Mario A. **Sandoval-Molina**

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Education

Cornell University-EEB Department
NY, USA

PhD Student. *2022- Present*

- Thesis: Ecology and evolution of plant defenses in the Mimosoid clade: thigmonasty, physical and chemical defenses.
- Committee: André Kessler

Instituto de Ecología (INECOL)-Departamento de Ecología Funcional
Veracruz, México

Master of Science in Ecology. GPA: 9.27/10 *2019*

- Thesis: Interaction between ants, herbivore insects and extrafloral nectaries in *Opuntia robusta*: a test of the defensive function.
- Committee: MK, Janczur, JG, García-Franco, C, Diaz-Castelazo, and Rodolfo Dirzo.

Universidad Autónoma del Estado de México (UAEM)
Estado de México, México

Bachelor of Science Degree in Biology. GPA: 8.20/10 *2014*

- Thesis: Morphology and anatomy of extrafloral nectaries of *Opuntia robusta*.
- Committee: MK, Janczur, and H, Zavaleta-Mancera.

Research Experience

Principal Researcher

The Distraction Function of Extrafloral Nectaries: Keeping Ants Away From Flowers and Preventing Disruption of Pollination in *Ferocactus recurvus* *Puebla, Mexico. 2017 - 2018*

- Tested the Distraction Hypothesis in the field by conducting an ant-exclusion experiment in *F. recurvus* plants in Tehuacán-Cuicatlán Valley, México.
- Funded by the Cactus and Succulents Society of America.

Morphology, ultrastructure and function of extrafloral nectaries *Puebla, Mexico. 2017 - 2018*

- Analyzed the morphological and ultrastructural characteristics of extrafloral nectaries from two cactus species in Tehuacán-Cuicatlán Valley, México. Examined their function in association with ants and pollinators in the field.
- Funded by the Cactus and Succulents Society of America.

Defense against herbivores in *Myriocarpa longipes* (Urticaceae)" *Veracruz, Mexico. 2019 - 2020*

- Principal Investigator: Dr.Mariusz Janczur
- Conducted field work related to analyzing the effect of ants and domatia position on herbivore damage of *Myriocarpa longipes*.

Morphological and anatomical description of extrafloral nectaries of *Opuntia robusta* *COLPOS, Mexico. 2015*

- Conducted laboratory work using different microscopical techniques, such as TEM, SEM, and light. This was part of a research internship at Colegio de Postgraduados.

Collaborator

Evolution of defense against herbivores in plants: an optimal model allocation and field study *Hidalgo, Mexico. 2012 - Present*

- Principal Investigator: Dr.Mariusz Janczur
- Conducted field work related to collect tissues for secondary metabolite analysis, arbuscular mycorrhizal fungi, measuring plant defensive traits and seed set of *Opuntia robusta* plants.

Volunteer Research Assistant

Optimal Defense Theory in *Mimosa pudica* *Cornell University. Apr 2021 - Dec 2021*

- Collaborators: Dr. André Kessler
- Greenhouse work analyzing leaf movement, and response to herbivory.

Plant-pollinator interaction networks *Cornell University. Apr 2021 - Sept 2021*

- Collaborators: MSc. Zaidee Powers
- Collected and identified insect pollinators in the botanic garden and natural areas. Performed plant-pollinator interaction network analysis.

Publications

Peer-Reviewed publications:

1. **Sandoval-Molina, M. A.**, Gracía-Franco, J. G., Díaz-Castelazo, C. and Janczur M. K. (2023) Plant sex change the outcome of ant-plant interactions in a facultative myrmecophytic cactus. *Functional Ecology*, 00, 1– 13. DOI: https://doi.org/10.1111/1365-2435.14267
2. **Sandoval-Molina, M. A.**, Lugo-García, B. R., Mendoza-Mendoza, A. D., and Janczur M. K. (2021). Females restrict the position of domatia and suffer more herbivory than hermaphrodites in *Myriocarpa longipes*, a Neotropical myrmecophyte. *Journal of Tropical Ecology.* DOI: http://dx.doi.org/10.1017/S0266467421000584
3. Janczur, M. K., González-Camarena, E., Leon-Solano H.J, **Sandoval-Molina, M. A.**, Bartosz J. (2021). Impact of the female and hermaphrodite forms of *Opuntia robusta* on the plant defence hypothesis. *Scientific Reports 11, 12063*. DOI: https://doi.org/10.1038/s41598-021-91524-5

4. **Sandoval-Molina, M. A.**, Flórez-Gómez, N. A., Reyes-Tovar, J. M., Pérez-Botello, A. M., Hinojosa-Díaz, I. A., Ayala, R. (2020). Effects of floral display and abiotic environment on the foraging activity of bees on *Kallstroemia pubescens* (Zygophyllaceae). *Ethology Ecology Evolution* 32(6), 551-571. DOI: https://doi.org/10.1080/03949370.2020.1755371

5. **Sandoval-Molina, M. A.**, Zavaleta-Mancera, H. A., León-Solano, H., Solache-Ramos, L., Jenner, B., Morales-Rodríguez, S., Patrón-Soberano, A. and Janczur M. (2018). First description of extrafloral nectaries in *Opuntia robusta* (Cactaceae): anatomy and ultrastructure. *PLOS ONE 13(7)*. DOI: https://doi.org/10.1371/journal.pone.0200422

Non-peer-reviewed publications:

1. **Sandoval-Molina, M. A.**, Gónzales-Camarena, E., Rosas-Sánchez J., Janczur M. K. The Distraction Function of Extrafloral Nectaries: Keeping Ants Away From Flowers and Preventing Disruption of Pollination in *Ferocactus recurvus*. *EcoEvoRxiv preprint*. https://doi.org/10.32942/X27W3W
2. **Sandoval-Molina, M. A.**, Morales-Rodríguez, S., Janczur, M. K. (2023). Morphological and anatomical characterization of extrafloral nectaries of Opuntia streptacantha and Ferocactus recurvus (Cactaceae). *EcoEvoRxiv preprint*. URL: https://doi.org/10.32942/X2PW2J
3. **Sandoval-Molina, M. A. (2021).** tlamatini: Funciones utiles para biologxs y ecologxs confundidos con los modelos lineales. R package version 0.1. URL: https://zenodo.org/doi/10.5281/zenodo.7765346

4. León-Solano,H.J., Janczur,M.K., González-Camarena, E., Czarnoleski, M., Jenner, B., **Sandoval-Molina, M. A. (2021).** Resource Allocation Among Cladodes of *Opuntia robusta* From East-central Mexico, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-161086/v1]

Peer-Reviewed publications in process:

1. **Sandoval-Molina, M. A.**, Gónzales-Camarena, E., Rosas-Sánchez J., Janczur M. K. The Distraction Function of Extrafloral Nectaries: Keeping Ants Away From Flowers and Preventing Disruption of Pollination in *Ferocactus recurvus*. *Arthropod-plant interactions* [Manuscript submitted]

2. Macotela, L., **Sandoval-Molina, M. A.**, Venebra-Muñoz, A., Anaya, M., González-Morales, J.C., Daniel E. Naya and Manjarrez, J. Histomorphological changes due to altitude in a high-altitude lizard (Sceloporus grammicus) from three mountain systems? J Therm Biol [Manuscript submitted]
3. Bata-Benitez, R, Nowakowski, J, Rosas-Sánchez, JJ, Lugo-García, BR, Fernández-Villavicencio, MJ, **Sandoval-Molina, M. A.**, Janczur, M. K. Disturbance of a deciduous tropical forest increases the competition between migratory and resident or endemic birds. *Ecological Engineering* [Manuscript in process]

Fellowships, awards, and grants

2024	**Grant: Cornell Atkinson Center for Sustainability (SBF)**, Amount: $7,264.00	*NY, USA*
2023	**Grant: Cornell Chapter of Sigma Xi**, Amount: $1,000.00	*NY, USA*
2023	**Grant: Andrew W. Mellon Student Research**, Amount: $1,000.00	*NY, USA*
2023	**Grant: EEB-Cornell University, Department Summer Research Support**, Amount: $1,000.00	*NY, USA*
2022	**Award: EEB Book Award**, EEB Cornell University Annual Graduate Student Symposium	*NY, USA*
2022	**Fellowship: Graduate Education- PhD**, Consejo Nacional de Ciencia y Tecnología (CONAHCYT)	*México*
2017	**Grant: Cactus and Succulents Society of America**, Amount: $2,616.21	*CA, USA*
2016	**Fellowship: Graduate Education**, Consejo Nacional de Ciencia y Tecnología (CONACYT)	*México*
2014	**Fellowship: Bachelor's Research**, Secretaría de Educación Pública and CONACYT	*México*

Conferences and symposiums

Speaker at 8 National Conferences and symposiums (in Mexico).
Speaker in 4 International Conferences and symposiums.

Outreach

Nine science communication publications in several Mexican newspapers. 2012-2016

One science communication publication in the magazine of Social Sciences entitled "The Ixion Wheel", Faculty of Humanities, Universidad Autónoma del Estado de México, 2012.

Professional societies and scientific associations

EcoEvoRxiv preprints. Editorial Committee.	*2023 - Present.*
The American Society of Naturalists. Student member.	*2024 - Present.*
Ecological Society of America. Student member.	*2024 - Present.*
Botanical Society of Mexico. Student member.	*2016 - Present.*
Mexican Scientific Society of Ecology. Student member.	*2017 - Present.*