Effects of temperature on germination and seed quality in locally adapted Mexican maize landraces

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Southern Mexico is the center of origin for maize (*Zea mays* ssp. *mays)* and hosts a wide array of landraces (or traditional varieties). The diversity found within and among landrace populations is shaped by the interplay between selection and gene flow, resulting in populations that often evolve to be locally adapted to a particular environment. Mercer et al. (2008) found that landrace maize populations sourced from along an altitudinal gradient in the Mexican state of Chiapas exhibited a pattern of asymmetrical local adaptation. We will study the role of temperature as a driving force of this local adaptation by examining the effect of temperature on the germination phase of the maize lifecycle. We will use a thermogradient table to expose the seeds of nine landrace populations (three from each altitudinal group) to temperatures the seeds would encounter after sowing and record the percent germination and uniformity of germination. We will also examine the seed quality, or the ability of the seeds to germinate uniformly over a wide range of conditions, of each of the nine populations using a standard germination test, an accelerated aging test, and a cold test. These results will help us to accurately assess the ability of individual seeds to contribute to future generations. Thus, they will provide a more complete understanding of the fitness of each population. Stark difference in seed quality may suggest alternative reproductive strategies among altitudinal types with important implications for fitness. Once we have assessed the effect of temperature on seed germination and the seed quality for each of our populations, we will determine whether we see relationships between our early lifecycle data and the fitness of these same populations measured in the field (from a separate study in the Mercer lab).