**MITCHELL TUINSTRA**

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

Department of Agronomy, 1150 Lilly Hall of Life Sciences, Purdue University,
West Lafayette, Indiana 47907-1150   Phone: 765-494-9093   Email: drmitch@purdue.edu

## EDUCATION

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| 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

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| 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: Although farmers have faced the challenges of droughts and heat waves for thousands of years, there are concerns that the frequency and severity of these adverse environmental conditions is increasing. Dr. Tuinstra and his collaborators are responding to these concerns with efforts to develop "climate resilient" cultivars of maize and sorghum that contribute to the adaptation of agriculture to warmer and drier environments. His research focuses on identifying genes and genetic resources that contribute to improved crop performance in stressful environments. This work is done in collaboration with scientists and plant breeders in the Americas, Africa and Asia.

10% Teaching: Dr. Tuinstra seeks to educate the next generation of citizens and scientists so they are aware of the importance of agriculture and are well-equipped with the abilities to increase food security and safety. His education programs help students understand that we are connected to people and practices across the globe. His teaching and mentorship activities are designed to equip students with the knowledge and skills to translate discoveries and concepts in fundamental plant biology into new tools and technologies for crop improvement.

30% Administration – Scientific Director, Institute for Plant Sciences: Dr. Tuinstra serves as the Scientific Director of the Institute for Plant Sciences. His goal is to empower researchers at Purdue with the best plant science research platform in the world. Recent investments include
- The Indiana Corn and Soybean Innovation Center (ICSC) is being developed to support field-based phenotyping research initiatives at the Agronomy Farm and includes a high-resolution imaging gantry, a core facility for UAV-based phenotyping and data processing, and an integrated solar power/agriculture production research platform.
- The Ag Alumni Seed Phenotyping Facility (AAPF) is being developed to support controlled-environment phenotyping research initiatives and includes an automated Red/Blue/Green and hyperspectral imaging platforms for shoot phenotyping and an X-Ray CT root imaging system to support non-destructive root imaging.  The growth chamber capacity in the AAPF was recently doubled in size. $CO_2$ injection capabilities were added to provide better control of environmental conditions.
- A new four-season greenhouse is under construction to support plant science research and education initiatives across the College of Agriculture.

**HONORS AND AWARDS**
Seed for Success, Excellence in Research, Purdue University – 2009, 2013, 2014, 2016, 2018, 2020, 2024
Outstanding Undergraduate Teacher, Department of Agronomy – 2020, 2023
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
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
Student Travel Award, International Society of Plant Molecular Biology – 1996
Excellence in Biological Research Graduate Scholarship, Dow Elanco – 1995
Fellow, *Gamma Sigma Delta* – The Honor Society of Agriculture – 1994
McKnight Doctoral Fellowship, McKnight Foundation – 1994

## PROFESSIONAL SOCIETIES

American Society of Agronomy
Crop Science Society of America
Sorghum Improvement Conference of North America
National Association of Plant Breeders

## PATENTS

Agrawal, R., Alam, M. and Tuinstra, M., 2022. Photovoltaic structures for use in agriculture farms. U.S. Patent 12,041,897. Issue Date: July 23, 2024.

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

Tuinstra MR, Al-Khatib K. K. 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

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Jung, J., Fei, S., Tuinstra, M.R., Yang, Y., Wang, D., Song, C., Gillan, J., Bhandari, M., Ibrahim, A., Zhao, L. and Swetnam, T., 2024, June. Data to science: an open-source online platform for managing, visualizing, and publishing UAS data. In Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping IX (Vol. 13053, pp. 12-15). SPIE. https://doi.org/10.1117/12.3021199

Diatta-Holgate, E., Bergsma, B. and Tuinstra, M.R., 2024. Mutations in the dwarf3 gene confer height stability in sorghum. The Plant Genome, p.e20466. https://doi.org/10.1002/tpg2.20466

Arora, A., Das, A.K., Dixit, S., KR, Y., Singh, S.B., Sekhar, J.C., Ravikesavan, R., Sahi, J.P., Kumar, I.S., Mahadevu, P., Swain, D., Kachapur, R.M., Tuinstra, M.R., Venadan, S., Rakshit, S., 2024. Genetic diversity analysis and heterotic grouping of Indian white maize

inbred lines using combining ability and SNP markers. Crop Science. https://doi.org/10.1002/csc2.21201

Gruss, S.M., Johnson, K.D., Radcliffe, J.S., Lemenager, R.P. and Tuinstra, M.R., 2024. Preference of dhurrin-free sorghum by ewes. Crop, Forage & Turfgrass Management, 10(1), p.e20259. https://doi.org/10.1002/cft2.20259

Grubbs, E.K., Gruss, S.M., Schull, V.Z., Gosney, M.J., Mickelbart, M.V., Brouder, S., Gitau, M.W., Bermel, P., Tuinstra, M.R., Agrawal, R., 2024. Optimized agrivoltaic tracking for nearly-full commodity crop and energy production. Renewable and Sustainable Energy Reviews, 191, p.114018. https://doi.org/10.1016/j.rser.2023.114018

Tolley, S.A., Brito, L.F., Wang, D.R., Tuinstra, M.R., 2023. Genomic Prediction and Association Mapping of Maize Grain Yield in Multi-environment Trials Based on Reaction Norm Models. Frontiers in Genetics, 14, p.1221751. https://doi.org/10.3389/fgene.2023.1221751

Maki, H., Lynch, V., Ma, D., Tuinstra, M.R., Yamasaki, M., and Jin, J., 2023. Comparison of Various Nitrogen and Water Dual Stress Effects for Predicting Relative Water Content and Nitrogen Content in Maize Plants through Hyperspectral Imaging. AI, 4(3), pp.692-705. https://doi.org/10.3390/ai4030036

Zaidi, P.H., Vinayan M.T., Nair, S.K., Kuchanur P.H., Kumar, R., Singh, S.B., Tripathi, M.P., Patil, P., Ahmed, S., Hussain, A., Kulkarni, A.P., Wangmo, P., Tuinstra, M.R., Prasanna, B.M., 2023. Heat-tolerant maize for rainfed hot, dry environments in the lowland tropics: From breeding to improved seed delivery. The Crop Journal. https://doi.org/10.1016/j.cj.2023.06.008

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Lima, D.C., Washburn, J.D., Varela, J.I., Chen, Q., Gage, J.L., Romay, M.C., Holland, J., Ertl, D., Lopez-Cruz, M., Aguate, F.M. and de los Campos, G., Kaeppler, S., Beissinger, T., Bohn, M., Buckler, E., Edwards, J., Flint-Garcia, S., Gore, M.A., Hirsch, C.N., Knoll, J.E., McKay, J., Minyo, R., Murray, S.C., Ortez, O.A., Schnable, J.C., Sekhon, R.S., Singh, M.P., Sparks, E.E., Thompson, A., Tuinstra, M.R., Wallace, J., Weldekidan, T., Xu, W., de Leon, N., 2023. Genomes to Fields 2022 Maize genotype by Environment Prediction Competition. BMC Res Notes 16, 148. https://doi.org/10.1186/s13104-023-06421-z

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Thomison, P., Thompson, A., Tuinstra, M.R., Wallace, J., Washburn, J.D., Weldekidan, T., Wisser, R.J., Xu, W., de Leon., N. 2023. 2018–2019 field seasons of the Maize Genomes to Fields (G2F) G x E project. BMC Genomic Data, 24(1), pp.1-4. https://doi.org/10.1186/s12863-023-01129-2

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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

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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

Herrero-Huerta, M., Tolley, S., Tuinstra, M.R. and Yang, Y., 2021, April. Individual maize extraction from UAS imagery-based point clouds by 3D deep learning. In Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping VI (Vol. 11747, p. 1174704). International Society for Optics and Photonics. https://doi.org/10.1117/12.2587100

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

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## MENTORING

### VISITING SCHOLARS
1. Dr. Ayangouda Patil, 2017. Assistant Professor, College of Agriculture, University of Agricultural Sciences - Raichur, Raichur, INDIA.
2. Dr. Ohnishi, Takayuki, 2019-2020. Associate Professor, Utsunomiya University, Utsunomiya, JAPAN.
3. Dr. Elisabeth Diatta, 2020-present. Sorghum Breeder, Centre d'Études Régional pour L'Amélioration de l'Adaptation à la Sécheresse (CERAAS), Theis, SENEGAL.
4. Viswanadh Sudarsanam, 2023. Maize Research Specialist, CIMMYT, Hyderabad, INDIA.
5. Dr. Vinyan Madhumal Thayil, 2023. Maize Breeder, CIMMYT, Hyderabad, INDIA.

### POSTDOCTORAL FELLOWS
1. Dr. Hesham Agrama, 1998-2000. Current Employment: Assistant Professor, College of Agricultural and Marine Sciences, Sultan Qaboos University, PO Box 34, Al-Khod 123, Sultanate of Oman.
2. Dr. Chindo Hicks, 2000-2002. Current Employment: Professor, LSU-School of Medicine, Department of Genetics, Clinical Science and Research Building, 533 Bolivar Street, Room 748C, New Orleans, LA 70112.
3. Dr. Kartikeya Krothapalli, 2008-2012. Current Employment: Maize Breeder, CIMMYT-Asia, Hyderabad, India.

4. Dr. Antje Klempien, 2013-2017. Current Employment: Senior Bioanalytical Scientist at Pharmaron, Ijamsville, Maryland.
5. Dr. Nicola Carraro, 2013-2017. Current Employment: Senior Scientist, MilleporeSigma, Gaithersburg, Maryland.
6. Dr. Addie Thompson, 2014-2017. Current Employment: Assistant Professor, Department of Plant Soil and Microbial Sciences, Michigan State University, East Lansing, MI 48824.
7. Dr. Amritpal Singh, 2017-2018. Current Employment: Research Scientist, Advanta Seeds, College Station, TX.
8. Dr. Neal Carpenter, 2018-2019. Current Employment: Head of Field Data Science, Bayer Crop Science, Chesterfield, MO.
9. Dr. Shelby Gruss, 2021-2022. Current Employment: Current Employment: Assistant Professor, Department of Agronomy, Iowa State University.

## STUDENT ADVISING

### *Graduate students served as major or co-major professor:*
1. Jianming Yu. (M.S.) Graduated – 2000. Current Employment: Pioneer Distinguished Chair in Maize Breeding, Professor, Department of Agronomy, Iowa State University, Ames, IA 50011-1010.
2. Jacob Reed (M.S.) Graduated – 2001. Current Employment: Station Manager - Trait Development and Breeding at BASF, Wollforth, Texas.
3. Tesfaye Tesso (Ph.D.) Graduated – 2002. Current Employment: Sorghum Breeder, Professor, Department of Agronomy, Purdue University, West Lafayette, IN.
4. Travis Kriegshauser (M.S.) – 2003. Current Employment: Head of Global Seeds Strategy & Planning, Raleigh, North Carolina.
5. Michael Stamm (M.S.) – 2003. Current Employment: Canola Breeder, Associate Agronomist, Department of Agronomy, Kansas State University, Manhattan, KS.
6. Anand Pandravada (Ph.D.) Graduated – 2004. Current Employment: Regional Research Director, Corteva Agriscience, Hyderabad, India.
7. Dustan Ridder (M.S.) Graduated – 2005. Current Employment: Assistant Agronomist, North Farm, Department of Agronomy, Kansas State University, Manhattan, KS.
8. Rhett Kaufman (M.S.) Graduated – 2005. Current Employment: Technical Consultant, RCK Cereal Consulting, Manhattan, KS.
9. Souley Soumana (M.S.) Graduated – 2007. Current Employment: Sorghum Breeder, Institut National de Recherche Agronomique du Niger (INRAN), Niamey, NIGER.
10. Grant Groene (M.S.) Graduated – 2008. Current Employment: Global Agronomy Lead, Corteva Agriscience, Des Moines, IA.
11. Ivan Dario Barrero Farfan (M.S.) Graduated – 2010. Current Employment: Research Scientist, Hormel Foods, Sacramento, CA.
12. Kellan Kershner (Ph.D.) Graduated – 2010. Current Employment: Corn Breeder, Wyffels Hybrids, Geneseo, IL.
13. Mike Popelka (Ph.D.) Graduated – 2012. Current Employment: Hybrid Product Breeders Manager, AgReliant Genetics, LLC, Sioux Falls, South Dakota.

14. Jason Morales (Ph.D.) Graduated – 2013. Current Employment: Corn Breeder, Corteva Agrisciences, Dallas Center, IA.
15. Ani Elias (Ph.D.) Graduated – 2013. Current Employment: Department of Botany, University of Delhi, New Delhi, INDIA.
16. Jenae Skelton (M.S.) Graduated – 2014. Current Employment: Clerk, Treasurer's Office, Jewell County, KS.
17. Alex Renaud (Ph.D.) Graduated – 2015. Current Employment: US Corn Germplasm and Deployment Lead, Bayer Crop Science, Chesterfield, MO.
18. Raymond Lindsey (Ph.D.) Graduated – 2015. Current Employment: Production Research Scientist, Bayer Crop Science, Constantine, MI.
19. Molly McKneight (M.S.) Graduated – 2015. Continuous Improvement Project Leader, Coteva Agricscience, Indianapolis, IN.
20. Moriah Massafaro (M.Sc.) Graduated – 2015. Current Employment: Molecular Biologist, Eli Lilly, Indianapolis, IN.
21. Brad Thada (Ph.D.) Graduated – 2017. Current Employment: Popcorn Breeder, Weaver Popcorn, New Richmond, IN.
22. Valerie Lynch (Cross) (M.Sc.) Graduated – 2018. Current Employment: Associate Breeder, PanAmerican Seed Company, Aurora, IL.
23. Ryan Gibson (Ph.D.) Graduated – 2018. Current Employment: Maize Breeding and Genetics, Corteva Agriscience, Johnston, IA.
24. Stefanie Griebel (Ph.D.) Graduated – 2019. Current Employment: Research Coordinator, Deutsche Welthungerhilfe, Bonn, Germany.
25. Elisabeth Diatta, (Ph.D.) – Sandwich program with West Africa Center for Crop Improvement, Accra, Ghana. Graduated – 2019. Current Employment: Sorghum Breeder, Centre d'Études Régional pour L'Amélioration de l'Adaptation à la Sécheresse (CERAAS), Theis, SENEGAL.
26. Ousmane Seyni, (Ph.D.) – Sandwich program with West Africa Center for Crop Improvement, Accra, Ghana. Graduated – 2019. Current Employment: Sorghum Breeder, Institut National de Recherche Agronomique du Niger (INRAN), Niamey, NIGER.
27. Shelby Gruss (Ph.D.) Graduated – 2021. Current Employment: Assistant Professor, Department of Agronomy, Iowa State University.
28. Kai Wei Yang (Ph.D.) Graduated – 2021. Current Employment: Data Scientist, Testing by Design, Bayer Crop Science, Chesterfield, MO.
29. Meng-Yang Lin (Ph.D.) Graduated – 2022. Current Employment: Discovery Breeder - Phenotyping Lead, PepsiCo, Rhinelander, Wisconsin.
30. Seth Tolley (Ph.D.) Graduated – 2023. Current Employment: Technical Representative, Bayer Crop Science, Decatur, IL.
31. Mark Gee (Ph.D.) Arrived – 2022; Current Employment: Database Engineer - Lead, Purdue University.

***Current graduate student advisees as major or co-major professor:***
1. Aaron Widener (Ph.D.) Arrived – 2024; Estimated Completion – 2028.
2. Nicolas Roberts (Ph.D.) Arrived – 2024; Estimated Completion – 2028.

3.    Christopher Barron (Ph.D.) Arrived – 2024; Estimated Completion – 2028.

***Undergraduate student advisees:*** Plant Genetics, Breeding, and Biotechnology Major.

| Year | # Students |
|------|-----------|
| 2023-24 | 4 |
| 2022-23 | 4 |
| 2021-22 | 4 |
| 2020-21 | 4 |
| 2019-20 | 4 |
| 2018-19 | 6 |
| 2017-18 | 17 |
| 2016-17 | 20 |
| 2015-16 | 30 |
| 2014-15 | 26 |
| 2013-14 | 31 |
| 2012-13 | 29 |
| 2011-12 | 16 |
| 2010-11 | 9 |
| 2009-10 | 7 |
| 2008-09 | 6 |
| 2007-08 | 2 |