CYREN MENDOZA RICO, PHD

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EDITORIAL BOARD MEMBER
Plant Nano Biology

EDUCATIONAL BACKGROUND

2010 – 2014	**PHD CHEMISTRY** *(Analytical/Environmental Chemistry)***.** The University of Texas at El Paso, Texas, USA.
2005 – 2007	**MS AGRICULTURE** *(Environmental Agronomy)***.** Kyungpook National University, Daegu, South Korea**.**
1994 – 1999	**BS CHEMISTRY** *(Analytical/Environmental Chemistry)***.** University of the Philippines Los Baños, Laguna, Philippines.

ACADEMIC APPOINTMENT

August 2023 – present	**ASSOCIATE PROFESSOR.** Chemistry and Biochemistry Department, Missouri State University, Springfield, Missouri, USA.
August 2017 – July 2023	**ASSISTANT PROFESSOR.** Chemistry and Biochemistry Department, Missouri State University, Springfield, Missouri, USA.
January 2015 – July 2017	**POSTDOCTORAL RESEARCH ASSOCIATE.** National Research Council, US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Corvallis, Oregon, USA.
May 2010 – December 2014	**GRADUATE RESEARCH ASSISTANT.** University of California Center for Environmental Implications of Nanotechnology, The University of Texas at El Paso, El Paso, Texas, USA.
May 2010 – December 2014	**TEACHING ASSISTANT.** Department of Chemistry, The University of Texas at El Paso, El Paso, Texas, USA.
February 2007 – March 2010	**RESEARCHER.** ISTECH, Inc., CU Techno Center, Catholic University of Daegu, South Korea.
February 2005 – February 2007	**GRADUATE RESEARCH ASSISTANT.** School of Applied Biosciences, College of Agriculture and Life Sciences, Kyungpook National University, Daegu, South Korea.
March 2004 – February 2005	**UNIVERSITY EXTENSION ASSOCIATE.** University of the Philippines Los Baños, Laguna, Philippines.
June 2002 – February 2004	**INSTRUCTOR.** School of Arts and Sciences & School of Allied Medicine, Marinduque State College, Marinduque, Philippines.

June 2001 – April 2002	**LECTURER.** Department of Chemistry, De La Salle University, Manila, Philippines.
February 2000 – May 2001	**UNIVERSITY EXTENSION ASSOCIATE.** University of the Philippines Los Baños, Laguna, Philippines.

CITATION METRICS

RESEARCHERID		GOOGLE SCHOLAR	
Number of publications:	42	Number of publications:	48
Sum of the times cited:	3921	Total Number of Citations:	6362
Number of citing articles:	2458	i10-Index:	30
h-Index:	24	h-Index:	25

COURSES TAUGHT AT MSU

CHM161: General Chemistry I Lab (SP/FA 2017-2021, FA 2022)

CHM161: General Chemistry I Lab Coordinator (FA 2022-present)

CHM398/791: Chemical Symposium (SP 2019, SP/FA20-21, FA 2022)

CHM498: Chemistry Careers (FA 2019)

CHM460/660: Environmental Chemistry: Water and Land (FA 2017-2021)

CHM461/661: Environmental Chemistry: Air and Energy (SP 2017-2021)

CHM462/662: Environmental Chemistry: Laboratory (SP 2020-2022)

CHM463: Environmental Analysis (SP 2020)

CHM763: Advanced Topics in Environmental Chemistry: Emerging Contaminants in the Environment (SP 2022)

STUDENT MENTORING

GRADUATE RESEARCH MENTORING

1. **Iqra Shakoor,** MS Chemistry, *Fall 2022 – present*
2. **Joshua Garland,** MS Chemistry, *Fall 2022 – present*
3. **Preston Clubb,** MS Chemistry, *Summer 2022 – present*
4. **Olamide R. Ogundele,** MS Chemistry, *Spring 2022 – present*
5. **Naum J. Kirwa,** MS Chemistry, *Fall 2021 – Fall 2022*
6. **Jacqueline Baker,** Professional Science Masters, *Spring 2020 – Fall 2022*
7. **Dane C. Wagner,** MS Chemistry, *Spring 2020 – Summer 2022*
8. **Taiwo Awobona,** MS Chemistry, *Spring 2020 – Fall 2020 (Left the program)*
9. **Polycarp Ofoegbu,** MS Chemistry, *Fall 2019 – Summer 2021*
10. **Oluwasegun Michael Abolade,** MS Chemistry, *Fall 2017 – Summer 2019*

UNDERGRADUATE RESEARCH MENTORING

1. **Jonathan Ivanoff,** BS Chemistry, *Spring 2023 – present*

2. **Riley Pope,** BS Chemistry, *Spring 2023 – present*
3. **Brooke Winder,** BS Chemistry, *Spring 2023*
4. **Maximo Reyes,** BS Chemistry, *Spring 2022 – Summer 2023*
5. **Jessica Linson,** BS Chemistry, *Fall 2022 – Spring 2023*
6. **Aaron Autry,** BS Chemistry, *Fall 2022*
7. **Andrew Coulliette,** BS Chemistry, *Spring 2022*
8. **Preston Clubb,** BS Chemistry, *Summer 2021 – Fall 2022*
9. **Jackson Glover,** BS Chemistry, *Spring 2021*
10. **Avery Harms,** BS Chemistry, *Spring 2021*
11. **Ian Sayers,** BS Chemistry, *Spring 2021*
12. **Eden Kohn,** BS Chemistry, *Fall 2020 – Spring 2021*
13. **Joshua Garland,** BS Chemistry, *Fall 2020 – Spring 2021*
14. **Travis Love,** BS Chemistry, *Fall 2020*
15. **Hannah Parker,** BS Chemistry, *Spring 2020*
16. **Zachary Dobbs,** BS Chemistry, *Spring 2020 – Fall 2020*
17. **Hussain Alhashim,** BS Chemistry, *Summer 2019*
18. **Sarah Braun,** BS Chemistry, *Spring 2019*
19. **Stephen Sample,** BS Chemistry, *Spring 2019*
20. **Dane Wagner,** BS Chemistry, *Fall 2018 – Fall 2019*
21. **Megan Roberts,** BS Chemistry, *Summer 2018*
22. **Brett Lottes,** BS Chemistry, *Summer 2018 – Spring 2019*
23. **Kameron Coates,** BS Chemistry, *Spring 2017 – Summer 2018, Fall 2019 (Volunteer)*
24. **Madison Jones,** BS Chemistry, *Spring 2017*

AWARDS

1. *NSF Early Career Investigator Award* (*Sustainable Nanotechnology Organization (SNO) Conference Award)*, November 2021
2. *NSF Early Career Investigator Award (SNO Conference Award)*, November 2020
3. Research Lab Members
    1) Corteva AgriSciences *Delta Award*, Recipient: Olamide R. Ogundele, August 2023
    2) National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) *Advancing Science Conference Grant*, Recipient: Joshua Garland, September 2023
    3) National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) *Advancing Science Conference Grant*, Recipient: Olamide R. Ogundele, September 2023
    4) American Chemical Society (ACS) *Undergraduate Student Award in Environmental Chemistry*, Recipient: Maximo Reyes, May 2023
    5) Einhellig Interdisciplinary Forum *Outstanding Poster Award*, Recipient: Olamide Ogundele, April 2023

6) CNAS Undergraduate Research Symposium *Poster 1st Place Award*, Recipient: Maximo Reyes, April 2023
7) Plant the Moon Challenge, Institute of Competition Science, Recipient: Jessica Linson, Spring 2023
8) AAAS 2023 *Emerging Researchers* National (ERN) Conference in STEM, Recipient: Maximo Reyes, February 2023
9) CNAS 3MT (Three Minute Thesis) Competition *Winner & University 3MT Qualifier*, Recipient: Olamide R. Ogundele, October 24, 2022
10) SNO *Student Award*, Recipient: Preston Clubb, November 11-13, 2022
11) National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) *Advancing Science Conference Grant*, Recipient: Olamide R. Ogundele, September 2022
12) ACS *Undergraduate Student Award in Environmental Chemistry*, Recipient: Preston Clubb, June 2022
13) ACS Division of Environmental Chemistry *Graduate Student Award in Environmental Chemistry*, Recipient: Dane C. Wagner, December 2021
14) *NSF Student Award* (*SNO Conference Award*), Recipient: Preston Clubb, November 2021
15) SNO *Outstanding Poster Award (Honorable Mention)*, Recipient: Preston Clubb, November 2021
16) ACS *Undergraduate Student Award in Environmental Chemistry*, Recipient: Ian Sayers, June 2021
17) Einhellig Interdisciplinary Forum *Outstanding Poster Award*, Recipient: Dane C. Wagner, May 2021
18) Einhellig Interdisciplinary Forum *Outstanding Presentation Award*, Recipient: Oluwasegun Michael Abolade, May 2019

PUBLICATIONS SINCE COMING TO MSU (UNDERLINE = GRADUATE STUDENTS, DOUBLE UNDERLINE ARE = UNDERGRADUATE STUDENTS, * = HIGH SCHOOL STUDENTS, ** = HIGH SCHOOL TEACHER)

PUBLISHED IN REFEREED JOURNALS

1. Ayub, M.A.; Rehman, M.Z.; Ahmad, H.R.; Umar, W.; Wright, A.L.; Nadeem, M.; Rico, C.M.; Rossi, L. Divergent effects of cerium oxide nanoparticles alone and in combination with Cd on nutrient acquisition of maize (*Zea mays*). Frontiers in Plant Science 2023, 14, 1151786
2. Hong, J.; Jia, S.; Wei, L.; Wu, M.; Chen, F.; He, F.; Ogundele, O.R.; Rico, C.M.; Physiological profiles and co-occurrence patterns of soil microbes following exposure to nanoceria and ionic cerium. Environmental Science: Nano, 2023 https://doi.org/10.1039/D2EN00848C
3. Ayub, M.A.; ur Rehman, M.Z.; Ahmad, H.R.; Fox, J.P.; Clubb, P.; Wright, A.L.; Anwar-ul-Haq, M.; Nadeem, M.; Rico, C.M.; Rossi, L. Influence of ionic and cerium oxide nanoparticle on *Zea mays* seedlings grown with and without cadmium. Environmental Pollution, 2023, 322, 121137.

4. Wang, L.; Chen, C.; He, R.; Rico, C.M.; Mao, Q.; Sun. P. Tree age and maturity stage affect reducing sugars, organic acids and minerals in *Ziziphus jujuba* Mill. cv. Huping fruits. Journal of Food Composition and Analysis, 2023, 115, 105007.
5. Ofoegbu, P.C.; Wagner, D.C.; Abolade, O.M.; Clubb, P.; Dobbs, Z.; Sayers, I.; Zenobio, J.E.; Adeleye, A.S.; Rico, C.M. Impacts of perfluorooctanesulfonic acid on plant biometrics and grain metabolomics of wheat (*Triticum aestivum* L.). *Journal of Hazardous Materials Advances* 2022, 7, 100131.
6. Ying, S.; Guan, Z.; Ofoegbu, P.C.; Clubb, P., Rico, C.M.; He, F.; Hong, J. Green synthesis of nanoparticles: Current developments and limitations. *Environmental Technology & Innovation* 2022, 26, 102336.
7. Hong, J.; Wang, C.; Wagner, D.C.; Gardea-Torresdey, J.L.; He, F.; Rico, C.M. Reply to the comment on "Foliar application of nanoparticles: Mechanisms of absorption, transfer, and multiple impacts" by S. Husted, P. Mos, S. Le Tougaard, A. Pinna and F. Minutello, Environ Sci.: Nano, DOI:10.1039/D1EN00630D. *Environmental Science: Nano* 2022, 9, 1185-1186.
8. Hong, J.; Wang, C.; Wagner, D.C.; Gardea-Torresdey, J.L.; He, F.; Rico, C.M. Foliar application of nanoparticles: Mechanisms of absorption, transfer, and multiple impacts. *Environmental Science: Nano* 2021*,* 8, 1196-1210.
9. Rico, C.M.; Wagner, D.C.; Abolade, O.M.; Lottes, B.; Coates, K. Metabolomics of wheat grains generationally-exposed to cerium oxide nanoparticles. *Science of the Total Environment* 2020, 712, 136487.
10. Rico, C.M.; Abolade, O.M.; Wagner, D.C.; Lottes, B.; Rodriguez, J.; Biagioni, R.; Andersen, C.P. Wheat exposure to cerium oxide nanoparticles over three generations reveals transmissible changes in nutrition, biochemical pools, and response to soil N. *Journal of Hazardous Materials* 2020, 384, 121364.
11. Rico, C.M.; Johnson, M.G.; Marcus, M.; Andersen, C.P. Shifts in N and $\delta^{15}N$ in wheat and barley exposed to cerium oxide nanoparticles. *NanoImpact* 2018, 11, 156-163. ***(Trips to the Advanced Light Source, UC Berkeley were made in September 2017, December 2017, and March 2018. Experiments at ALS, data analysis, and manuscript writing were done at MSU.)***
12. Rico, C.M.; Johnson, M.G.; Marcus, M. Cerium oxide nanoparticles transformation at the root-soil interface of barley (*Hordeum vulgare* L.). *Environmental Science: Nano* 2018, 5, 1807-1812. ***(Trips to the Advanced Light Source, UC Berkeley were made in September 2017, December 2017, and March 2018. Experiments at ALS, data analysis, and manuscript writing were done at MSU.)***

BOOK EDITED

1. Rico, C.M. (Editor) *Plant Exposure to Engineered Nanoparticles: Uptake, Transformation, Molecular and Physiological Responses,* 1e, Elsevier, August 2022, 9780323850322

BOOK CHAPTER

1. Rico, C.M.; Ofoegbu, P.C.; Kirwa, N.J.; Wagner, D.C.; Abolade, O.M.; Jia, S.; Hong, J. Changes in metabolite profile of plants exposed to engineered nanomaterials. In *Plant Exposure to Engineered Nanoparticles: Uptake, Transformation, Molecular and Physiological Responses,* 1e, Rico, C.M., Ed. Elsevier, August 2022
2. Andersen, C.P.; Rico, C.M. The importance of system complexity in understanding plant responses to ENPs: Direct vs indirect effects. In *Plant Exposure to Engineered*

Nanoparticles: Uptake, Transformation, Molecular and Physiological Responses, 1e, Rico, C.M., Ed. Elsevier, August 2022

PRESENTATIONS SINCE COMING TO MSU (UNDERLINE = GRADUATE STUDENTS, DOUBLE UNDERLINE ARE = UNDERGRADUATE STUDENTS, * = HIGH SCHOOL STUDENTS, ** = HIGH SCHOOL TEACHER)

INVITED PRESENTATIONS

1. Plenary Speaker, "Interaction between cerium oxide nanoparticles and plants", International Seminar on Nano-Bio Interfaces and their Application in our Lives, K.D. College of Commerce and General Studies, Midnapore, India. March 12, 2023.

ORAL PRESENTATIONS

1. Ayub, M.A. (*presenter*); Rehman, M.Z.; Ahmad, H.R.; Rico, C.M.; Umar, W.; Rossi, L. Divergent effects of cerium oxide nanoparticles alone and in combination with Cd on nutrient acquisition and growth of maize (*Zea mays*). International Conference on Environment, Life and Climate Change. Islamia University of Bahawalpur, Pakistan. November 2022.
2. Ayub, M.A. (*presenter*); Rehman, M.Z.; Ahmad, H.R.; Rico, C.M.; Wright, A.L.; Rossi, L. Effect of bulk cerium and cerium oxide nanoparticles on growth and micronutrients distribution in *Zea mays* seedlings under normal and Cd spiked condition. *19th International Congress of Soil Science on "Soil Health and Sustainable Development Goals"*. Faisalabad, Pakistan. February 15-17, 2022.
3. Reichman, J.R. (*presenter*), Rico, C.M., Smith, B., Ren, H., Fisher, A., Plocher, M., Storm, M., King, G., Andersen, C. Transgenerational changes in *Arabidopsis* tsRNA expression and chloroplast genomic methylation following exposure to CeO_2 nanoparticles. *SETAC North America 42nd Annual Meeting.* November 16, 2021.
4. Rico, C.M., Kirwa, N.J., Clubb, P., Wagner, D.C. Assessing plants performance in successive exposures to cerium oxide nanoparticles and perfluorooctanesulfonic acid. *10th Sustainable Nanotechnology Organization*. November 5, 2021. **(*NSF Early Career Investigator Award - SNO Conference Award*)**
5. Rico, C.M. (*presenter*), Wagner, D.C., Ofoegbu, P.C., Dobbs, Z., Sayers, I., Glover, J., Harms, A. Barley (*Hordeum vulgare*) performance after successive exposures to cerium oxide nanoparticles and perfluorooctanesulfonic acid*. American Chemical Society*. August 25, 2021.
6. Rico, C.M. (*presenter*), Ofoegbu, P.C., Awoboona, T., Wagner, D.C., Dobbs, Z., Parker, H. Physiological and molecular response of wheat (*Triticum aestivum*) exposed to perfluorooctanoic acid. *SETAC North America 41st Annual Meeting*, November 15-19, 2020.
7. Rico, C.M. (*presenter*), Wagner, D.C., Ofoegbu, P.C., Awoboona, T., Dobbs, Z., Parker, H. Physiological and molecular changes in plants generationally-exposed to cerium oxide nanoparticles. *Sustainable Nanotechnology Organization 9th Nano Conference*, November 12-13, 2020. **(*NSF Early Career Investigator Award - SNO Conference Award*)**
8. Reichman, J.R. (*presenter*), Rico, C.M., Smith, B., Ren, H., Fisher, A., Plocher, M., Storm, M.J., King, G.A., Andersen, C.P. Transgenerational changes in *Arabidopsis* smRNA expression and genomic methylation following exposure to CeO_2 nanoparticles. *EPA Epigenetics Workgroup*, September 14, 2020.

STUDENT ORAL PRESENTATIONS AT CONFERENCES

1. Reyes, M.; Clubb, P.; Horn, E.;* Rico, C.M. The subtle effects of contaminants: The case of continuous exposure of wheat *(Triticum aestivum* L.) to cerium oxide nanoparticles and perfluorooctanesulfonic acid*. AAAS Emerging Researchers National (ERN) Conference in STEM,* Washington, D.C. February 10-11, 2023.
2. Clubb, P.; Rico, C.M.; Adeleye, A. Nano zerovalent iron (nZVI) for remediation of arsenic (As) toxicity in wheat. *NanoPitch Competition*, *Sustainable Nanotechnology Organization,* Austin, Texas. November 11-13, 2022
3. Kirwa, N.J.; Clubb, P.; Reyes, M.; Rico, C.M. Metabolomics reveal size-dependent impacts of cerium oxide nanoparticles on barley grains. *Sustainable Nanotechnology Organization,* Austin, Texas. November 11-13, 2022.
4. Kirwa, N.J., Wagner, D.C., Ofoegbu, P., Clubb, P., Coates, K., Rico, C.M. Barley responses to successive exposures to CeO_2 nanoparticles (CeO_2-NPs) and perfluorooctanesulfonic acid (PFOS). *American Chemical Society*. March 20-24, 2022.
5. Wagner, D.C., Ofoegbu, P., Kirwa, N.J., Dobbs, Z., Sayers, I., Clubb, P., Rico, C.M. Physiological and metabolomic changes in plants exposed to perfluorooctane sulfonic acid (PFOS). *SETAC North America 34th Annual Meeting*, Portland, Oregon. November 14-18, 2021.
6. Wagner, D.C., Ofoegbu, P., Kirwa, N.J., Dobbs, Z., Sayers, I., Clubb, P., Rico, C.M. Metabolomic and physiological changes in plants exposed to perfluorooctane sulfonic acid (PFOS). *American Chemical Society Midwest Regional Meeting*, Springfield, Missouri. October 21, 2021.
7. Ofoegbu, P.C., Awoboona, T., Wagner, D.C., Dobbs, Z., Parker, H., Rico, C.M. Physiological and molecular response of wheat (*Triticum aestivum*) exposed to perfluorooctanoic acid (PFOA)*. American Chemical Society* April 14, 2021.

STUDENT POSTER PRESENTATIONS AT CONFERENCES

8. Ogundele, O.; Ofoegbu, P.; Kirwa, N.; Clubb, P.; Rico, C.M. Comparison of the carry over effects on daughter plants of wheat and soybean plants previously exposed to perfluorooctanesulfonic acid (PFOS). *American Chemical Society,* Indianapolis, Indiana, March 26-30, 2023.
9. Clubb, P.; Reyes, M.; Horn, E.;* Rico, C.M. Generational exposure to cerium oxide nanoparticles alters the performance of wheat (*Triticum aestivum*) exposed to perfluorooctanesulfonic acid. *Sustainable Nanotechnology Organization,* Austin, Texas. November 11-13, 2022.
10. Ogundele, O.R., Kirwa, N.J., Clubb, P., Rico, C.M. Performance of daughter plants of wheat previously exposed to perfluorooctanesulfonic acid (PFOS). *ACS Midwest Regional Conference,* Iowa City, Iowa. October 2022.
11. Kirwa, N.J., Wagner, D.C., Ofoegbu, P.C., Clubb, P., Coates, K., Horn, E., Rico, C.M. Successive exposure of cereal crops to cerium oxide nanoparticles and perfluorooctanesulfonic acid: Wheat and barley studies. *ACS Midwest Regional Conference,* Iowa City, Iowa. October 2022.
12. Ogundele, O.R., Kirwa, N.J., Clubb, P., Rico, C.M. Performance of daughter plants of wheat previously exposed to perfluorooctanesulfonic acid (PFOS). *2022 NOBCChE*

Conference, Orlando, Florida. September 2022. **(*Advancing Science Conference Grant Award*)**

13. Clubb, P., Rico, C.M. Parental exposures to cerium oxide affect the responses of daughter plants to perfluorooctanesulfonic acid. *American Chemical Society*. March 20-24, 2022.
14. Clubb, P., Rico, C.M. Parental exposures to cerium oxide nanoparticles (CeO_2-NPs) affect the responses of daughter plants to perfluorooctanesulfonic acid (PFOS). *10th Sustainable Nanotechnology Organization*. November 3, 2021. **(*Outstanding Poster Award, NSF Student Award*)**
15. Kirwa, N.J., Wagner, D.C., Clubb, P., Coates, K.,** Ofoegbu, P., Rico, C.M. Responses of barley *(Hordeum vulgare L.)* to cerium oxide nanoparticles (CeO_2-NPs) and perfluorooctanesulfonic acid (PFOS). *American Chemical Society Midwest Regional Meeting*, Springfield, Missouri. October 21, 2021.
16. Clubb, P., Glover, J., Corbell, L., Coulliette, A., Dumstorff, C., Rydland, M., Smith, C., Takahashi, T., Wagner, D.C., Rico, C.M. Effects of perfluorooctanesulfonic acid (PFOS) on wheat (*Triticum aestivum L.*). *American Chemical Society Midwest Regional Meeting*, Springfield, Missouri. October 21, 2021.
17. Wagner, D.C., Ofoegbu, P., Sayers, I., Dobbs, Z., Rico, C.M. Effects of perfluorooctanesulfonic acid (PFOS) on plant physiology and metabolite profile*. American Chemical Society*. August 24, 2021.
18. Wagner, D.C., Ofoegbu, P., Dobbs, Z., Rico, C.M. Effects of PFOA exposure to velvetleaf (*Abutilon theophrasti*) physiology and metabolite profile*. American Chemical Society*. April 5-30, 2021.
19. Abolade, M.O., Jones, M., Coates, K., Rico, C.M. Cerium oxide nanoparticles and soil nitrogen modified phosphorus and phytate-phosphorus in second generation seeds but not in first generation seeds of wheat and barley. *ACS Midwest Regional Meeting. October 21-23, 2018.*

STUDENT ORAL PRESENTATIONS AT MSU

1. Ogundele, O.R. Does prior exposure of plants to perfluorooctanesulfonic acid (PFOS) affect the next generation? *University-wide 3MT Competition.* November 4, 2022.
2. Ogundele, O.R. Does prior exposure of plants to perfluorooctanesulfonic acid (PFOS) affect the next generation? *CNAS 3MT Competition.* October 25, 2022. **(*Winner/Qualifier to University 3MT Competition*)**
3. Wagner, D.C. Physiological, elemental content, and metabolomics changes in soybean (*Glycine max*) exposed to perfluorooctane sulfonic acid (PFOS). *CNAS 3MT Competition.* October 25, 2021.
4. Kirwa, N.J. Responses of barley (*Hordeum vulgare* L.) to cerium oxide nanoparticles and perfluorooctanesulfonic acid (PFOS). *CNAS 3MT Competition.* October 25, 2021.
5. Ofoegbu, P. Physiological and molecular response of wheat (*Triticum aestivum*) exposed to perfluorooctane sulfonic acid (PFOS). *CNAS 3MT Competition*. January 25, 2021.
6. Ofoegbu, P., Awoboona, T., Wagner, D.C., Dobbs, Z., Parker, H., Rico, C.M. Physiological and molecular response of wheat (*Triticum aestivum*) exposed to perfluorooctanesulfonic acid (PFOS). *Einhellig Interdisciplinary Research Forum*. May 1, 2021.

7. Abolade, M.O., Rico, C.M. Quality of wheat grains (*Triticum aestivum*) generationally exposed to cerium oxide nanoparticles. *26th Annual Einhellig Interdisciplinary Research Forum*. May 4, 2019. **(*Outstanding Presentation Award*)**

STUDENT POSTER PRESENTATIONS AT MSU

8. Ogundele, O.; Ofoegbu, P.; Kirwa, N.; Clubb, P.; Rico, C.M. Does prior exposure of plants to perfluorooctanesulfonic acid (PFOS) affect the next generation? *Einhellig Interdisciplinary Research Forum.* April 29, 2023. **(*Outstanding Presentation Award*)**
9. Linson, J.; Reyes, M.; Clubb, P.; Pope, R.; Winder, B.; Horn, E.;* Rico, C.M. Effects of positive and neutral charged iron nanoparticles on scallion (*Allium fistulosum*) growth in Mars simulant soil. *CNAS Undergraduate Research Day*. April 28, 2023.
10. Reyes, M.; Linson, J.; Clubb, P.; Winburn, M.; Cheung, B.; Rico, C.M. Effects of atmospheric plasma treatment on the toxicity of polystyrene nanoplastics in wheat (*Triticum aestivum* L.). *CNAS Undergraduate Research Day*. April 28, 2023. **(1st place Award)**
11. Ogundele, O.R., Kirwa, N.J., Ofoegbu, P.C., Clubb, P., Reyes, M., Horn, E.,* Rico, C.M. Effects of previous exposure of soybeans to perfluooctanesulfonic acid (PFOS) on the performance of daughter plants. *Einhellig Interdisciplinary Forum*. May 7, 2022.
12. Kirwa, N.J., Wagner, D.C., Ofoegbu, P.C., Clubb, P., Coates, K.,** Horn, E.,* Rico, C.M. Successive exposure of cereal crops to cerium oxide nanoparticles and perfluorooctanesulfonic acid: Wheat and barley studies. *Einhellig Interdisciplinary Forum*. May 7, 2022.
13. Clubb, P., Reyes, M., Coulliette, A., Horn, E.,* Rico, C.M. Generational exposure to cerium oxide nanoparticles alters performance of wheat exposed to perfluorooctanesulfonic acid. *CNAS Undergraduate Research Day*. May 5, 2022.
14. Reyes, M., Clubb, P., Kirwa, N.J., Linson, J., Struemph, P., Denny, A., Rico, C.M. Stress and antioxidant assays of wheat successively exposed to cerium oxide nanoparticles and perfluorooctanesulfonic acid. *CNAS Undergraduate Research Day*. May 5, 2022.
15. Coulliette, A., Clubb, P., Reyes, M., Rico, C.M. ICP-MS analysis of changes in elemental concentration of wheat generationally-exposed to cerium oxide nanoparticles and perfluorooctanesulfonic acid. *CNAS Undergraduate Research Day*. May 5, 2022.
16. Wagner, D.C., Ofoegbu, P., Dobbs, Z., Rico, C.M. *Growth, elemental, and metabolite changes velvetleaf* (*Abutilon theophrasti*) *exposed to perfluorooctanesulfonic acid (PFOS). 2021 Einhellig Interdisciplinary Research Forum*. May 1, 2021. **(*Outstanding Poster Award*)**
17. Sayers, I., Ofoegbu, P., Wagner, D.C., Rico, C.M. Metabolomics reveals changes in nutritional quality of wheat (*Triticum aestivum*) exposed to perfluorooctanesulfonic acid (PFOS). *CNAS Undergraduate Research Day*. April 30, 2021.
18. Glover, J., Clubb, P., Corbell, L., Coulliette, A., Dumstorff, C., Rydland, M., Smith, C., Takahashi, T., Wagner, D.C., Rico, C.M. Short exposure study of wheat to perfluorooctanesulfonic acid (PFOS): A laboratory-based undergraduate research experience*. CNAS Undergraduate Research Day*. April 30, 2021.

19. Kohn, E., Wagner, D.C., Dobbs, Z., Sayers, I., Glover, J., Rico, C.M. Growth and chlorophyll content of wheat (*Triticum aestivum*) exposed to perfluorooctanesulfonic acid (PFOS) in hydroponic solution. *CNAS Undergraduate Research Day*. April 30, 2021.
20. Wagner, D., Lottes, B., Abolade, M.O., Rico, C.M. Changes in metabolites and fatty acids in wheat generationally exposed to cerium oxide nanoparticles (CeO_2-NPs). *10th Annual CNAS Undergraduate Research Day*. May 3, 2019.
21. Braun, S.; Rico, C.M. The interaction of per- and polyfluoroalkyl substances (PFAS) and cerium oxide nanoparticles with wheat (*Triticum aestivum* L.). *10th Annual CNAS Undergraduate Research Day*. May 3, 2019.
22. Sample, S.M.; Wagner, D.C.; Lottes, B.M.; Abolade, O.M.; Rico, C.M. Analysis of metals in the soil and water near recycling facilities and industry. *10th Annual CNAS Undergraduate Research Day*. May 3, 2019.
23. Lottes, B., Sample, S., Abolade, M.O., Rico, C.M. Analysis of heavy metals in soil using ICP-MS. *10th Annual CNAS Undergraduate Research Day*. May 3, 2019.
24. Jones, M., Abolade, O., Coates, K., Rico, C.M. Effect of nanoceria on total phosphorus and phytates in wheat. *9th Annual CNAS Undergraduate Research Day*. May 3, 2018.

FUNDING/GRANTS APPLICATION

FUNDED

1. NSF-MRI: Research Infrastructure: Acquisition of Liquid Chromatography – Mass Spectrometry System. PI – Richard Biagioni; Co-PIs: Paul Durham, Natasha DeVore, Cyren Rico, Laszlo Kovacs; Senior Personnel: Tuhina Banerjee, Gary Meints, Erich Steinle, Day Ligon, Keiichi Yoshimatsu. July 2022.
2. Summer Faculty Fellowship, Missouri State University, “Successive exposures of plants to cerium oxide nanoparticles (CeO_2-NPs) and perfluorooctanesulfonic acid (PFOS)”, June 2022 – December 2022.
3. Summer Faculty Fellowship, Pittsburg State University, “Associations between the quality of water and soil and the obesity of residents in tri-state mining district”, PI: Hyejoon Park, Co-PIs: Cyren Rico, Keeyoon Noh. February 2020 – December 2020.
4. Summer Faculty Fellowship, Missouri State University, “Competition between wheat and barley co-exposed to cerium oxide nanoparticles”, June 2019 – December 2019.
5. NSF-MRI, “Acquisition of Inductively Coupled Plasma Mass Spectrometry (ICP-MS) system to increase functionality for interdisciplinary research, applications, and research training”, PI: Cyren Rico; Co-PIs: Richard Biagioni, Erich Steinle, Keiichi Yoshimatsu; Gary Michelfelder, Melida Gutierrez; Melissa Remley, William McClain; La Toya Kissoon-Charles. August 2018 – August 2021.
6. Faculty Research Grant, Missouri State University, “Metabolite profiling of wheat exposed to cerium oxide nanoparticles”, January 2018 – December 2018.
7. Advanced Light Source, Lawrence Berkeley National Laboratory, “Understanding mechanism of differential uptake of cerium oxide nanoparticles in wheat and barley”, Fall 2016 – Fall 2018.

8. National Research Council, US Environmental Protection Agency, “Interactions of coated silver nanoparticles with mycorrhizal wheat”, January 2015 – July 2017.
9. Dodson Research Grant, “Mechanism of toxicity and macromolecular modifications of cerium oxide nanoparticles in cereals” August 2013 – December 2014.
10. Frank B. Cotton Trust Scholarship Awards, “Interaction between cerium oxide nanoparticles and cereals” January 2014 – December 2014.

STUDENT GRANT APPLICATION

1. Arsenic speciation and uptake in wheat exposed to nanozero valent iron oxide (nZVI). NSF Graduate Research Fellowships Program (GRFP). Preston Clubb, Cyren Rico. Submitted October 2022.
2. Carryover effects of successive exposures of plants exposed to perfluorooctanesulfonic acid as measured by metabolomic changes. Sigma Xi Grants in Aid of Research. Olamide Ogundele, Cyren Rico. Amount: $1,000. Submitted October 2022.
3. Metabolite changes in wheat exposed to sulfidated nanozero valent iron oxide (S-nZVI) and arsenic. Sigma Xi Grants in Aid of Research. Preston Clubb, Cyren Rico. Amount: $1,000. Submitted October 2022.
4. Grain metabolomics of barley (*Hordeum vulgare* L.) successively exposed to cerium oxide nanoparticles (CeO_2-NPs) and perfluorooctanesulfonic acid (PFOS). Sigma Xi Grants in Aid of Research. Naum Kirwa, Cyren Rico. March 2022. Amount: $1,000. Not Funded.

COMMITTEE INVOLVEMENT

1. **Chemistry & Biochemistry Department Personnel Evaluation Committee,** *Fall 2023 – present*
2. **Organic Chemistry Professor Search Committee,** *February 2023*
3. **Biochemistry Assistant Professor Search Committee,** *October 2020 – February 2021*
4. **Chemistry Department Head Search Committee,** *September 2019 – March 2020*
5. **CNAS Greenhouse Committee,** *March 2018 – present*
6. **Undergraduate Curriculum and Recruitment Committee,** *August 2019 – present*
7. **Summer Undergraduate Research Promotion,** *Summer 2019 – present*
8. **Sustainability Advisory Committee Academics Subcommittee,** *August 2017 – May 2019*
9. **Bull Shoals Field Station Committee,** *Fall 2017 – present*

THESIS/PROGRAM COMMITTEE INVOLVEMENT

1. **Kristos Baffour,** MS Chemistry, *Fall 2022 – present*, Adviser: Tuhina Banerjee
2. **Alexander Babel,** MS Chemistry, *Fall 2022 – present*, Adviser: Keiichi Yoshimatsu
3. **Madalyn Bass,** BS Environmental Sustainability Management (Individualized Major), *Spring 2022 – present*, Adviser: Alexander Wait
4. **Lauren Sayler**, MS Chemistry 2023, Adviser: Fei Wang
5. **Sarah Adeoye**, MS Chemistry 2023, Adviser: Matthew Siebert
6. **Elson Eguaosa,** MS Chemistry 2023, Adviser: Matthew Siebert

7. **Brenda Wekesa**, MS Chemistry 2021, Adviser: Natasha Devore
8. **Tyler Odom,** MS Chemistry 2021, Adviser: Keiichi Yoshimatsu
9. **Adam Shoemaker,** MS Biology 2020, Adviser: Alexander Wait
10. **Adjoa Adams,** MS Chemistry 2020, Adviser: Keiichi Yoshimatsu
11. **Jacob Blankenship,** MS Chemistry 2018, Adviser: Keiichi Yoshimatsu

STUDENT ADVISING

1. **Preston Clubb,** BS Chemistry 2022, Major: Environmental Chemistry (2020-2022)
2. **Ian Sayers,** BS Chemistry 2021, Major: Environmental Chemistry (2019-2021)

SERVICE TO THE PROFESSION/COMMUNITY

EDITORIAL BOARD MEMBER, Plant Nano Biology, Elsevier Journal, *February 2022 – present*

ACS SCIENCE COACH, Kameron Coates, Willard High School, American Chemical Society/American Association of Chemistry Teachers Science Coaches Program, September 2022 – September 2024

EVENT COORDINATOR, State Science Olympiad Environmental Chemistry Division C, Missouri State University, *April 2022, 2023*

EVENT COORDINATOR, Science Olympiad Environmental Chemistry Division C, Missouri State University, *February 2023*

POSTER JUDGE, Sustainable Nanotechnology Organization Poster Competition, *November 2020*

MENTORING HIGH SCHOOL TEACHER/STUDENT

1. **Andrew Cooper,** Willard High School Student, Lab Intern, *October 2022 – May 2023*
2. **Victoria Stevens,** Willard High School Student, Lab Intern, *October 2022 – May 2023*
3. **Elim Horn,** Willard High School Student, Lab Intern, *December 2021 – May 2023*
4. **Kameron Coates,** Willard High School Science Teacher, Lab Volunteer, *Summer 2021*

REVIEWER FOR FUNDING AGENCIES

1. National Academy of Science, Engineering and Medicine, US-Egypt Fund, 2023
2. BARD – Binational Agricultural Research and Development Fund US-Israel, 2022
3. Swiss National Science Foundation (SNF), 2022
4. UK Research and Innovation (UKRI) Biotechnology and Biological Sciences Research Council (BBSRC), 2021
5. NSF-MRI Mass Spectrometry Onsite Panel, 2020
6. NSF-MRI Ad-Hoc Reviewer 2019

REVIEWER

1. Book Proposal, “Nanoparticles: Sources and toxicity in plants” Elsevier Publishing
2. Master of Science Thesis, “Interactions of engineered nanoparticles with economically important food crops”, Nazanin Nikoo Jamal, University of Southern Australia (2018)

WEBINAR RESOURCE SPEAKER

1. Network of CALABARZON Educational Institutions, Inc., Philippines, “Thriving in Uncertainty and Overcoming Adversity in the Academe” March 19, 2021
2. Batangas State University, Philippines, “Writing Research and Literature Review Papers” July 30, 2020

HIGH SCHOOL RECRUITMENT

1. Glendale High School (Invited by Nicole Hardison) with participation of research member Preston Clubb, March 22, 2023
2. Willard High School (Invited by Mr. Kameron Coates) with participation of research group: Naum Kirwa, Olamide Ogundele, Preston Clubb, Maximo Reyes, Elim Horn, August 30 & September 6, 2022

REVIEWER FOR REFEREED JOURNALS

1. ACS Nano
2. Acta Physiologiae Plantarum
3. Chemical Speciation & Bioavailability
4. Chemosphere
5. Current Opinion in Environmental Science and Health
6. Ecotoxicology and Environmental Safety
7. Environmental Pollutants & Bioavailability
8. Environmental Pollution
9. Environmental Science & Technology
10. Environmental Science & Technology Letters
11. Environmental Science and Pollution Research
12. Environmental Science: Nano
13. Food Analytical Methods
14. Frontiers in Plant Science
15. Food Chemistry
16. Frontiers in Plant Science
17. Functional Plant Biology
18. Industrial Biotechnology
19. Journal of Agricultural and Food Chemistry
20. Journal of Hazardous Materials
21. Journal of Nanoparticle Research
22. Journal of Plant Nutrition and Soil Science
23. NanoImpact
24. Nature Scientific Reports
25. Plant Nano Biology
26. Plant Physiology and Biochemistry
27. RSC Advances
28. Science of the Total Environment
29. Soils
30. Sustainability

OTHERS (BEFORE MSU)

1. Reviewer for US EPA Western Ecology Division Technical Manuscript Review
2. Reviewer for International Conference on Innovations in Engineering, Science and Technology, Batangas State University, Philippines

PUBLICATIONS BEFORE COMING TO MSU

REFEREED JOURNALS

1. Rico, C.M.; Johnson, M.G.; Marcus, M.; Andersen, C.P. Intergenerational responses of wheat (*Triticum aestivum* L.) to cerium oxide nanoparticles exposure. *Environmental Science: Nano* 2017, 4, 700-711.
2. Barrios, A.C.; Rico, C.M.; Trujillo-Reyes, J.; Medina-Velo I.A.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Effects of uncoated and citric acid coated cerium oxide nanoparticles, bulk cerium oxide, cerium acetate, and citric acid on tomato plants. Science *of The Total Environment* 2015, *563-564*, 956-964.
3. Hong, J.; Wang, L.; Sun, Y.; Zhao, L.; Niu, G.; Tan, W.J.; Rico, C.M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Foliar applied nanoscale and microscale CeO_2 and CuO alter cucumber (*Cucumis sativus*) fruit quality. Science *of The Total Environment* 2015, *563-564*, 904-911.
4. Bandyopadhyay, S.; Mukherjee, A.; Rico, C.M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Differential effects of CeO_2 and ZnO nanoparticles on chlorophyll and secondary metabolites in alfalfa (*Medicago sativa*). *Science and Technology Journal* 2015, 2.
5. Rico, C.M.; Barrios, A.C.; Tan, W.J.; Rubenecia, R.; Lee, S.C.; Varela-Ramirez, A.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Physiological and biochemical response of soil-grown barley (*Hordeum vulgare* L.) to cerium oxide nanoparticles. *Environmental Science and Pollution Research,* 2015, *22*, 10551-10558.
6. Bandyopadhyay, S.; Plascencia-Villa, G.; Mukherjee, A.; Rico, C.M.; Jose-Yacaman, M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Comparative phytotoxicity of ZnO NPs, bulk ZnO, and ionic zinc onto the alfalfa plants symbiotically associated with *Sinorhizobium meliloti* in soil. *Science of The Total Environment* 2015, *515-516*, 60-69.
7. Rico, C.M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Differential effects of cerium oxide nanoparticles on rice, wheat and barley roots: An infrared microspectroscopy (FTIR-IMS) study. *Applied Spectroscopy* 2015, *69*, 287-295.
8. Hong, J.; Rico, C.M.; Zhao, L.; Adeleye, A.S.; Keller, A.A.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Toxic effects of copper-based nanoparticles or compounds to lettuce (*Lactuca sativa*) and alfalfa (*Medicago sativa*). *Environmental Science: Processes & Impacts* 2015, *17*, 177-185.
9. Holden, P.A.; Klaessig, F.; Gardea-Torresdey, J.L.; Turco, R.F.; Priester, J.H.; Rico, C.M.; Avila-Arias, H.; Pacpaco, K. A critical evaluation of exposure concentrations used in assessing manufactured nanomaterial environmental hazards. *Environmental Science & Technology* 2014, *48*, 10541-10551.
10. Hong, J.; Peralta-Videa, J.R.; Rico, C.M.; Sahi, S.; Viveros, M.N.; Bartonjo, J.; Zhao, J.; Gardea-Torresdey, J.L. Evidence of translocation and physiological impacts of foliar applied CeO_2 nanoparticles on cucumber (*Cucumis sativus*) plants. *Environmental Science & Technology* 2014, *48*, 4376-4385.
11. Zhao, L.; Peralta-Videa, J.R.; Rico, C.M.; Hernandez-Viezcas, J.A.; Sun, Y.; Niu, G.; Servin, A.; Nunez, J.; Duarte-Gardea, M.; Gardea-Torresdey, J.L. CeO_2 and ZnO nanoparticles change the nutritional qualities of cucumber (*Cucumis sativus*). *Journal of Agricultural and Food Chemistry* 2014, *62*, 2752-2759.

12. Gardea-Torresdey, J.L.; Rico, C.M.; White, J.C. Trophic transfer, transformation, and impact of engineered nanomaterials in terrestrial environments. *Environmental Science & Technology* 2014, *48*, 2526-2540.
13. Mukherjee, A.; Peralta-Videa, J.R.; Bandyopadhyay, S.; Rico, C.M.; Zhao, L.; Gardea-Torresdey, J.L. Physiological effects of nanoparticulate ZnO in green peas (*Pisum sativum* L.) cultivated in soil. *Metallomics* 2014, *6*, 132-138.
14. Rico, C.M.; Lee, S.C.; Rubenecia, R.; Mukherjee, A.; Hong, J.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Cerium oxide nanoparticles modify yield and affect the nutritional content of wheat (*Triticum aestivum* L.). *Journal of Agricultural and Food Chemistry* 2014, *62*, 9669-9675.
15. Rico, C.M.; Morales, M.I.; McCreary, R.; Castillo-Michel, H.; Barrios, A.C.; Hong, J.; Tafoya, A.; Lee, W.Y.; Varela-Ramirez, A.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Cerium oxide nanoparticles modify the antioxidative stress enzyme activities and macromolecule composition in rice seedlings. *Environmental Science & Technology* 2013, *47*, 14110-14118.
16. Rico, C.M.; Morales, M.I.; Barrios, A.C.; McCreary, R.; Hong, J.; Lee, W.Y.; Nunez, J.E.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Effect of cerium oxide nanoparticle on the quality of rice (*Oryza sativa* L.) grains. *Journal of Agricultural and Food Chemistry* 2013, *61*, 11278-11285.
17. Rico, C.M.; Hong, J.; Morales, M.I.; Zhao, L.; Barrios, A.C.; Zhang, J.Y.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Effect of cerium oxide nanoparticles on rice: A study involving the antioxidant defense system and in vivo fluorescence imaging. *Environmental Science & Technology* 2013, *47*, 5635-5642.
18. Morales, M.I.; Rico, C.M.; Hernandez-Viezcas, J.A.; Nunez, J.E.; Barrios, A.C.; Tafoya, A.; Flores-Marges, J.P.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Toxicity assessment of cerium oxide nanoparticles in cilantro (*Coriandrum sativum* L.) plants grown in organic soil. *Journal of Agricultural and Food Chemistry* 2013, *61*, 6224-6230.
19. Hernandez-Viezcas, J.A.; Castillo-Michel, H.; Andrews, J.C.; Cotte, M.; Rico, C.M.; Peralta-Videa J.R.; Ge, Y.; Priester, J.H.; Holden, P.A.; Gardea-Torresdey, J.L. *In situ* synchrotron x-ray fluorescence mapping and speciation of CeO_2 and ZnO nanoparticles in soil cultivated soybean (*Glycine max*). *ACS Nano* 2013, *7*, 1415-1423.
20. Majumdar, S.; Peralta-Videa J.R.; Castillo-Michel H.; Hong J.; Rico, C.M.; Gardea-Torresdey, J.L. Applications of synchrotron μ-xrf to study the distribution of biologically important elements in different environmental matrices: a review. *Analytica Chimica Acta* 2012, *755*, 1-16.
21. Zhao, L.; Peng, B.; Hernandez-Viezcas, J.A.; Rico, C.M.; Sun, Y.; Peralta-Videa J.R.; Tang, X.; Niu, G.; Jin, L.; Varela-Ramirez, A.; Zhang, J.Y.; Gardea-Torresdey, J.L. Stress response and tolerance of *Zea mays* to CeO_2 nanoparticles: cross talk among H_2O_2, heat shock protein, and lipid peroxidation. *ACS Nano* 2012, *6*, 9615-9622.
22. Rico, C.M.; Majumdar, S.; Duarte-Gardea, M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Interaction of nanoparticles with edible plants and their possible implications in the food chain. *Journal of Agricultural and Food Chemistry* 2011, *59*, 3485-3498.

23. Kang, M.Y.; Heo, K.H.; Kim, J.H.; Cho, S.S.; Rico, C.M.; Lee, S.C. Effects of carbonized rice hull and wood charcoal mixed with pyroligneous acid on the yield, and antioxidant and nutritional quality of rice. *Turkish Journal of Agriculture and Forestry* 2010, *36*, 45-53.
24. Son, T.K.; Kim, J.H.; Rico, C.M.; Lee, S.C.; Chung, I.K. Effects of self-incompatibility control substance and blossom thinner on fruit set and quality of apple (*Malus domestica*). *Turkish Journal of Agriculture and Forestry* 2010, *34*, 207-212.
25. Souvandouane, S.; Esguerra, M.; Heo, K.H.; Rico, C.M.; Lee, S.C. Effects of planting dates and mulch types on the growth, yield and chemical properties of waxy corn crosses sonjajang×KNU-7 and Asan×KNU-7. *Korean Journal of Crop Science* 2010, *55*, 91-97.
26. Ahn, D.J.; Won, J.G.; Rico, C.M.; Lee, S.C. Influence of variety, location, growing year, and storage on the total phosphorus, phytate-phosphorus, and phytate-phosphorus to total phosphorus ratio in rice. *Journal of Agricultural and Food Chemistry* 2010, *58*, 3008-3011.
27. Son, T.K.; Kim, J.H.; Rico, C.M.; Lee, S.C.; Chung, I.K. Effects of self-incompatibility control substance on self-pollination, fruit set, fruit weight, and number of seeds in pear. *Horticulture, Environment and Biotechnology* 2009, *50*, 492-496.
28. Esguerra, M.; Heo, K.H.; Cho, S.S.; Rico, C.M.; Son, T.K.; Lee, S.C. Effects of mixture treatment of wood vinegar and bentazone+cyhalofop-butyl on barnyard grass (*Echinochloa crus-galli* var. *crus-galli*). *Korean Journal of Weed Science* 2009, *29*, 112-120.
29. Kang, M.Y.; Kim, J.H.; Heo, K.H.; Cho, S.S.; Esguerra, M.; Rico, C.M.; Son, T.K.; Lee, S.C. Effects of combined application of rice bran and chemical fertilizer on the phytochemical contents of rice. *Korean Journal of Crop Science* 2008, *53*, 65-71.
30. Mintah, L.O.; Rico, C.M.; Shin, D.I.; Chung, I.K.; Son, T.K.; Lee, S.C. Effects of biofertilizer rate and application time on growth characters and grain quality of rice. *Korean Journal of Crop Science* 2007, *52*, 403-410.
31. Eun, J.H.; Rico, C.M.; Kim, M.K.; Souvandouane, S.; Son, T.K.; Shin, D.I.; Chung, I.K.; Lee, S.C. Yield performance and nutritional quality of 'Agakong' soybean harvested in drained-paddy and upland fields. *Korean Journal of Plant Resources* 2007, *20*, 258-262.
32. Rico, C.M., Mintah, L.O., Kim, M.K., Chung, I.K., Son, T.K., and Lee, S.C. Effects of mixtures of wood vinegar and sulfonylurea-based herbicides on the control of mixed weed flora and the yield of transplanted rice (*Oryza sativa* L.). *The Philippine Agricultural Scientist* 2007, *90*, 187-195.
33. Rico, C.M., Bhuiyan, M.K.I., Mintah, L.O., Shin, D.I., Chung, I.K., Son, T.K., and Lee, S.C. Effects of biofertilizer on the quality and antioxidant property of rice (*Oryza sativa* L.). *Korean Journal of Crop Science* 2007, *52*, 1-7.
34. Rico, C.M., Souvandouane, S., Mintah, L.O., Chung, I.K., Son, T.K., and Lee, S.C. 2007. Effects of mixed application of wood vinegar and herbicides on weed control, yield and quality of rice. *Korean Journal of Crop Science* 2007, *52*, 387-392.
35. Rico, C.M., Mintah, L.O., Kim, M.K., Chung, I.K., Son, T.K., and Lee, S.C. Effects of wood vinegar mixed with cyhalofop-butyl+bentazone or butachlor+chlomazone on

weed control of rice (*Oryza sativa* L.). *Korean Journal of Weed Science* 2007, *27*, 184-191.

36. Espino, T.M., Arevalo, R.E., Sapin, A.B., Tambalo, F.Z., Rico, C.M. 2002. Enzymatic extraction of essential oil from the leaves of patchouli (*Pogostemon cablin* (Blco.) Benth.). *The Philippine Agricultural Scientist* 2002, *85*, 286-294.

BOOK CHAPTER

1. Rico, C.M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Chemistry, biochemistry of nanoparticles, and their role in antioxidant defense system in plants. In *Nanotechnology and Plant Sciences – Nanoparticles and Their Impact on Plants*; Siddiqui, M. H., Al-Whaibi, M. H., Mohammad, F., Eds.; Springer 2015 DOI:10.1007/978/-3-319-14502-0_1

POPULAR SCIENCE MAGAZINES

1. Rico, C.M. Nanomaterial implications for agricultural productivity and food safety. *AZoNano*. July 6, 2015.

STANDARD OPERATING PROCEDURE

1. Rico, C.M. Assessing growth and productivity of plants exposed to nanomaterials. November 9, 2015. SOP EEB/CA/2015-01-r0. USEPA, National Health and Environmental Effects Research Laboratory, Western Ecology Division, Corvallis, Oregon.

TALKS & PRESENTATIONS BEFORE COMING TO MSU

INVITED TALKS

1. Rico, C.M., Johnson, M.G., Reichman, J.A.; Andersen, C.P. Systems-level approach to characterizing effects of ENMs in terrestrial organisms and ecosystems. 253rd American Chemical Society National Meeting and Exposition, San Francisco, California. April 5, 2017.
2. Rico, C.M. Isotopic changes in plants exposed to cerium oxide nanoparticles. Oregon State University Isotopics Class, US EPA Western Ecology Division, Corvallis, Oregon. March 1, 2017.
3. Rico, C.M. Plants exposure to engineered nanomaterials: Implications to agricultural productivity and food safety. US Environmental Protection Agency Western Ecology Division Science Seminar, Corvallis, Oregon. March 26, 2015.

ORAL PRESENTATIONS

1. Rico, C.M., Barrios, A.C., Hong, J., Morales, M.I., McCreary, R., Lee, W.Y., Peralta-Videa, J.R., Gardea-Torresdey, J.L. The interaction of CeO_2 nanoparticles with rice: impacts on productivity and nutritional value. *Society for Risk Analysis 2013 Annual Meeting*, Baltimore, Maryland. December 8-11, 2013.
2. Rico, C.M., Hong, J., Barrios, A.C., Morales, M.I., McCreary, R., Lee, W.Y., Peralta-Videa, J.R., Gardea-Torresdey, J.L. CeO_2 nanoparticles induce biochemical but not

phenotypical modifications in rice. *SETAC North America 34th Annual Meeting*, Nashville, Tennessee. November 17-21, 2013.

3. Rico, C.M., Barrios, A.C., Hong, J., Peralta-Videa, J.R., Gardea-Torresdey, J.L. Cerium oxide nanoparticles compromise the quality of rice (*Oryza sativa* L.) grains. *2nd Annual Conference of Sustainable Nanotechnology Organization*, Santa Barbara, California. November 3-5, 2013.
4. Hong, J., Rico, C.M., Zhao, L., Peralta-Videa, J.R., Gardea-Torresdey, J.L. Toxicity effects of seven Cu compounds/nanoparticles in lettuce (*Lactuca sativa*) and alfalfa (*Medicago sativa*). *2nd Annual Conference of Sustainable Nanotechnology Organization*, Santa Barbara, California. November 3-5, 2013.
5. Mukherjee, A., Bandyopadhyay, S., Rico, C.M., Peralta-Videa, J.R., Gardea-Torresdey, J.L. 2013. Effects of ZnO nanoparticles on green pea plants (*Pisum sativum* L.) cultivated in soil. *2nd Annual Conference of Sustainable Nanotechnology Organization*, Santa Barbara, California. November 3-5, 2013.
6. Rico, C.M., Morales, M.I., Barrios, A.C., Hong, J., McCreary, R., Lee, W.Y., Varela-Ramirez, A., Peralta-Videa, J.R., Gardea-Torresdey, J.L. The impact of CeO_2 nanoparticles in rice. *UTEP Chemistry Research Day*, El Paso, Texas. May 3-4, 2013.
7. Rico, C.M., Hong, J., Morales, M.I., Barrios, A.C., Peralta-Videa, J.R., Gardea-Torresdey, J.L. The impact of CeO_2 NPs on rice roots: the relationship between enzyme activity, membrane damage, and lipid content. *1st Sustainable Nanotechnology Organization Conference*, Arlington, Virginia. November 4-6, 2012.
8. Rico, C.M., Hong, J., Morales, M.I., Barrios, A.C., McCreary, R., Lee, W.Y., Varela-Ramirez, A., Peralta-Videa, J.R., Gardea-Torresdey, J.L. The impact of CeO_2 NPs on rice roots: the relationship between enzyme activity, membrane damage, and macromolecule contents. *Graduate Research Expo*, The University of Texas at El Paso. November 9, 2012.
9. Morales, M.I., Barrios, A.C., Rico, C.M., Peralta-Videa, J.R. 2012. Impact of cerium oxide nanoparticles on cilantro (*Coriandum sativum*). *SETAC North America 33rd Annual Meeting*, Long Beach, California. November 11-15, 2012.
10. Rico, C.M., Mintah, L.O., Kim, M.K., Chung, I.K., Son, T.K., and Lee. S.C. Effect of wood vinegar and sulfonylurea-based herbicides on the growth and protein formation of barnyard grass (*Echinochloa crus-galli* var. crus-galli). *21st Asia-Pacific Weed Science Conference*, Colombo, Sri Lanka. October 2-6, 2007.
11. Rico, C.M. Review of water pollution of Marinduque. *Marinduque Agencies In-House Review, Southern Tagalog Agriculture and Resources Research and Development Consortium, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development.* Marinduque State College, Philippines. February 27, 2004.
12. Rico, C.M. The cultural and historical significance of bathala cave. *2nd Marinduque Agencies In-House Review, Southern Tagalog Agriculture and Resources Research and Development Consortium, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development.* Marinduque State College, Philippines. February 27, 2004. (Recipient of the First Best Paper in Information for Dissemination Category Award)

13. Rico, C.M. Bathala cave ecosystem: Conservation and management. *2nd Marinduque Agencies In-House Review, Southern Tagalog Agriculture and Resources Research and Development Consortium, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development.* Marinduque State College, Philippines. February 27, 2004.
14. Espino, T.M. and Rico, C.M. Application of fungal pectinase on the extraction of essential oils from patchouli (*Pogostemon cablin*). *29th Annual Convention of the Philippine Society for Microbiology*. Ilocos Norte, Philippines. June 2000.

SELECT POSTER PRESENTATIONS

1. Rico, C.M.; Andersen, C.P. Intergenerational studies on the effects of cerium oxide nanoparticles in wheat. *11th International Conference on Environmental Effects of Nanoparticles and Nanomaterials*, Golden, Colorado. August 14-18, 2016
2. Barrios, A.C.; Rico, C.M.; Medina-Velo, I.A.; Peralta-Videa J.R., Gardea-Torresdey J.L. Impact of uncoated and citric acid coated cerium oxide nanoparticles on tomato plants. *4th Sustainable Nanotechnology Organization Conference*, Portland, Oregon. November 8-10, 2015
3. Rico, C.M., Barrios, A.C., Tan, W., Peralta-Videa J.R., Gardea-Torresdey J.L. Wheat and barley exposure to nanoceria: Implications to agricultural productivity. *Gordon Research Conference*, Mount Dover, Vermont. June 21-26, 2015.
4. Barrios, A.C.; Rico, C.M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Comparison of citric acid coated and uncoated nanoceria and their impact on tomato (*Solanum lycopersicum* L.) plants grown in organic soil. *Gordon Research Conference*, Mount Dover, Vermont. June 21-26, 2015.
5. Barrios A.C., Rico C.M., Peralta-Videa J.R., Gardea-Torresdey J.L. Comparison of the toxicity of uncoated and coated cerium oxide nanoparticles on tomato (*Solanum lycopersicum* L.). *3rd Sustainable Nanotechnology Organization Conference*, Boston, Massachusetts. November 2-4, 2014.
6. Barrios A.C., Rico C.M., Peralta-Videa J.R., Gardea-Torresdey J.L. Toxicity assessment of cerium oxide nanoparticles on tomato (*Solanum lycopersicum* L.). *Center for Education and Training in Agricultural and Related Sciences-Symposium*, San German, Puerto Rico. August 11-13, 2014.
7. Rico, C.M., Morales, M.I., Barrios, A.C., McCreary, R., Hong, J., Peralta-Videa, J.R., Gardea-Torresdey, J.L. 2013. Physiological impacts of cerium oxide nanoparticles in rice plants. *UC-CEIN EH&S Forum*, Los Angeles, California. May 8-9, 2013.
8. Hong, J., Peralta-Videa, J.R., Rico, C.M., Sahi, S., Zappala, M.N., Zhao, L., Gardea-Torresdey, J.L. Evidence of translocation and physiological impacts of foliar applied CeO_2 nanoparticles on cucumber (*Cucumis sativus*) plants. *246th American Chemical Society National Meeting & Exposition*, Indianapolis, Indiana. September 8-12, 2013.
9. Hernandez-Viezcas, J.A.; Castillo-Michel, H.; Andrews, J.C.; Cotte, M.; Rico, C.M.; Peralta-Videa J.R.; Ge, Y.; Priester, J.H.; Holden, P.A.; Gardea-Torresdey, J.L. In situ synchrotron x-ray fluorescence mapping and speciation of CeO_2 and ZnO nanoparticles in soil cultivated soybean (*Glycine max*). *UC-CEIN EH&S Forum*, Los Angeles, California. May 8-9, 2013.

10. Bandyopadhyay, S., Mukherjee, A., Peralta-Videa, J.R., Plascencia-Villa, G., Rico, C.M., Jose-Yacaman, M., Gardea-Torresdey, J.L. 2013. Eco-toxicological effects of ZnO nanoparticles onto the plant (*Medicago sativa*)-bacterium (*Sinorhyzobium meliloti*) association: An essential symbiotic association towards nitrogen fixation. *UC-CEIN EH&S Forum*, Los Angeles, California. May 8-9, 2013.
11. Rico, C.M., Morales, M.I., Hong, J., Barrios, A.C., Peralta-Videa, J.R., Gardea-Torresdey, J.L. CeO_2 nanoparticles enhance lipid peroxidation in the shoot of germinating rice seeds. *SETAC North America 33rd Annual Meeting*, Long Beach, California. November 11-15, 2012.
12. Morales, M.I., Barrios, A.C., Rico, C.M., Peralta-Videa, J.R., Gardea-Torresdey, J.L. Impact of Cerium Oxide Nanoparticles on Cilantro (*Coriandrum sativum*). *Center for Education and Training in Agricultural and Related Sciences Symposium*, University of Puerto Rico Mayagüez. August 2012.
13. Rico, C.M., Son, T.K., Chung, I.K. Effects of self-incompatibility control substance on fruit set rate and quality of apple. *5th International Crop Science & Exhibition*, Jeju Island, Korea. April 13-18, 2008.

SELECT MEDIA COVERAGE

1. **ACS PRESSPAC** "*Safety of nanoparticles in food crops is still unclear*"
2. **ACS PRESSPAC** "*Widely used nanoparticles enter soybean plants from farm soil*"
3. **ACS PODCAST** "*Questions about the safety of nanoparticles in food crops*"
4. **CBS NEWS** "*Safe enough to eat?*"
5. **SCIENCEDAILY** "*Safety of nanoparticles in food crops is still unclear*"
6. **CNET MAGAZINE** "*Scientists declare knowledge gap in nanoagriculture*"
7. **NEW HAVEN INDEPENDENT** "*Nano & the food chain: Another puzzle*"
8. **NANOWERK** "*Safety of nanoparticles in food crops is still unclear*"
9. **AZONANO** "*Soybean plants may be adversely affected by nanoparticles*"
10. **ESRL HIGHLIGHTS** "*X-Ray reveal uptake of nanoparticles by soya bean crops*"
11. **LIGHTSOURCES.ORG** "*X-rays reveal uptake of nanoparticles by soya bean crops*"
12. **UC-CEIN RESEARCHER SPOTLIGHT** "*Nanoparticle interactions with plants*"
13. **SNO Report** *"Where are they now? Student award winners Q&A"*
14. **US EPA This Week @ WED** *"Spotlight on Research"*

OUTSTANDING PUBLICATIONS

1. ***Chosen as best paper from 40+ peer-reviewed journals of the American Chemical Society, featured in ACS PressPac and cited in over a hundred newspapers, magazines and websites/blogs***
    - **Rico, C.M.**; Majumdar, S.; Duarte-Gardea, M.; Peralta-Videa, J.R.; Gardea-Torresdey, J.L. Interaction of nanoparticles with edible plants and their possible implications in the food chain. *Journal of Agricultural and Food Chemistry* **2011**, *59*, 3485-3498.

2. ***Chosen as best paper from 40+ peer-reviewed journals of the American Chemical Society, and featured in ACS PressPac, Stanford Synchrotron Radiation Lightsource, and European Synchrotron Radiation Facility***
    - Hernandez-Viezcas, J.A.; Castillo-Michel, H.; Andrews, J.C.; Cotte, M.; **Rico, C.M.**; Peralta-Videa J.R.; Ge, Y.; Priester, J.H.; Holden, P.A.; Gardea-Torresdey, J.L. *In situ* synchrotron x-ray fluorescence mapping and speciation of CeO_2 and ZnO nanoparticles in soil cultivated soybean (*Glycine max*). *ACS Nano* **2013**, *7*, 1415-1423.
3. ***Featured as journal cover***
    - Majumdar, S.; Peralta-Videa J.R.; Castillo-Michel H.; Hong J.; **Rico, C.M.**; Gardea-Torresdey, J.L. Applications of synchrotron μ-xrf to study the distribution of biologically important elements in different environmental matrices: a review. *Analytica Chimica Acta* **2012**, *755*, 1-16.
4. ***Republic of the Philippines Department of Agriculture Secretary's Award for Research and Development Paper***
    - Espino, T.M., Arevalo, R.E., Sapin, A.B., Tambalo, F.Z., **Rico, C.M.** 2002. Enzymatic extraction of essential oil from the leaves of patchouli (*Pogostemon cablin* (Blco.) Benth.). *The Philippine Agricultural Scientist* **2002**, *85*, 286-294.