated measure ordinal data is monotonic in nature (either non-decreasing or non-increasing). We explored different methods for repeated measure ordinal monotonic data, and applied the *isotonic sequential regression (ISR) model* with application to the analysis of budbreak data in grapevines. The issue of monotonicity in the data was handled by considering the binary transitions of data. The results of the exploratory data analysis using chi-square test for homogeneity of multinomial proportions for all treatments followed by pairwise comparisons for treatments showed that there is significant difference in response between treatments. Isotonic sequential regression analysis verified the positive relation between increased chilling budbreak competency and suggested optimal monitoring period.