

**TRANSCRIPTIONS OF SEEDLINGS GERMINATING IN WATER,
HYDROGEN PEROXIDE, AND SALT FOR DISCOVERY OF SEEDLING
VIGOR GENES AND BIOCHEMICAL PATHWAYS**

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Germination is crucial to developing healthy, vigorous, and productive field populations of sugar beets. Despite planting high-quality, technically-augmented seed for growers with very high germination (>92%), field emergence and persistence continues to hover at ~60% in Michigan. Previous research suggests this difference is the result of stress during germination in the field environment. For many years, the East Lansing USDA-ARS sugar beet program, located at MSU, has focused on stress responses during germination. To date, we have identified some biochemical pathways that appear to influence seed germination and seedling vigor in ways that can improve emergence potential. However, we still do not understand the panoply of responses in a way that might allow us to increase genetic gains for traits related to emergence, seedling vigor and stand establishment, a goal for the 'one seed – one beet' concept. One way to identify additional genes involved is to examine expression of all genes during germination in different environments. In this case, we generated transcriptome datasets of a high vigor variety germinated in a variety of stressful laboratory environments. Currently we have six sets of 48 hour germinating seedling transcriptomes and are in the process of identifying the major differentially expressed genes between water or salt (low germination conditions) and hydrogen peroxide (high germination condition). To date we have identified 75 differentially expressed candidate genes that appear to have roles in signal transduction pathways, as transcription factors, and as enzymatic proteins.