

Additional Project Outputs for OREI 2018-51300-28431

Breeding Biofortified Pulse and Cereal Crops for US Organic Cropping Systems

Organic grain and pulse breeding for nutritional value and food security:

- Rutherford, K. *Organic Plant Breeding Institute* (19 December 2019) YouTube. www.youtube.com/watch?v=s3lfngq6TxM&t=1s.
- Dil Thavarajah. 2019. *Fighting Hidden Hunger*. Lentil for human nutrition, production in SC. Clemson World Magazine. <https://clemson.world/research/dil-thavarajah/>.
- Thavarajah Lab listing of articles and publications 2003-2022 on organic crop breeding and production for human health and nutrition available at <https://www.clemson.edu/cafls/organic-breeding/thavarajah-lab/publications.html>.

Journal articles - sorghum:

- Wenndt A, Boyles R, Ackerman A, Sapkota S, Repka A, Nelson R (2023) *Host determinants of fungal species composition and symptom manifestation in the sorghum grain mold disease complex*. Plant Disease 107(2):315-325. <https://doi.org/10.1094/PDIS-03-22-0675-RE> . Open access.
- Kumar, N, Boatwright JL, Brenton ZW, Sapkota S, Ballén-Taborda C, Myers MT, Cox WA, Kordan KJ, Kresovich S, Boyles R* (2023) *Development and characterization of a sorghum Multi-parent Advanced Generation Intercross (MAGIC) population for capturing diversity among seed parent gene pool*. Genes Genomes Genet jkad037. <https://doi.org/10.1093/g3journal/jkad037>. Open access.
- Sapkota S, Boatwright JL, Kumar N, Myers M, Cox A, Ackerman A, Caughman W, Brenton ZW, Boyles R, Kresovich S (2022) *Genomic prediction of hybrid performance for agronomic traits in sorghum*. Genes Genomes Genet jkac311. <https://doi.org/10.1093/g3journal/jkac311>. Open access.
- Kumar N, Brenton Z, Myers M, Boyles R, Sapkota S, Boatwright JL, Cox A, Jordan K, Kresovich S (2022) *Registration of the sorghum carbon-partitioning nested association mapping (CP-NAM) population*. Journal of Plant Registrations 16:656663. <https://doi.org/10.1002/plr2.20229>. Open access.
- Boyles, R.E., Ackerman, A.J., Kresovich, S (2022) *Traits and underlying genetics important for low-input organic sorghum production*. Crop Sci 62:753-766. <https://doi.org/10.1002/csc2.20693>. Open access.
- Boatwright JL, Sapkota S, Jin H, Schnable J, Brenton Z, Boyles R, Kresovich S (2022) *Sorghum Association Panel whole-genome sequencing establishes cornerstone resource for dissecting genomic diversity*. Plant J 111:888904. <https://doi.org/10.1111/tpj.15853>. Open access.
- Boatwright, J. L., Brenton, Z., Boyles, R. E., Sapkota, S., Myers, M., Jordan, K., Dale, S., Shakoor, N., Cooper, E., Morris, G., Kresovich, S. (2021). *Genetic characterization of a Sorghum bicolor multiparent mapping population emphasizing carbon-partitioning*

dynamics. G3 Genes|Genomes|Genetics, 11(4).

<https://doi.org/10.1093/g3journal/jkab060>. Open access.

- Mural, R., Grzybowski, M., Miao, C., Damke, A., Sapkota, S., Boyles, R. E., Salas-Fernandez, M., Schnable, P., Sigmon, B., Kresovich, S., Schnable, J. (2021). *Meta-analysis identifies pleiotropic loci controlling phenotypic trade-offs in sorghum*. Genetics, 218(3), <https://doi.org/10.1093/genetics/iyab087>. Open access.
- Shields, L., Gang, Y., Jordan, K., Sapkota, S., Boatwright, J. Lucas, Jiang, X., Kresovich, S., Boyles, R. E. (2020). *Genome-wide association studies of antimicrobial activity in global sorghum [Sorghum bicolor (L.) Moench]*. Crop Science, 61(2), 1301-1316. <https://doi.org/10.1002/csc2.20348>. Open access.
- Sapkota, S., Boatwright, J. Lucas, Jordan, K., Boyles, R. E., Kresovich, S. (2020). *Identification of Novel Genomic Associations and Gene Candidates for Grain Starch Content in Sorghum*. Genes, 11(12). <https://www.mdpi.com/2073-4425/11/12/1448>. Open access.
- Brenton, ZW, Juengst BT, Cooper EA, Myers MT, Jordan KE, Dale SM, Glaubitz JC, Wang X, Boyles, RE, Connolly EL, Kresovich S. 2020. *Species-specific duplication event associated with elevated levels of nonstructural carbohydrates in Sorghum bicolor*. G3: Genes | Genomes | Genetics 10:1511-1520. <https://doi.org/10.1534/g3.119.400921>. Open access.
- Sapkota S, Boyles RE, Cooper EA, Brenton ZW, Myers MT, Kresovich S (2020) *Impact of sorghum racial structure and diversity on genomic prediction of grain yield components*. Crop Science 60:132-148. <https://doi.org/10.1002/csc2.20060>. Open access.
- Sapkota S, Boatwright JL, Jordan K, Boyles RE, Kresovich S (2020) *Multi-trait regressor stacking increased genomic prediction accuracy of sorghum grain composition*. Agronomy 10(9). <https://doi.org/10.3390/agronomy10091221>. Open access.

Journal articles – winter field pea:

- Thavarajah D, Lawrence T, Boatwright L, Windsor N, Johnson N, Kay J, et al. (2023) *Organic dry pea (Pisum sativum L.): A sustainable alternative pulse-based protein for human health*. PLoS ONE 18(4): e0284380. <https://doi.org/10.1371/journal.pone.0284380>. Open access.
- Nathan Johnson , Pushparajah Thavarajah, Nathan Windsor, Leung Tang, Dil Thavarajah. 2023. *Fourier-transform infrared spectroscopy (FTIR): an inexpensive, rapid, and non-destructive tool for starch and resistant starch analysis from pulse flour*. The Plant Phenome Journal, TPPJ-2023-05-0013-OA. <https://doi.org/10.1002/ppj2.20086>. Open access.
- Dil Thavarajah D, Lawrence TJ, Powers SE, Kay J, Thavarajah P, Shipe E, McGee R, Kumar S, Boyles RE (2022) *Organic dry pea (Pisum sativum L.) biofortification for better human health*. PLOS One e0261109. <https://doi.org/10.1371/journal.pone.0261109>. Open access.
- Sarah Powers , J Lucas Boatwright, Dil Thavarajah. 2021. *Genome-wide association studies of mineral and phytic acid concentrations in pea (Pisum sativum L.) to evaluate biofortification potential*. G3 Genes|Genomes|Genetics, jkab227, <https://doi.org/10.1093/g3journal/jkab227>. Open access.

- Sarah Powers, Emily Mirsky, Anuruddha Bandaranayake, Pushparajah Thavarajah, Emerson Shipe, William Bridges, Dil Thavarajah 2020. *Field pea (Pisum sativum L.) shows genetic variation in phosphorus use efficiency in different P environments*. Scientific Report, 10:18940. <https://doi.org/10.1038/s41598-020-75804-0>. Open access.

Journal articles – chickpea and lentil:

- Amod Madurapperumage, Nathan Johnson, Pushparajah Thavarajah, Leung Tang, Dil Thavarajah, 2023. *Fourier-transform mid-infrared (FT-MIR) spectroscopy as a high-throughput phenotyping tool for measuring total fatty acids in chickpeas (Cicer arietinum L.)*. ACS Food Science & Technology, fs-2023-00239m. <https://doi.org/10.1021/acsfoodscitech.3c00239>. Paywall.
- Amod Udayanga , Leung Tang, Pushparajah Thavarajah, William Bridges, Emerson Shipe, George Vandemark, Dil Thavarajah. 2021. *Chickpea (Cicer arietinum L.) as a source of essential fatty acids a biofortification approach*. Frontiers in Plant Science, Plant Breeding. 12:734980. <https://doi.org/10.3389/fpls.2021.734980>. Open access.
- Nathan Johnson, J Lucas Boatwright, William Bridges, Pushparajah Thavarajah, Shiv Kumar, Emerson Shipe, Dil Thavarajah, 2021. *Genome-wide association mapping of lentil (Lens culinaris Medikus) prebiotic carbohydrates toward improved human health and crop stress tolerance*. Scientific Reports, 11, 13926, <https://doi.org/10.1038/s41598-021-93475-3>. Open Access.
- Nathan Johnson, Casey Johnson, Pushparajah Thavarajah, Shiv Kumar, Dil Thavarajah. 2020. *Lentil prebiotic carbohydrates play a vital role in human and plant health*. Plants, People, Planet. <https://doi.org/10.1002/ppp3.10103>. Open access.

Theses and dissertations:

- Sarah Power. 2021. *Evaluating Pea (Pisum sativum L.) for Nutritional Traits and Implications for Organic Agriculture and Biofortification*. PhD. Dissertation. http://tigerprints.clemson.edu/all_dissertations/2899.