

Curriculum Vitae

F. Omar Holguin
Assistant Professor
Department of Plant and Environmental Science
College of Agriculture, Consumer and Environmental Sciences
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Educational Background

Ph.D., Plant & Environmental Sciences, 2012 NMSU, Las Cruces, NM

Areas of Specialization: Mass Spectral Analysis Plant Metabolism

M.S., Agronomy, 2005 NMSU, Las Cruces, NM

Areas of Specialization: Natural Product Isolation

B.S., Environmental Science, 2002 NMSU, Las Cruces, NM

Areas of Specialization: Environmental Chemistry

Previous Professional Experience

Senior Research Associate (2010-2012) Center for Animal Health and Food Safety Chemical Analysis and Instrumentation Laboratory, NMSU, Las Cruces, NM

Laboratory Manager (2007-2010) Department of Plant and Environmental Sciences Metabolomics Laboratory, NMSU, Las Cruces, NM

Laboratory Director (2005-2007) Counter Terrorism Chemical Technologies Laboratory, Physical Science Laboratory, Las Cruces, NM

Research Chemist (2004-2005) Counter Terrorism Chemical Technologies Laboratory, Physical Science Laboratory, Las Cruces, NM

Graduate Research Assistant (2003-2004) Department of Agronomy and Horticulture, NMSU, Las Cruces, NM

Teaching Assistantship (2002-2003) Department of Agronomy and Horticulture, NMSU, Las Cruces, New Mexico

Undergraduate Research Assistant (1999-2002) Department of Agronomy and Horticulture, NMSU, Las Cruces, NM

Research products and creative achievements

Intellectual Property:

1. Deng, S., Reddy H., **Holguin, F.O.**, Schaub, T., "Extraction of Lipids from wet algae under subcritical water conditions" Serial No. 61/668,920 United States Provisional Patent
2. O'Connell, M. A., **Holguin, F. O.**, Richins, R. D., Posakony, J., Simon, J., "D. Innoxia Withanolides with Specific Anti-Cancer Activities," United States Regular Patent PCT/US11/29455.

In Review:

1. Lujan, P., Dungan, B., **Holguin, F.O.**, Sanogo, S. *, Puppala, N., Randall, J. The role of carbon sources in relation to pathogenicity of *Sclerotinia sclerotiorum* on Valencia peanut. *Canadian Journal of Plant Science*, Submitted August 2018
2. Seger, M., Unc, A. *, Starkenburg, S.R., **Holguin, F.O.**, Lammers, P.J. Nutrient-driven algal-bacterial dynamics in semi-continuous, pilot-scale photobioreactor cultivation of *Nannochloropsis salina* CCMP1776 with municipal wastewater nutrients. *Algal Research*, Submitted October 2018

Published:

1. Khan, N. A., Johnson, M. D., Kubicki, J. D., **Holguin, F. O.**, Dungan, B., & Carroll, K. C*. (2018). Cyclodextrin-enhanced 1, 4-dioxane treatment kinetics with TCE and 1, 1, 1-TCA using aqueous ozone. *Chemosphere*.
2. Gill, S., Willette, S., Dungan, B., Jarvis, J., Schaub, T., VanLeeuwen, D. St Hilaire, R., & **Holguin, F.** * (2018). Suboptimal Temperature Acclimation Affects Kennedy Pathway Gene Expression, Lipidome and Metabolite Profile of *Nannochloropsis salina* during PUFA Enriched TAG Synthesis. *Marine drugs*, 16(11), 425.
3. Brusseau, M. L. *, Yan, N., Van Glubt, S., Wang, Y., Chen, W., Lyu, Y., Dungan, B., & Carroll, K. C., & **Holguin, F. O.** (2019). Comprehensive retention model for PFAS transport in subsurface systems. *Water research*, 148, 41-50.
4. Bailey, S. J., Sapkota, R. R., Gollither, A. E., Dungan, B., Talipov, M., **Holguin, F. O.**, & Maio, W. A. * (2018). Lewis-Acid-Mediated Union of Epoxy-Carvone Diastereomers with Anisole Derivatives: Mechanistic Insight and Application to the Synthesis of Non-natural CBD Analogues. *Organic letters*, 20(15), 4618-4621.
5. Gonzales, K.K., Rodriguez, S.D., Chung, H., Kowalski, M., Vulcan, J., Moore, E.L., Li, Y., Willette, S., Voorhies, W., **Holguin, F.O.**, Hanley, K.A., Hansen, I.A.* The Effect of SkitoSnack, an Artificial Blood Meal Replacement, on *Aedes aegypti* Life History Traits and Gut Microbiota. *Scientific reports*, 8(1), 11023.
6. Willette, S., Gill, S.S., Dungan, B., Schaub, T.M., Jarvis, J.M., St. Hillaire, R., **Holguin, F.O.***(2018) Alterations in lipidome and metabolome profiles of *Nannochloropsis salina* in response to reduced culture temperature during sinusoidal temperature and light. *Algal Research*, 32, 79-92
7. Gasparovic, B.*, Penezic, A., Frika, S., Kazazic, S., Lampitt, R.S., **Holguin, F.O.**, Sudasinghe, N., Schaub,T. (2018) Particulate sulfur-containing lipids: Production of cycling from the epipelagic to the abyssopelagic zone. *Deep Sea Research Part 1: Oceanographic Research*, 134, 12-22
8. Nankar, A., **Holguin, F.O.**, Scott, M.P., Pratt, R.C.* (2017). Grain and Nutritional Quality Traits of Southwestern U.S. Blue Maize Landraces. *Cereal Chemistry*, 94, 950-955.
9. Gaire, S., O'Connell, M., **Holguin, F.O.**, Amatya, A., Bundy, S., Romero, A.* (2017). Insecticidal Properties of Essential Oils and Some of Their Constituents on the Turkestan Cockroach (Blattodea: Blattidae). *Journal of Economic Entomology*, 110, 584-592.
10. Dandamudi, K. P. R., Muppaneni, T., Sudasinghe, N., Schaub, T., **Holguin, F. O.**, Lammers, P. J., & Deng, S.* (2017). Co-liquefaction of mixed culture microalgal strains under sub-critical water conditions. *Bioresource Technology*.
11. Muppaneni, T., Reddy, H. K., Selvaratnam, T., Dandamudi, K. P. R., Dungan, B., Nirmalakhandan, N., Schaub, T., **Holguin, F. O.**, Lammers, P. J., & Deng, S.* (2017). Hydrothermal liquefaction of *Cyanidioschyzon merolae* and the influence of catalysts on products. *Bioresource Technology*, 223, 91-97.

12. Neofotis, P., Huang, A., Sury, K., Chang, W., Joseph, F., Gabr, A., Twary, S., Qiu, W., **Holguin, F. O.** & Polle, J. E.W.* (2016). Characterization and classification of highly productive microalgae strains discovered for biofuel and bioproduct generation. *Algal Research*, 15, 164-178.
13. Reddy, H. K., Muppaneni, T., Ponnusamy, S., Sudasinghe, N., Pegallapati, A., Selvaratnam, T., Seger, M., Dungan, B., Nirmalakhandan, N., Schaub, T., **Holguin, F. O.**, Lammers, P., Voorhies, W., Deng.* (2016). Temperature effect on hydrothermal liquefaction of *Nannochloropsis gaditana* and *Chlorella* sp. *Applied Energy*, 165, 943-951.
14. Nankar, A. N., Dungan, B., Paz, N., Sudasinghe, N., Schaub, T., **Holguin, F. O.**, & Pratt, R. C.* (2016). Quantitative and qualitative evaluation of kernel anthocyanins from southwestern United States Blue Corn. *Journal of the Science of Food and Agriculture*.
15. Khan, N. A., Engle, M., Dungan, B., **Holguin, F. O.**, Xu, P., & Carroll, K. C.* (2016). Volatile-organic molecular characterization of shale-oil produced water from the Permian Basin. *Chemosphere*, 148, 126-136.
16. Gargouri, M., Park, J.J., **Holguin, F. O.**, Kim, M.-J., Wang, H., Deshpande, R. R., Shachar-Hill, Y., Hicks, L. M., Gang, D. R.* (2015). Identification of regulatory network hubs that control lipid metabolism in *Chlamydomonas reinhardtii*. *Journal of Experimental Botany*, erv217.
17. Negi, S., Barry, A. N., Friedland, N., Sudasinghe, N., Subramanian, S., Pieris, S., **Holguin, F. O.**, Dungan, B., Schaub, T. M., Sayre, R.* (2015). Impact of nitrogen limitation on biomass, photosynthesis, and lipid accumulation in *Chlorella sorokiniana*. *Journal of Applied Phycology*, 1–10.
18. Selvaratnam, T., Reddy, H., Muppaneni, T., **Holguin, F. O.**, Nirmalakhandan, N., Lammers, P. J., Deng, S.* (2015). Optimizing energy yields from nutrient recycling using sequential hydrothermal liquefaction with *Galdieria sulphuraria*. *Algal Research*, 12, 74–79.
19. Juergens, M. T., Deshpande, R. R., Lucker, B. F., Park, J.-J., Wang, H., Gargouri, M., **Holguin, F. O.**, Disbrow, B., Schaub, T. M., Skepper, J. N., Kramer, D. M., Gang, D. R., Hicks, L. M., Shachar-Hill, Y.* (2015). The Regulation of Photosynthetic Structure and Function during Nitrogen Deprivation in *Chlamydomonas reinhardtii*. *Plant Physiology*, 167(2), 558-573.
20. Stamler, R. A., **Holguin, O.**, Dungan, B., Schaub, T., Sanogo, S., Goldberg, N., & Randall, J. J.* (2015). BABA and *Phytophthora nicotianae* Induce Resistance to *Phytophthora capsici* in Chile Pepper (*Capsicum annuum*). *PLoS one*, 10(5), e0128327.
21. Park, J. J., Wang, H., Gargouri, M., Deshpande, R. R., Skepper, J. N., **Holguin, F. O.**, Juergens, M. T., Shachar-Hill, Y., Hicks, L. M., Gang, D. R.* (2015). The response of *Chlamydomonas reinhardtii* to nitrogen deprivation: a systems biology analysis.. *The Plant Journal: for cell and molecular biology*, 81(4), 611-24.
22. Sitthithanaboon, W., Reddy, H. K., Muppaneni, T., Ponnusamy, S., Punsuvon, V., **Holguin, F.**, Dungan, B., Deng, S.* (2015). Single-step conversion of wet *Nannochloropsis gaditana* to biodiesel under subcritical methanol conditions. *Fuel*, 147, 253-259.
23. Reddy, H. K., Muppaneni, T., Sun, Y., Li, Y., Ponnusamy, S., Patil, P. D., **Holguin, F. O.**, Dungan, B., Cooke, P., Lammers, P., Voorhies, W., Deng, S.* (2014). Subcritical water extraction of lipids from wet algae for biodiesel production. *Fuel*, 133, 73-81.
24. Bartley, M. L., Boeing, W. J.* , Dungan, B. N., **Holguin, F. O.**, & Schaub, T. (2014). pH effects on growth and lipid accumulation of the biofuel microalgae *Nannochloropsis salina* and invading organisms. *Journal of Applied Phycology*, 26(3), 1431-1437.
25. Pegallapati, A. K., Nirmalakhandan, N.* , Dungan, B., **Holguin, F. O.**, & Schaub, T. (2014). Evaluation of internally illuminated photobioreactor for improving energy ratio. *Journal of bioscience and bioengineering*, 117(1), 92-98.
26. Bartley, M. L., Boeing, W. J.* , Corcoran, A. A., **Holguin, F. O.**, & Schaub, T. (2013). Effects of salinity on growth and lipid accumulation of biofuel microalga *Nannochloropsis salina* and invading organisms. *Biomass and Bioenergy*, 54, 83-88.
27. Patil, P. D., Reddy, H., Muppaneni, T., Schaub, T., **Holguin, F. O.**, Cooke, P., Lammers, P., Nirmalakhandan, N., Li, Y., Lu., Xiuyang Deng, S.* (2013). *In situ* ethyl ester production from wet algal biomass under microwave-mediated supercritical ethanol conditions. *Bioresource technology*, 139, 308-315.

28. **Holguin, F. O.**, & Schaub, T.* (2013). Characterization of microalgal lipid feedstock by direct-infusion FT-ICR mass spectrometry. *Algal Research*, 2(1), 43-50.
29. Li H, **Holguin O**, Wang J, Schaub T, Wang J, Hao C, Geng G, Creamer R*; (2012) Proteomic analysis of the endophytic fungus *Undifilum oxytropis*. *African Journal of Biotechnology*; 11(46); 10484-10493
30. Patil PD, Reddy H, Muppaneni T, Mannarswamy A, Schaub T, **Holguin FO**, Lammers P, Nirmalakhandan N, Cooke P, Deng S*; (2012) Power dissipation in microwave-enhanced in situ transesterification of algal biomass to biodiesel. *Green Chemistry*; 14: 809-817.
31. Vermillion K#, **Holguin FO#**, Berhow MA*, Richins RD, Redhouse T, O'Connell MA, Posakony J, Kelly SM, Simon J; (2010) Dinoxin B, a withanolide from *Datura innoxia* leaves with specific cytotoxic activities. *Journal of Natural Products*; 74(2) 267-271
32. Richins RD, Hernandez L, Dungan B, Hambly S, **Holguin FO**, O'Connell MA*; (2010) A "Green" Extraction Protocol to Recover Red Pigments from Hot *Capsicum* Fruit. *HortScience* 45(70); 1084-1087
33. Aleman L, Ortega JL, Martinez-Grimes M, Seger M, **Holguin FO**, Uribe DJ, Sengupta-Gopalan C*; (2010) Nodule-enhanced expression of a sucrose phosphate synthase gene member (MsSPSA) has a role in carbon and nitrogen metabolism in the nodules of alfalfa (*Medicago sativa* L.). *Planta* 231(2):233-44
34. Medina-Holguin, AL; **Holguin, FO**; Micheletto, S; Goehle, S; Simon, JA; O'Connell, MA*; (2008) Chemotypic variation of essential oils in the medicinal plant, *Anemopsis californica*. *Phytochemistry*; 69(4); 919-927
35. Medina-Holguin AL, Micheletto S, **Holguin FO**, Rodriguez J, O'Connell MA*; (2007) Environmental influences on essential oils in roots of *Anemopsis californica*. *Hortscience*; 42(7); 1578-1583
36. Medina AL, Lucero ME, **Holguin FO**, Estell RE, Posakony JJ, Simon J, O'Connell MA*; (2005) Composition and Antimicrobial Activity of *Anemopsis californica* Leaf Oil. *J. Agric. Food Chem.*; 53(22); 8694-8698

Published Abstracts:

1. Gašparović, B.*, Cvitešić, A., Penezić, A., Frka, S., Kazazić Saša, L., Richard, S., **Holguin F.O.**, Sudasinghe, N., Schaub, T. (2014). Potential of lipids for carbon sequestration in the Atlantic Ocean. In *2014 Joint Aquatic Sciences Meeting: Aquatic science at a time of rapid change*.
2. Khan, N. A., **Holguin, F. O.**, Xu, P., Engle, M., Dungan, B., Hunter, B., & Carroll, K. C.* (2014). Geochemical Variability and the Potential for Beneficial Use of Waste Water Coproduced with Oil from Permian Basin of the Southwest USA. In *AGU Fall Meeting Abstracts* (Vol. 1, p. 0902).
3. Stamler, R., Dungan, B., **Holguin, O.**, Sanogo, S., Goldberg, N., Schaub, T., & Randall, J.* (2013). Metabolomic analysis of non-host pathogen induced resistance in chile pepper (*Capsicum annuum*). In *Phytopathology* (Vol. 103, No. 6, pp. 138-138). 3340 Pilot Knob Rd, St Paul, MN 55121 USA: American Psychopathological Society

Invited Speaker:

1. **Holguin, F. O.** Summer Community College Opportunity for Research Experience (SCCORE) Symposium, Keynote Speaker, "Food, Water, Energy and Environmental Research", (2018).
2. **Holguin, F. O.** 5th Pan American Plants and BioEnergy Meeting, "The Green Marathon: Algal Cultivation, Crop Protection, Co-Products and Conversion at NMSU", (2016).
3. **Holguin, F. O.** New Mexico Tech Fall Symposium, "From Peaks to Pathways; Multi-Omic Analysis of Lipid Metabolism in Algae", (2013).

Active Research Projects:

1. **Screening Short-Day Onion (*Allium cepa* L.) Germplasm for *Fusarium* Basal Rot Resistance.** My roles are to preform the metabolic profile of secondary metabolites as they are associated with fungal disease resistance. USDA CAP Role: Co-PI
2. **Success through synergy: Increasing cultivation yield and stability with rationally designed consortia.** The overall goal of the project is to improve outdoor cultivation biomass yields by co-cultivating algae and bacteria communities. DOE Role: Co-PI
3. **Sustainable Bioeconomy for Arid Regions.** The overall goal of the project is to develop native arid crops for renewable energy. USDA CAP Role: Co-PI
4. **Energize New Mexico.** The overall goal of the project is to develop alternative renewable energy sources that are found in NM. My roles were to coordinate the bioalgal efforts as well as to develop co-products. NSF EPSCoR Role: Bio Algal Team Co-Lead
5. **A Novel Platform for Algal Biomass Production Using Cellulosic Mixotrophy.** The overall goal of the project is to determine if the ten-fold improvement in algal biomass productivity demonstrated by our team for mixotrophic metabolism of common sugars by extremophilic algae in outdoor PBRs can be reproduced with cellulose-derived sugars. DOE Role: Co-PI
6. **Acquisition of a High Resolution Orbitrap Mass Spectrometer for Multi-Disciplinary Research in the State of New Mexico** The main objective is to acquire and high-resolution mass spectrometer to advance mass spectroscopy at NMSU. NSF MRI Role: Co-P

Recently Completed Research Support:

1. **Heart Health Microalgae? Algal production of TAGs with high levels of PUFAs.** The main objective is to study and advance polyunsaturated fatty acid metabolism in the marine alga *N. salina* under environmental conditions producing high levels of EPA sequestered in the triacylglycerol lipid pool. NIH SC2 Role: PI
2. **Regional Algal Feedstock Testbed Partnership.** The main objective is the operation of a regional algal tested facility to perform strain evaluations. DOE Role: Co-PI
3. **Realization of Algae Potential (REAP)** The main objective is to develop the ability to produce 2500 gal/acre/yr of algal biofuel intermediates by 2018 by integrating and extending the most promising organisms and technologies developed by us during the DOE National Alliance for Algal Biofuels and Bioproducts project. DOE Role: Co-PI