# ELENA MARQUEZ, Ph.D.

**Agricultural Scientist | Crop Systems & Soil Health**

Davis, California • +1 530 555 0184 • elena.marquez@protonmail.com
linkedin.com/in/elena-marquez-agscience • ORCID 0000-0002-7416-3981

## Professional Profile

Agricultural scientist with 10+ years of experience translating field research into resilient, profitable crop-production systems. Expertise spans soil health, plant nutrition, regenerative practices, experimental design, and grower-facing technology transfer across irrigated and rain-fed agriculture. Led multi-site trials totaling 4,800 acres, secured $3.4M in competitive funding, and delivered recommendations that reduced nitrogen use by up to 18% while maintaining yield. Trusted collaborator to growers, universities, government agencies, and multidisciplinary R&D teams.

## Core Expertise

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| **Crop Systems** | Soil fertility; nutrient-use efficiency; cover crops; crop rotations; conservation tillage; irrigation scheduling |
| **Research** | Randomized complete block and split-plot trials; protocol development; sampling plans; GLMMs; meta-analysis |
| **Analytics** | R; Python; SAS; JMP; ArcGIS Pro; QGIS; remote sensing; data visualization; reproducible research |
| **Field/Laboratory** | Soil and plant-tissue sampling; greenhouse studies; lysimeters; soil moisture sensors; QA/QC; GLP |
| **Leadership** | Grant writing; budget ownership; cross-functional teams; extension programming; grower training; scientific writing |

## Professional Experience

**Senior Agricultural Scientist** **2021–Present**
*TerraVerde Agricultural Research, Davis, CA* *Crop Systems & Sustainability*

- Direct a $1.2M annual portfolio of 14 on-farm and research-station trials evaluating nitrogen management, biological inputs, cover crops, and deficit irrigation in tomato, almond, wheat, and maize systems.
- Designed variable-rate nitrogen trials across 1,600 acres; integrated soil nitrate, yield maps, and canopy imagery to cut fertilizer use 18% with no statistically significant yield penalty.
- Built reproducible R workflows for trial randomization, mixed-model analysis, power calculations, and automated reporting, reducing analysis turnaround from three weeks to five days.
- Supervise four research associates and six seasonal technicians; standardized field protocols and audit-ready records, improving complete and valid plot data from 89% to 98%.
- Won $1.7M in USDA-NIFA and California Department of Food and Agriculture funding as principal or co-principal investigator; manage milestones, subcontractors, and sponsor reporting.
- Translate results through field days, technical briefs, and one-on-one consultations reaching 450+ growers and advisers annually; 63% of surveyed participants adopted at least one recommended practice.

**Research Agronomist** **2017–2021**
*University of California Cooperative Extension, Fresno, CA* *Soils, Water & Cropping Systems*

- Managed 32 replicated field experiments across five counties, coordinating growers, irrigation districts, laboratories, and extension specialists from protocol approval through publication.
- Developed sensor-based irrigation schedules for processing tomato and alfalfa that improved water productivity 21% and saved an average 4.1 acre-inches of applied water per season.
- Quantified soil-carbon and aggregate-stability responses to cover crops and reduced tillage over four seasons; findings informed regional conservation-practice guidance.
- Created bilingual English–Spanish training materials and delivered 26 workshops on soil sampling, nutrient budgeting, and integrated nutrient management to 900+ participants.
- Co-authored seven peer-reviewed papers and 18 extension publications; presented results at ASA, SSSA, and Western Nutrient Management conferences.

**Graduate Research Fellow** **2013–2017**
*Iowa State University, Ames, IA* *Department of Agronomy*

- Investigated maize–soybean rotation diversification and nitrogen dynamics using field trials, stable-isotope tracing, and process-based crop modeling across contrasting soil types.
- Developed a decision framework that predicted economically optimal nitrogen rates within 11 kg N $ha^{-1}$ across three growing seasons.
- Mentored eight undergraduate researchers, managed laboratory safety and procurement, and served as teaching assistant for Soil Fertility and Plant Nutrition.

## Selected Research Impact

- **Climate resilience:** Led a five-site drought-response network combining soil-moisture sensing and satellite evapotranspiration; identified management combinations that stabilized tomato yield under 20% less irrigation.
- **Nutrient stewardship:** Co-developed an open nutrient-budgeting tool used by 120 crop advisers to compare yield goals, soil-supply credits, and fertilizer scenarios.
- **Soil health:** Synthesized 11 years of regional trials to establish locally calibrated benchmarks for soil organic matter, potentially mineralizable nitrogen, and water-stable aggregates.

## Education

**Ph.D., Agronomy** **2017**
Iowa State University, Ames, IA *Soil Fertility & Cropping Systems*

**M.S., Soil Science** **2012**
University of Arizona, Tucson, AZ *Environmental Soil Chemistry*

**B.S., Plant Science, *summa cum laude*** **2010**
California State University, Fresno, CA *Plant Health*

## Selected Publications

Marquez, E., Liu, H., and Patel, R. (2025). *Sensor-informed nitrogen management improves input efficiency in processing tomato. Agricultural Systems, 229, 104312*

Marquez, E., Singh, A., and Keller, J. (2023). *Cover-crop functional diversity strengthens soil aggregation in irrigated rotations. Soil & Tillage Research, 228, 105645*

O'Connor, D., Marquez, E., and van Dijk, M. (2021). *Linking canopy temperature and soil water status to irrigation decisions in semi-arid cropping systems. Field Crops Research, 271, 108245*

Marquez, E. and Robertson, A. (2019). *Rotation diversity alters nitrogen supply and yield stability in rain-fed maize. Agronomy Journal, 111(6), 3018–3030*

## Grants, Recognition & Service

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| 2025–28 | USDA-NIFA, *Precision Nutrient Management for Climate-Smart Specialty Crops*, PI, $1.15M | $1.15M |
| 2023–26 | CDFA Healthy Soils Program, *Regional Soil-Health Benchmarking Network*, Co-PI | $820K |
| 2022 | Early Career Award, Western Society of Crop Science | Award |
| 2020– | Peer reviewer: *Agronomy Journal*, *Field Crops Research*, and *Soil & Tillage Research* | Service |

## Professional Credentials & Affiliations

Certified Crop Adviser (CCA), California, credential 48291 • Qualified Applicator Certificate, California DPR
American Society of Agronomy • Soil Science Society of America • International Society of Precision Agriculture
Languages: English (native) • Spanish (professional working proficiency)