Dear Managing Editor:

This manuscript is on local adaptation of temperature tolerance in *Solanum carolinense* populations in Minnesota and Texas and how divergent selection may drive adaptive responses to extreme temperatures. In this study, we also explored how temperature tolerance in the gametophyte compares to the sporophyte and whether there is an overlap in temperature driven selection of these traits, as has been observed in other traits (Beaudry et al. 2020; Pedersen et al. 1987; Tanksley et al. 1981; Willing and Mascarenhas 1984).

We found that temperature tolerance was not correlated among traits of the gametophyte and sporophyte. There was some evidence of local adaptation of temperature tolerance in some variables, but the results did not always match what we expected, including counter-gradient results. In pollen germination specifically, we found evidence of southern plants using an avoidance method by producing a higher proportion of pollen grains that remain dormant at high temperatures relative to northern plants. This finding supports a recent body of work describing a "two-basket" model for pollen, in which pollen grains can fit in one of two categories, active (high-ROS) or backup (low-ROS), determined by metabolic rate, size, and propensity to germinate.

This work is important because temperatures in areas across the globe are changing, and in many places are increasing, as was seen this summer with record highs in Europe and the United States. In the Midwestern United States, temperatures have been rising dramatically and in Texas, average temperatures have risen over the last 20 years, according to the National Climate Assessment (USGCRP 2018). A question on all our minds is how plant populations will or are responding. Do they have the capacity to acclimate and/or adapt to these temperature changes? Must they shift ranges? While these questions are often asked within the fields of agriculture, it is important to understand how wild species that have traits that are naturally selected respond and how conservation should be implemented to preserve or restore sensitive species. Furthermore, mechanisms of temperature tolerance in the wild may inform crop producers in related species.

We appreciate your consideration of our manuscript.

Sincerely,

Emma Chandler