Project FY22-DU-008: Transcriptome Analysis of Durum with Superior Scab Resistance and Performance

1. **What are the major goals and objectives of the research project?**

    a. *Identify genes that are associated with FHB resistance.*
    b. *Integrate transcriptome with genome haplotypes and develop high-throughput assays.*

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

    What were the major activities?

    RNASeq data from the 2022 greenhouse season was analyzed (RNASeq#1).
    Additionally, another greenhouse experiment was conducted in the Fall of 2023. This experiment consisted of five durum lines including Sumai3 and PI 277012. Samples from these eight lines were taken at 0 dpi, 5 dpi and 5 dpi of mock inoculated spikes. Non-sampled lines were also screened for disease scores. About half of the total RNA samples were sent for sequencing. The remaining are being extracted currently.

    What were the significant results?

    RNA-Seq #1 information from the Fall 2022 GH was analyzed. Initial analysis identified 2,101 genes that are significantly regulated in response to inoculation with FHB pathogen. Of these, 378 transcripts are also associated with the presence of FHB1 in the germplasm and 30 are associated with the expected resistance state of the taxa. Further analysis will provide more context for these genes, particularly as they relate to *cis*-genomic regions and the presence of the FHB1 locus.

    List key outcomes or other achievements.

    Along with the RNA-Seq, the annotations for the Sumai3 genome were finalized in this reporting period. This new reference will be used for all analysis moving forward.

3. **What opportunities for training and professional development has the project provided?**
    The graduate students assisting with this project are learning bioinformatic skills to process and analyze this information.

4. **How have the results been disseminated to communities of interest?**
    Initial results were presented at the FHB Forum and the Plant and Animal Genome Conference.

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
    The third greenhouse season will be conducted and combined analysis of RNASeq#1 and #2 will be done once sequencing data is returned.