

Dr. Somayanda Impa Muthappa

Professional qualification

M. S and Ph.D. in Crop Physiology, University of Agricultural Sciences, GKVK, Bangalore, India.

Funded Proposals (as PI and Co-PI)

- Quantifying fiber quality traits in diverse cotton varieties with different maturity and irrigation levels. Cotton Incorporated (14,000 USD) for 2024
- Establishing climate smart commodities with reduced greenhouse gas footprints to enhance environmental and economic sustainability in the Texas High Plains. Funded by USDA Climate Smart Commodities (4,945,552 USD) for 2023 to 2028
- Sorghum cotton rotation- a pragmatic route to improve farm profitability and environmental sustainability in water limited environments of the southwest High Plains. Funded by USDA-NIFA-AFRI (300,000 USD) for 2023 -2025
- Field phenotyping using machine learning tools integrated with genetic mapping to address heat and drought induced flower abortion in soybean. Funded by Multi Regional Soybean Checkoff (801,032 USD) for 2023-2024
- Heat stress impact on cotton yield and quality-Current status and future research. Funded by Cotton Incorporated (85,000 USD) for 2022 -2024

Publications (*= Corresponding author; IF= Impact Factor)

- 2024: Laosuntisuk K, Vennapusa A, **Impa SM**, Leman AR, Jagadish SVK, Doherty CJ. 2024. A normalization method that controls total RNA abundance affects the identification of differentially expressed genes, revealing bias toward morning expressed responses. *The Plant Journal*, <https://doi.org/10.1111/tpj.16654> (IF:7.01)
- 2023: Saini DK, **Impa SM***, McCallister D, Patil GB, Abidi N, Ritchie G, Jaconis SY, Jagadish SVK. 2023. High day and night temperatures impact on cotton yield and quality – current status and future research direction. *Journal of Cotton Research*, 6, 16, <https://doi.org/10.1186/s42397-023-00154-x> (IF:2.6)
- 2023: **Impa SM***, Bean SR, Loerger BP, Hayes C, Emendack Y, Jagadish SVK. 2023. Comparative assessment of grain quality in tannin versus non-tannin sorghums in the sorghum association panel. *Cereal Chemistry*, 100(3), 663-674. <https://doi.org/10.1002/cche.10643> (IF:2.4)
- 2023: Ostmeyer T, **Impa SM**, Bean SR, Dhillon R, Hayes CM, Ritchie G, Asebedo AR, Emendack Y, Jagadish SVK. 2023. Impact of in-season split application of nitrogen on intra-panicle grain dynamics, grain quality and vegetative indices that govern nitrogen use efficiency in sorghum. *Journal of Plant Nutrition and Soil Science*, <https://doi.org/10.1002/jpln.202200325> (IF:2.6)
- 2023: Bonnot T, **Impa SM**, Jagadish SVK, Nagel DH. 2023. Time of day and genotype sensitivity adjust molecular responses to temperature stress in sorghum. *The Plant Journal*, <https://doi.org/10.1111/tpj.16467> (IF:7.01)
- 2023: Shi W, Zhang X, Yang J, **Impa SM**, Wang D, Lai Y, Yang Z, Xu H, Wu J, Zhang J, Jagadish SVK. 2023. Irrigating with cooler water does not reverse high temperature impact on grain yield and quality in hybrid rice. *The Crop Journal*, 11(3), 904-913. <https://doi.org/10.1016/j.cj.2022.09.006>

- 2022: Sprague SA, Tamang TM, Steiner T, Wu Q, Hu Y, Kakesh T, Park J, Yang J, Peng Z, Bergkamp B, **Impa SM**, Peterson M, Garcia EO, Hao Y, Amand P, Bai G, Nakata PA, Rieu I, Jackson DP, Cheng N, Valent B, Hirschi KD, Jagadish SVK, Liu S, White FF, Park S. 2022. Redox engineering enhances maize thermotolerance and grain yield in the field. *Plant Biotechnology Journal*. <https://doi.org/10.1111/pbi.13866> (IF:9.8)
- 2022: Hein NT, **Impa SM**, Wagner D, Bheemanahalli R, Kumar R, Tiwari M, Prasad PVV, Tilley M, Wu X, Neilsen M, Jagadish SVK. 2022. Grain micronutrient composition and yield components in field-grown wheat are negatively impacted by high night-time temperature. *Cereal Chemistry* 99(3): 615-624. (IF:1.98)
- 2022: Nadaradjan S, **Impa SM**, Parasuraman B, Hukkeri S, Parsi SG, Sreeman S, Udayakumar M, Ganesh P. 2022. Dissecting the dependence of total biomass on physiological traits through path analysis. *Plant Physiology Reports*. <https://doi.org/10.1007/s40502-022-00649-w> (IF: 0.9)
- 2022: Shi W, Zhang X, Yang J, **Impa SM**, Wang De, Lai Y, Yang Z, Xu H, Wu J, Zhang J, Jagadish SVK. Irrigating with cooler water does not reverse high temperature impact on grain yield and quality in hybrid rice. *The Crop Journal*. <https://doi.org/10.1016/j.cj.2022.09.006> (IF:4.6)
- 2022: Shi W, Yang J, Kumar R, Zhang X, **Impa SM**, Xiao G, Jagadish SVK. 2022. Heat stress during gametogenesis irreversibly damages female reproductive organ in rice. *Rice*, 15, 32. <https://doi.org/10.1186/s12284-022-00578-0>
- 2022: Wang C, Caragea D, Narayana NK, Hein NT, Bheemanahalli R, **Impa SM**, Jagadish SVK. 2022. Deep learning based high-throughput phenotyping of chalkiness in rice exposed to high night temperature. *Plant Methods* 18:9. (IF: 5.1)
- 2021: **Impa SM**, Raju B, Hein NT, Sandhu J, Prasad PVV, Walia H, Jagadish SVK. 2021. High night temperature effects on wheat and rice – current status and way forward. *Plant Cell and Environment*, 44(7): 2049-2065. (IF:6.2)
- 2021: Wang Y, **Impa SM**, Sunkar R, Jagadish SVK. 2021. The neglected other half-role of the pistil in plant heat stress responses. *Plant Cell and Environment* 44(7): 2200-2210. (IF:6.2)
- 2021: Vennapusa AR, Assefa Y, Sebela D, **Impa SM**, Perumal R, Riechers DE, Prasad PVV, Jagadish SVK. 2021. Safeners improve early-stage chilling-stress tolerance in sorghum. *Journal of Agronomy and Crop Science*. <https://doi.org/10.1111/jac.12503> (IF: 3.06)
- 2020: **Impa SM**, Vennapusa AR, Bheemanahalli R, Sabela D, Boyle D, Walia H, Jagadish SVK. 2020. High night temperature induced changes in grain starch metabolism alters starch, protein and lipid accumulation in winter wheat. *Plant Cell and Environment*, 43(2): 431-447. (IF: 6.2)
- 2020: Bheemanahalli R, **Impa SM**, Krassovskaya I, Vennapusa AR, Gill KS, Obata T, Jagadish SVK. 2020. Enhanced N-metabolites, ABA and IAA-conjugate in anthers instigate heat sensitivity in spring wheat. *Physiologia Plantarum*, 169(4): 501-514. (IF: 4.1)
- 2020: Vennapusa AR, **Impa SM**, Doherty CJ, Jagadish SVK. 2020. A universal method for highquality RNA extraction from plant tissues rich in starch, proteins, and fiber. *Scientific Reports*.10:16887. (IF: 3.99)
- 2020: Sabela D, Bergkamp B, **Impa SM**, Fritz A, Jagadish SVK. 2020. Spike and flag leaf senescence tracked through temporal chlorophyll fluorescence signals in winter wheat exposed to post flowering heat stress. *Agronomy Journal*, 112: 3993-4006. (IF: 1.7)

- 2019: **Impa SM**, Sunoj VSJ, Krassovskaya I, Bheemanahalli R, Obata T, Jagadish SVK. 2018. Carbon balance and source-sink metabolic changes in winter wheat exposed to high night-time temperature. *Plant, Cell & Environment*, 42(4): 1233-1246. (IF = 6.2)
- 2019: **Impa SM**, Perumal R, Bean SR, Sunoj VSJ, Jagadish SVK. 2019. Water deficit and heat stress induced alterations in grain physico-chemical characteristics and micronutrient composition in field grown grain sorghum. *Journal of Cereal Science*, 86:124-131. (IF: 2.3)
- 2019: Moghimi N, Desai JS, Bheemanahalli R, **Impa SM**, Vennapusa AR, Obata T, Jagadish SVK. 2019. New candidate loci and marker genes on chromosome 7 for improved chilling tolerance in sorghum. *Journal of Experimental Botany*, 70(12): 3357-3371. (IF: 5.4)
- 2019: Goloran JB, Johnson-Beebout SE, Morete MJ, **Impa SM**, Kirk GJD, Wissuwa M. 2019. Grain Zn concentrations and yield of Zn-biofortified versus Zn-efficient rice genotypes under contrasting growth conditions. *Field Crops Research*, 234:26-32. (IF = 3.1)
- 2018: Bergkamp B, **Impa SM**, Asebedo AR, Fritz AK, Jagadish SVK. 2018. Prominent winter wheat varieties response to post-flowering heat stress under controlled chambers and field-based heat tents. *Field Crops Research*, 222:143-152. (IF = 3.1)
- 2018: Sun A, **Impa SM**, Sunoj VSJ, Singh K, Gill KS, Prasad PVV, Jagadish SVK. 2018. Heat stress during flowering affects time of day of flowering, seed-set and grain quality in spring wheat (*Triticum aestivum* L.). *Crop Science*, 58:380-392. (IF = 1.6)
- 2017: Sunoj VSJ, **Impa SM**, Chiluwal A, Perumal R, Prasad PVV, Jagadish SVK. 2017. Resilience of pollen and post-flowering response in diverse sorghum genotypes exposed to heat stress under field conditions. *Crop Science*, 57:1-12. (IF = 1.6)
- 2016: Tuyogon DSJ, **Impa SM**, Castillo OB, Larazo W, Johnson-Beebout SE. 2016. Enriching grain Zn through Zn fertilization and water management in rice. *Soil Science Society of America Journal*, 80:121-134. (IF = 1.92)
- 2016: Izquierdo M, **Impa SM**, Johnson-Beebout SE, Weiss DJ, Kirk GJD. 2016. Measurement of isotopically-exchangeable Zn in Zn-deficient paddy soil. *European Journal of Soil Science*, 67:51-59. (IF = 2.64)
- 2015: Slamet-Loedin IH, Beebout SE, **Impa SM**, Tsakirpaloglou N. 2015. Enriching rice with Zn and Fe while minimizing Cd risk. *Frontiers in Plant Sciences*, 6:121. (IF = 3.68)
- 2013: **Impa SM**, Morete MJ, Ismail AM, Schulin R, Johnson-Beebout SE. 2013. Zn uptake, translocation and grain Zn loading in rice (*Oryza sativa* L.) genotypes selected for Zn deficiency tolerance and high grain Zn. *Journal of Experimental Botany*, 64:2739-2751. (IF = 5.4)
- 2013: **Impa SM**, Gramlich A, Tandy S, Schulin R, Frossard E, Johnson-Beebout SE. 2013. Internal Zn allocation influences Zn deficiency tolerance and grain Zn loading in rice (*Oryza sativa* L.). *Frontiers in Plant Sciences*, 4:53. (IF = 3.68)
- 2013: Mabesa RL, **Impa SM**, Grewal D, Johnson-Beebout SE. 2013. Contrasting grain-Zn response of biofortification rice (*Oryza sativa* L.) breeding lines to foliar Zn application. *Field Crops Research*, 149: 223-233. (IF = 3.1)
- 2013: Rose TJ, **Impa SM**, Rose MT, Pariasca-Tanaka J, Mori A, Heuer S, Johnson-Beebout SE, Wissuwa M. 2013. Enhancing phosphorus and zinc acquisition efficiency in rice: a critical

- review of root traits and their potential utility in rice breeding. *Annals of Botany*, 112: 331-345. (IF = 4.04)
- 2013: Qin J, **Impa SM**, Tang Q, Yang S, Yang J, Tao Y, Jagadish SVK. 2013. Integrated nutrient, water, and other agronomic options to enhance rice grain yield and N use efficiency in doubleseason rice crop. *Field Crops Research*, 148:15-23. (IF = 3.1)
- 2012: **Impa SM**, Johnson-Beebout SE. 2012. Mitigating zinc deficiency and achieving high grain Zn in rice through integration of soil chemistry and plant physiology research. *Plant and Soil*, 361: 3-41. (IF = 2.97)
- 2011: Venuprasad R, **Impa SM**, Gowda VRP, Atlin G, Serraj R. 2011. Rice near-isogenic lines (NILs) contrasting for grain yield under lowland drought stress. *Field Crops Research*, 123:38-46. (IF = 3.1)
- 2011: Cairns JE, **Impa SM**, O'Toole JC, Jagadish SVK, Price AH. 2011. Influence of the soil physical environment on rice (*Oryza sativa* L.) response to drought stress and its implications for drought research. *Field Crops Research*, 121:303-310. (IF = 3.1)
- 2011: Jagadish SVK, Cairns JE, Kumar A, **Impa SM**, Craufurd P. 2011. Does susceptibility to heat stress confound screening for drought tolerance in rice? *Functional Plant Biology*, 38:261-269. (IF = 2.49)
- 2009: Bernier J, Serraj R, Kumar A, Venuprasad R, **Impa SM**, Gowda VRP, Oane R, Spanner D, Atlin G. 2009. The large effect drought resistance QTL *qtl12.1* increase water uptake in upland rice. *Field Crops Research*, 110:39-46. (IF = 3.1)
- 2006: Nadaradjan S, **Impa SM**, Shashidhar G, Sheshshayee MS, Prasad TG, Udayakumar M. 2006. Molecular mapping of QTLs associated with whole plant Water Use Efficiency (WUE). *Rice Genetics News Letter*, 23: 62-66.
- 2006: **Impa SM**, Nadaradjan S, Sheshshayee MS, Prasad TG, Udayakumar M, Shailaja H. 2006. Identification of markers for Mean Transpiration Rate and oxygen isotope enrichment ($\delta^{18}\text{O}$) in recombinant inbred lines of rice. *Rice Genetics News Letter*, 23:77-74.
- 2005: **Impa SM**, Nadaradjan S, Boominathan P, Shashidhara G, Bindumadhava H, Sheshshayee MS. 2005. Carbon isotope discrimination accurately reflects variability in WUE measured at a whole plant level in rice (*Oryza sativa* L.). *Crop Science*, 45: 2517-2522. (IF = 1.6)
- 2005: Nadaradjan S, **Impa SM**, Sheshshayee MS, Udayakumar M, Prasad TG. 2005. Overlapping QTLs for WUE and Carbon isotope discrimination in DHLs of rice. *Journal of Plant Biology*, 32: 1-8. (IF = 1.46)

Book Chapters

- **Impa SM**, Nadaradjan S, Jagadish SVK. 2012. Drought stress induced reactive oxygen species and antioxidants in plants. Abiotic stress adaptations in plants: Metabolism, production and sustained. Eds. P. Ahmad & M.N.V. Prasad. 131-147.
- Serraj R, Dimayuga G, Gowda V, Guan Y, Hong H, **Impa SM**, Liu DC, Mabesa RC, Sellamuthu R, Torres R. 2008. Drought-resistant rice: physiological framework for an integrated research strategy. In "Drought frontiers in rice – Crop improvement for increased

rained production” (R. Serraj, J. Bennett, B. Hardy, Eds.), World Scientific Publishing Co., Singapore, pp 139–170. ISBN: 978-981-4280-00-6.

- Bindumadhava H, Sudakar M, Sheshayee MS, Ramesh R, **Impa SM**, Prasad TG, Udayakumar M. 2006. Determination of transpiration rate and root biomass based on oxygen isotope enrichment. *Plant Molecular Physiology: Current Scenario and Future predictions Festschrift in honour of Prof. C. Malik/edited by P. C. Trivedi*, NewDelhi. Pp 1-16. ISBN 81-7910-151-7.

Poster and Oral presentations (2015 and beyond)

- Ichinose Y, Espindola J, Saini D, Cruz A, Zelaya C, Mehla M, **Impa SM**, Jagadish SVK. 2023. Addressing pre-harvest sprouting by integrating grain physiology and genetics. Poster presentation at ASA-CSSA-SSSA Annual meeting. Oct 29-Nov 1. St. Louis, MO, USA
- Ichinose Y, Mehla M, Zelaya AC, Lima JE, Saini DK, Bangari M, **Impa SM**, Ritchie G, Jagdish SVK. 2023. Assessing agronomic and environmental sustainability of sorghum-cotton rotation in West Texas High Plains. Poster presentation at ASA-CSSA-SSSA Annual meeting. Oct 29-Nov 1. St. Louis, MO, USA
- Ostmeyer TJ, Cruz A, Ritchie G, **Impa SM**, Bean S, Jagadish SVK. 2022. Intra-panicle grainfilling dynamics and sustainability of sorghum with in-season split nitrogen applications. Poster presentation at ASA-CSSA-SSSA Annual meeting. Nov 6-9. Baltimore, Maryland, USA.
- Vennapusa AR, **Impa SM**, Sebela D, Bheemanahalli R, Jagadish SVK. 2019. Source-sink mechanisms differentiating winter wheat exposed to a range of night-time temperatures during grain filling, Poster presentation, Plant & Animal Genome XXVII Conference, Jan 12-16, San Diego, CA, USA.
- Bustamante C, **Impa SM**, Jagadish SVK. 2019. Physiological Characterization of wild emmer wheat (*Triticum dicoccoides*) for heat stress resilience. Oral presentation at ASA-CSSA-SSSA Annual meeting. Nov 10-13. SanAntonio, TX, USA.
- Bheemanahalli R, **Impa SM**, Hein N, Jagadish SVK. 2019. Comparative assessment of chamber and field grown wheat to high night temperature. Poster presented at ASA-CSSASSSA Annual meeting. Nov 10-13. SanAntonio, TX, USA.
- Vennapusa A, **Impa SM**, Jagadish SVK. 2019. An universal protocol for high quality RNA extraction in wheat seeds and roots. Poster presented at ASA-CSSA-SSSA Annual meeting. Nov 10-13. SanAntonio, TX, USA.
- Vennapusa A, **Impa SM**, Bheemanahalli R, Jagadish SVK. 2019. High night temperatures affect grain quality dynamics and starch metabolism in winter wheat genotypes. Oral presentation at ASA-CSSA-SSSA Annual meeting. Nov 10-13. SanAntonio, TX, USA.
- Bergkamp B, **Impa SM**, Fritz AK, Jagadish SVK. 2017. Can current prominent Kansas winter wheat lines tolerate post-flowering heat stress? Oral presentation, ASA-CSSA-CSSA Annual Meeting, Oct 22-25, Tampa, FL, USA. [First place winner in C2 Division].
- Shetty NJ, **Impa SM**, Prasad PVV, Jagadish SVK. 2017. Mechanistic basis for high night temperature induced carbon imbalance and yield loss in winter wheat, Poster presentation, ASA-CSSA-CSSA Annual Meeting, Oct 22-25, Tampa, FL, USA.
- Shetty NJ, **Impa SM**, Bheemanahalli R, Fritz A, Prasad PVV, Jagadish SVK. 2017. Waterdeficit stress induced root morphological and anatomical plasticity in *Triticum Dicoccoides*, Oral presentation, ASA-CSSA-CSSA Annual Meeting, Oct 22-25, Tampa, FL, USA.

- **Impa SM**, Sunoj JVS, Sun A, Prasad PVV, Jagadish SVK. 2016. High night temperature induced alterations in post flowering carbon balance and its impact on yield in winter wheat. Oral presentation, ASA-CSSA-SSSA Annual Meeting, Nov 6-8, Phoenix, AZ, USA.
- Sunoj JVS, **Impa SM**, Chiluwal A, Prasad PVV, Perumal R and Jagadish SVK. 2016. Impact of heat stress on pollen germination and post flowering response in diverse sorghum genotypes under field condition, Oral presentation, ASA-CSSA-SSSA Annual Meeting, Nov 6-8, Phoenix, AZ, USA.
- Enniful R, Sunoj JVS, **Impa SM**, Prasad PVV, Jagadish SVK. 2016. Characterizing parents of sorghum mapping populations exposed to water-deficit stress during vegetative stage, Oral presentation, ASA-SSSA-CSSA Annual Meeting, Nov 6-9, Phoenix, AZ, USA.
- Enniful R, **Impa SM**, Sunoj JVS, Prasad PVV, Jagadish SVK. 2016. Morphological and anatomical adaptability of sorghum roots exposed to water-deficit stress during vegetative stage, Poster presentation, ASA-SSSA-CSSA Annual Meeting, Nov 6-9, Phoenix, AZ, USA [Second place winner].
- Bergkamp B, **Impa SM**, Sunoj JVS, Fritz A, Jagadish SVK. 2016. Can current prominent Kansas winter wheat cultivars tolerate post-flowering heat stress? Oral presentation Research and the State, Nov. 2, Manhattan, KS, USA.
- Chiluwal A, Kanaganahalli V, Sunoj JVS, Sun A, **Impa SM**, Prasad PVV, Jagadish SVK. 2016. Is sorghum truly tolerant or an efficient escaper of heat stress during flowering? Oral Presentation, ASA-SSSA-CSSA Annual Meeting, Nov 6-9, Phoenix, AZ, USA.
- Enniful R, Sunoj JVS, **Impa SM**, Prasad PVV, Jagadish SVK. 2015. Physiological characterization of sorghum NAM founder lines under water-deficit stress, Poster Presentation. Sorghum Improvement Conference of North America. Sept 1-3, Manhattan, KS, USA.

Graduate teaching

Practical classes taken for MS and PhD students as a part of AGRON 840 in Fall 2015 and Spring 2017, focusing on measurement of gas exchange parameters using LI-6400XT photosynthesis system, Chlorophyll fluorescence using dark adapted chlorophyll fluorometer OS30p+ and Chlorophyll index using SPAD chlorophyll meter