MITCHELL TUINSTRA

Professor of Plant Breeding and Genetics
Wickersham Chair of Excellence in Agricultural Research
Scientific Director – Institute for Plant Sciences

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EDUCATION
1996	Ph.D., Purdue University, West Lafayette, IN - Plant Breeding/Genetics
1993	M.S., Purdue University, West Lafayette, IN - Molecular Genetics
1991	B.S., Calvin College, Grand Rapids, MI - Biology

PROFESSIONAL POSITIONS
2013-present	Scientific Director, Institute for Plant Sciences, College of Agriculture, Purdue University
2007-present	Wickersham Chair of Excellence in Agricultural Research, Department of Agronomy, Purdue University
2007-present	Professor of Plant Breeding and Genetics, Department of Agronomy, Purdue University
2006-2007	Professor, Department of Agronomy, Kansas State University
2001-2005	Associate Professor, Department of Agronomy, Kansas State University
1997-2001	Assistant Professor, Department of Agronomy, Kansas State University
1997	Post-Doctoral Fellow, Department of Agronomy, Purdue University
1994	Teaching Assistant, Department of Horticulture, Purdue University
1994-1996	Research Assistant, Department of Horticulture, Purdue University
1993	Teaching Assistant, Department of Horticulture, Purdue University
1993	Teaching Assistant, Department of Agronomy, Purdue University
1991-1993	Research Assistant, Department of Horticulture, Purdue University

RESEARCH/TEACHING ACTIVITIES
60% Research	Plant Breeding and Genetics
10% Teaching	AGRY285: World Crop Adaptation and Distribution
30% Administration	Scientific Director, Institute for Plant Sciences

HONORS AND AWARDS
Lowell S. Hardin Award for Excellence in International Agriculture, College of Agriculture – 2023

Crops & Soils Merit Award In Recognition of Outstanding Contribution to Agriculture and the Seed Industry, Indiana Crop Improvement Association – 2022

David C. Pfendler Outstanding Undergraduate Counselor Award, College of Agriculture – 2022

Agronomy Outstanding Counselor – 2017, 2018, 2021, 2022

Wickersham Chair of Excellence in Agricultural Research, Purdue University – 2007, 2015, 2021

Seed for Success, Excellence in Research, Purdue University – 2009, 2013, 2014, 2016, 2018, 2020

Agronomy Outstanding Teacher – 2020

Fellow, American Society of Agronomy – 2017

Fellow, Crop Science Society of America – 2017

Spotlight Educator – Agricultural Council Student Choice Award, College of Agriculture, Purdue University – 2016

Gamma Sigma Delta – Early Career Award – 2001

PROFESSIONAL SOCIETIES

American Society of Agronomy

Crop Science Society of America

Sorghum Improvement Conference of North America

National Association of Plant Breeders

North American Plant Phenotyping Network

PATENTS

Tuinstra, M.R. and Al-Khatib, K., Kansas State University, 2019. Acetolactate synthase herbicide resistant sorghum. U.S. Patent 10,519,461. Issue Date: December 31, 2019.

Tuinstra MR, Al-Khatib K. Kansas State University Research Foundation. Acetyl-CoA Carboxylase Herbicide Resistant Sorghum. U.S. Patent No. 9,617,530. Issue Date: April 11, 2017.

Tuinstra MR, Krothapalli K, Dilkes B, Buescher E. Genetic Mutations that Disrupt Dhurrin Production In Sorghum. U.S. Patent No. 9,512,437. Issue Date: December 6, 2016.

PUBLICATIONS

REFEREED JOURNAL ARTICLES

Wang, T., Crawford, M.M. and Tuinstra, M.R., 2023. A novel transfer learning framework for sorghum biomass prediction using UAV-based remote sensing data and genetic markers. Frontiers in Plant Science, 14. https://doi.org/10.3389/fpls.2023.1138479

Gruss, S.M., Souza, A., Yang, Y., Dahlberg, J. and Tuinstra, M.R., 2023. Expression of Stay-green Drought Tolerance in Dhurrin-free Sorghum. Crop Science, 2023, 1–14. https://doi.org/10.1002/csc2.20947

Diatta-Holgate, E., Anderson, J.S., Hatch, R., Tuinstra, M.R. and Weil, C., 2023. Rapid Determination of Protein Digestibility in Sorghum Before and After Cooking. MethodsX, p.102162. https://doi.org/10.1016/j.mex.2023.102162

Gruss, S.M., Johnson, K.D., Ghaste, M., Widhalm, J.R., Johnson, S.K., Holman, J.D., Obour, A., Aiken, R.M. and Tuinstra, M.R., 2023. Dhurrin stability and hydrogen cyanide release in

dried sorghum samples. Field Crops Research, 291, p.108764. https://doi.org/10.1016/j.fcr.2022.108764

Diatta-Holgate, E., Hugghis, E., Weil, C., Faye, J.M., Danquah, A., Diatta, C., Tongoona, P., Danquah, E.Y., Cisse, N. and Tuinstra, M.R., 2022. Natural variability for protein digestibility and grain quality traits in a West African Sorghum Association Panel. Journal of Cereal Science, p.103504. https://doi.org/10.1016/j.jcs.2022.103504

Simons, J., Herbert, T., Kauffman, C., Batete, M., Simpson, A., Katsuki, Y., Le, D., Amundson, D., Buescher, E., Weil, C., Tuinstra, M.R., Addo-Quaye, C., 2022. Systematic prediction of EMS-induced mutations in a sorghum mutant population. Plant Direct. 6(5): e404. https://doi.org/10.1002/pld3.404

Ren, D., Engel, B. and Tuinstra, M.R., 2022. Crop improvement influences on water quantity and quality processes in an agricultural watershed. Water Research, p.118353. https://doi.org/10.1016/j.watres.2022.118353

Lin, M., Lynch, V., Ma, D., Maki, H., Jin, J., Tuinstra, M.R., 2022. Multi-species prediction of physiological traits with hyperspectral modeling. Plants, 11, 676. https://doi.org/10.3390/plants11050676.

Gruss, S.M., Ghaste, M., Widhalm, J.R., Tuinstra, M.R., 2022. Seedling growth and fall armyworm feeding preference influenced by dhurrin production in sorghum. Theoretical and Applied Genetics. https://doi.org/10.1007/s00122-021-04017-4

Ojeda, J.J., Hammer, G., Yang, K.W., Tuinstra, M.R., DeVoil, P., McLean, G., Huber, I., Volenec, J.J., Brouder, S.M., Archontoulis, S. and Chapman, S.C., 2022. Quantifying the effects of varietal types× management on the spatial variability of sorghum biomass across US environments. GCB Bioenergy, 14(3), pp.411-433. https://doi.org/10.1111/gcbb.12919

Nazeri, B., Crawford, M. and Tuinstra, M.R., 2021. Estimating Leaf Area Index in Row Crops Using Wheel-Based and Airborne Discrete Return Lidar Data. Frontiers in Plant Science, p.2727. https://doi.org/10.3389/fpls.2021.740322

Herrero, M., Meline, V., Iyer-Pascuzzi, A.S., Souza, A.M., Tuinstra, M.R. and Yang, Y., 2021. 4D Structural root architecture modeling from digital twins by X-Ray Computed Tomography. Plant Methods 17, 123. https://doi.org/10.1186/s13007-021-00819-1

Ma, D., Rehman, T.U., Zhang, L., Maki, H., Tuinstra, M.R. and Jin, J., 2021. Modeling of Environmental Impacts on Aerial Hyperspectral Images for Corn Plant Phenotyping. Remote Sensing, 13, p.2520. https://doi.org/10.3390/rs13132520

Tolley, S.A., Singh, A. and Tuinstra, M., 2021. Heterotic Patterns of Temperate and Tropical Maize by Ear Photometry. Frontiers in Plant Science, 12, p.1117. https://doi.org/10.3389/fpls.2021.616975

Perumal, R., Morris, G.P., Jagadish, S.V.K., Little, C.R., Tesso, T.T., Bean, S.R., Yu, J., Prasad, V., and Tuinstra, M.R., 2021. Registration of the Sorghum [Sorghum bicolor (L.) Moench] Nested Association Mapping (NAM) Population in RTx430 Background. Journal of Plant Registration. https://doi.org/10.1002/plr2.20110

Ma, D., Rehman, T.U., Zhang, L., Maki, H., Tuinstra, M.R. and Jin, J., 2021. Modeling of diurnal changing patterns in airborne crop remote sensing images. Remote Sensing, 13(9), p.1719. https://doi.org/10.3390/rs13091719

Herrero-Huerta, M., Meline, V., Iyer-Pascuzzi, A.S., Souza, A.M., Tuinstra, M.R. and Yang, Y., 2021. Root Phenotyping from X-Ray Computed Tomography: Skeleton Extraction. The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 43, pp.417-422. https://doi.org/10.5194/isprs-archives-XLIII-B4-2021-417-2021

Manish, Raja, Ze An, Ayman Habib, Mitchell R. Tuinstra, and David J. Cappelleri. "AgBug: Agricultural Robotic Platform for In-Row and Under Canopy Crop Monitoring and Assessment." In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, vol. 85451, p. V08BT08A017. American Society of Mechanical Engineers, 2021.

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Rogers, A.R., Dunne, J.C., Romay, C., Bohn, M., Buckler, E.S., Ciampitti, I.A., Edwards, J., Ertl, D., Flint-Garcia, S., Gore, M.A., Graham, C., Hirsch., C., Hood, E., Hooker, D., Knoll, J., Lee, E.C., Lorenz, A., Lynch, J.P., McKay, J., Moose, S.P., Murray, S.C., Nelson, R., Rocheford, T., Schnable, J.C., Schnable, P.S., Sekhon, R., Singh, N., Smith, M., Springer, N., Thelen, K., Thomison, P., Thompson, A., Tuinstra, M.R., Wallace, J., Wisser, R.J., Xu, W., Kaeppler, S., De Leon, N., and Holland, J.B., 2021. The Importance of Dominance and Genotype-by-Environment Interactions on Grain Yield Variation in a Large-Scale Public Cooperative Maize Experiment. G3 Genes| Genomes| Genetics. https://doi.org/10.1093/g3journal/jkaa050

Yang, K.W., Chapman, S., Carpenter, N., Hammer, G., McLean, G., Zheng, B., Chen, Y., Delp, E., Masjedi, A., Crawford, M. Ebert, D., Habib, A., Thompson, A., Weil, C., Tuinstra, M.R., 2021. Integrating crop growth models with remote sensing for predicting biomass yield of sorghum. in silico Plants, 3(1), p.diab001. https://doi.org/10.1093/insilicoplants/diab001

Zhang, X., Xie, J., Chen, T., Ma, D., Yao, T., Gu, F., Lim, J., Tuinstra, M.R., Hamaker, B.R., 2021. High arabinoxylan fine structure specificity to gut bacteria driven by corn genotypes but not environment. Carbohydrate Polymers, 257: 117667. https://doi.org/10.1016/j.carbpol.2021.117667

Griebel, S., Adedayo, A. and Tuinstra, M.R., 2021. Genetic diversity for starch quality and alkali spreading value in sorghum. The Plant Genome, 14(1), p.e20067. https://doi.org/10.1002/tpg2.20067

Jarquin, D., de Leon, N., Romay, C., Bohn, M., Buckler, E.S., Ciampitti, I., Edwards, J., Ertl, D., Flint-Garcia, S., Gore, M.A., Graham, C., Hirsch, C.N., Holland, J.B., Hooker, D., Kaeppler, S.M., Knoll, K., Lee, E.C., Lawrence-Dill, C.J., Lynch, J.P., Moose, S.P., Murray, S.C., Nelson, R., Rocheford, T., Schnable, J.C., Schnable, P.S., Smith, M., Springer, N., Thomison, P., Tuinstra, M.R., Wisser, R.J., Xu, W., and Lorenz, A., 2020. Utility of Climatic Information via Combining Ability Models to Improve Genomic Prediction for Yield within the Genomes to Fields Maize Project. Frontiers in Genetics, 11, p.1819. https://doi.org/10.3389/fgene.2020.592769

Masjedi, A., Crawford, M.M., Carpenter, N.R. and Tuinstra, M.R., 2020. Multi-Temporal Predictive Modelling of Sorghum Biomass Using UAV-Based Hyperspectral and LiDAR Data. Remote Sensing, 12(21), p.3587. https://doi.org/10.3390/rs12213587

Cotrozzi, L., Peron, R., Tuinstra, M.R., Mickelbart, M.V. and Couture, J.J., 2020. Spectral phenotyping of physiological and anatomical leaf traits related with maize water status. Plant Physiology, 184(3), pp.1363-1377. https://doi.org/10.1104/pp.20.00577

McFarland, B.A., AlKhalifah, N., Bohn, M., Bubert, J., Buckler, E.S., Ciampitti, I., Edwards, J., Ertl, D., Gage, J.L., Falcon, C.M., Flint-Garcia, S., Gore, M.A., Graham, C., Hirsch, C.N., Holland, J.B., Hood, E., Hooker, D., Jarquin, D., Kaeppler, S.M., Knoll, J., Kruger, G., Lauter, N., Lee, E.C., Lima, D.C., Lorenz, A., Lynch, J.P., McKay, J., Miller, N.D., Moose, S.P., Murray, S.C., Nelson, R., Poudyal C., Rocheford T., Rodriguez, O., Romay, M.C., Schnable, J.C., Schnable, P.S., Scully, B., Sekhon, R., Silverstein, K., Singh, M., Smith, M., Spalding, E.P., Springer, N., Thelen, K., Thomison, P., Tuinstra, M.R., Wallace, J., Walls, R., Wills, D., Wisser, R.J., Wenwei, X., Yeh, C.-T., and de Leon, N., 2020. Maize genomes to fields (G2F): 2014–2017 field seasons: genotype, phenotype, climatic, soil, and inbred ear image datasets. BMC Research Notes, 13(1), pp.1-6. https://doi.org/10.1186/s13104-020-4922-8

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Wang, L., Jin, J., Song, Z., Wang, J., Zhang, L., Rehman, T.U., Ma, D., Carpenter, N.R. and Tuinstra, M.R., 2020. LeafSpec: An accurate and portable hyperspectral corn leaf imager. Computers and Electronics in Agriculture, 169, p.105209. https://doi.org/10.1016/j.compag.2019.105209

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Wu, Y., Guo, T., Mu, Q., Wang, J., Li, X., Wu, Y., Tian, B., Wang, M.L., Bai, G., Perumal, R., Trick, H.N., Bean, S.R., Dweikat, I.M., Tuinstra, M.R., Morris, G., Tesso, T.T., Yu, J., Li, X., 2019. Allelochemicals targeted to balance competing selections in African agroecosystems. Nature Plants, pp.1-8. https://doi.org/10.1038/s41477-019-0563-0

Griebel, S., Westerman, R.P., Adeyanju, A., Addo-Quaye, C., Craig, B.A., Weil, C.F., Cunningham, S.M., Patel, B., Campanella, O.H. and Tuinstra, M.R., 2019. Mutations in sorghum SBEIIb and SSIIa affect alkali spreading value, starch composition, thermal properties and flour viscosity. Theoretical and Applied Genetics, 132(12), pp.3357-3374. https://doi.org/10.1007/s00122-019-03430-0

Ma, D., Carpenter, N., Amatya, S., Maki, H., Wang, L., Zhang, L., Neeno, S., Tuinstra, M.R. and Jin, J., 2019. Removal of greenhouse microclimate heterogeneity with conveyor system for indoor phenotyping. Computers and Electronics in Agriculture, 166, p.104979. https://doi.org/10.1016/j.compag.2019.104979

Ma., D., Carpenter, N., Rehman, T., Maki, H., Tuinstra, M.R. and Jin J., 2019. Greenhouse Environment Modeling and Simulation for Microclimate Control. Computers and Electronics in Agriculture, Computers and Electronics in Agriculture, 162, pp.134-142. https://doi.org/10.1016/j.compag.2019.04.013

Griebel, S., Webb, M.M., Campanella, O.H., Craig, B.A., Weil, C.F. and Tuinstra, M.R., 2019. The alkali spreading phenotype in Sorghum bicolor and its relationship to starch gelatinization. Journal of cereal science, 86, pp.41-47. https://doi.org/10.1016/j.jcs.2019.01.002

Al Khalifah, N., Campbell, D.A., Falcon, C.M., Gardiner, J.M., Miller, N.D., Cinta Romay R, Walls, R., Walton, R., Yeh, C.T., Bohn, M., Bubert, J., Buckler, E.S., Ciampitti, I., Flint-Garcia, S., Gore, M.A., Graham, C., Hirsch, C., Holland, J.B., Hooker, D., Kaeppler, S., Knoll, J., Lauter, N., Lee, E.C., Lorenz, A., Lynch, N.P., Moose, S.P., Murray, S.C., Nelson, R., Rocheford, T., Rodriguez, O., Schnable, J.C., Scully, B., Smith, M., Springer, N., Thomison, P., Tuinstra, M.R., Wisser, R.J., Xu, W., Ertl, D., Schnable, P., De Leon, N., Spalding, E.P., Edwards, J., Lawrence-Dill, C.J. 2018. Maize Genomes to Fields: 2014 and 2015 field season genotype, phenotype, environment, and inbred ear image datasets. BMC research notes, 11(1), p.452. https://doi.org/10.1186/s13104-018-3508-1

Balzan, S., Carraro, N., Salleres, B., Dal Cortivo, C., Tuinstra, M.R., Johal, G. and Varotto, S., 2018. Genetic and phenotypic characterization of a novel brachytic2 allele of maize. Plant Growth Regulation, pp.1-12. https://doi.org/10.1007/s10725-018-0412-6

Addo-Quaye, C., Tuinstra, M., Carraro, N., Weil, C. and Dilkes, B.P., 2018. Whole genome sequence accuracy is improved by replication in a population of mutagenized sorghum. G3: Genes, Genomes, Genetics, pp.g3-300301. https://doi.org/10.1534/g3.117.300301

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