

## Assessment of Harvested and Sequestered Nitrogen Content to Improve Nitrogen Management in Crops

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### **Abstract**

This project is developing updated nitrogen removal conversion factors for 25 crops. The project includes sampling and analyzing harvested carrots, corn [grain and silage], peaches, pima cotton, pistachio, plums, pomegranates, raisins, safflower, sorghum [grain and silage], and processing tomatoes. By partnering with commodity organizations, growers, processors, and packers, hundreds of samples that represent a range of varieties and growing environments for each crop can be collected. In most cases, substantial information about source fields, such as age of perennial crops, crop management, variety, yield, quality, and dates of bloom or planting, can be acquired and related to results. In this way, some of the factors that affect N content of the harvest can be investigated and explained. These data will be incorporated into updates of Nitrogen Concentrations in Harvested Plant Parts - A Literature Overview by Dr. Daniel Geisseler (2016) as part of this project. The existing Y-to-R calculator (<http://agmpep.com/calc-y2r/>) will be revised to reflect these findings, and the results will be used to update the assessment and planning tools available to growers, grower advisors, and coalitions.

### **Project Objectives**

1. Assess N concentration of harvested material removed from fields (N removed [R]) for approximately 25 crops over several growing seasons. Samples of harvested material will be collected and analyzed for twelve of those crops. Data for the remaining crops will come from existing sources.
2. Establish values for the annual amount of N sequestered in standing biomass for seven perennial crops. Tissue samples will be collected and analyzed for one of those crops. Data for the remaining crops will come from existing sources.
3. Refine crop yield (Y)-to-R conversion factors, and add N-sequestration rate estimates, for use by growers and grower advisors during nutrient management planning and by coalitions for large-scale performance assessment.
4. Promote and enable expanded knowledge and appropriate use of N-removal coefficients and N-sequestration rates (as part of routine N-management planning and evaluation) by growers, grower advisors, and coalitions.

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Co-Project Leaders and Cooperators: Charlotte Gallock, Kings River Conservation District; Ken Cassman, Agronomic and Soils Advisor; Daniel Geisseler, University of California Cooperative Extension, Nutrient Management Specialist

## Training on Crop Management that Integrates Climate, Soil and Irrigation System Data to Minimize Nutrient Loss and Optimize Irrigation Efficiency

### **Project Leader: Trina Walley**

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### **Abstract**

The Management, Assessment and Training (MAT) program will address and alleviate a knowledge gap in the Central Valley through: Training, Evaluation, Certification, and Outreach. Trainings will include Soil Health, Nutrient Management, Irrigation Water Management and Irrigation Evaluation Methods. The trainings will be provided in both English and Spanish to reach operators at all levels including landowners, field managers, and crop advisors. The MAT evaluation process will provide an in-field system and site evaluation for each of the growers who choose to utilize the evaluation service. The evaluations will consist of system efficiency test to determine distribution uniformity and identify maintenance issues, a graphical soil assessment of micro and macro nutrients, and discussion about current operational practices. These evaluations will identify areas where best management practices could be fine-tuned and lead to some implementation options to increase operational efficiency. A full conservation plan will be developed based on the landowner's desire to address the most pressing water, soil and nutrient management practices that can be used to seek additional technical assistance.

### **Project Objectives**

1. Promote best management practices through workshops for agricultural workers in English and Spanish based on existing resources from University of California Cooperative Extension, USDA-Natural Resource Conservation Services, NCAT/ATTRA and CDFA-FREP.
2. Establish training materials and workshops that can be approved for continuing education credits towards maintaining certifications through Irrigation Association, California Certified Crop Advisors and Department of Pesticide Regulation.
3. Encourage irrigators to share individual challenges and successes in workshops, which will create a networking environment for ongoing farmer-to-farmer education.

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Co-Project Leaders and Cooperators: Khaled Bali, University of California Cooperative Extension, Irrigation Specialist; Rex Dufour, National Center for Appropriate Technology; Steve Amador, Modesto Junior College

## Evaluation of Nitrogen Uptake and Applied Irrigation Water in Asian Vegetables Bok Choy, Edible Chrysanthemum, Garlic Chives, Moringa, and Lemongrass

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### **Abstract**

Grown primarily in Fresno, Monterey, Riverside, San Bernardino, Santa Clara, San Luis Obispo, and Ventura counties on around 7,026 acres, Asian vegetables are valued at \$79 million per year. Asian growers producing specialty vegetables and herbs are required to fill out the nitrogen management plan as part of the ILRP. However, they lack the information to complete this form accurately as there is no information on nitrogen fertilizer recommendations or nitrogen uptake for most of their crops. The project proposes to provide detailed measurements of total N uptake and N uptake pattern of bok choy, edible chrysanthemum, garlic chives, moringa, and lemongrass. This project will also evaluate current irrigation management practices of these crops and compare them with the crops' water requirements and identify potential practices that may help reduce nitrate leaching. Together, the information collected will provide the basic information necessary for growers to better manage N inputs to these crops and protect water quality.

### **Project Objectives**

1. Evaluate N uptake, N availability, canopy development and water application of bok choy, edible chrysanthemum, garlic chives, moringa, and lemongrass.
2. Extend the findings of this research to Chinese and Hmong growers in the Central Coast and Central Valley regions to increase their understanding of N uptake and publish results to provide documentation of the findings.

## A System Nitrogen Balance for Container Plant Production

### **Project Leader: Lorence Oki**

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### **Abstract**

Nursery production is the 3rd largest crop commodity in California with 2014 sales of \$3.22 billion (CDFA 2016) and container grown plants account for 68% of 2012 total sales in this category (USDA 2014). The results of this research will provide economic, environmental, regulatory, and horticultural benefits by educating growers in N utilization and loss mechanisms within container plant production. After environmentally harmful N losses are identified, N mitigation strategies will be developed to reduce their environmental impact by reducing, recovering, or preventing N discharge. With a greater understanding of the fate of applied N in container plant production optimal mitigation strategies can be implemented that result in the best possible nitrogen use efficiency. Implementation of these strategies will help reduce nitrate leaching into groundwater and could improve water quality for future generations in many Central Valley communities. Deliverables include an improved understanding of N cycling, BMPs to improve NUE, and the cost of those BMPs in container plant production. This information will be conveyed to growers via outreach materials, including presentations at workshops and articles in trade and academic journals.

### **Project Objectives**

1. Develop system nitrogen balance for container plant production.
  - a. Determine the mechanisms and pathways of nitrogen (N) loss from container plant nurseries in California.
  - b. Use the results from this study to help influence a nursery specific N management plan.
2. Test strategies that mitigate environmentally harmful N losses from nursery production systems.
  - a. Use the information on N mitigation strategies to help growers increase N use efficiency, thereby resulting in decreased costs and increased profitability.
3. Economic analysis for BMPs and mitigation strategies.
4. Extend research results to industry, regulators, and scientific community