CASFER

Center for Advancing Sustainable and Distributed Fertilizer Production

RET 2026 Orientation (Part 2)

Feliza Mercado, EdD

TEXAS TECH

FAMU Florida Agricultural and Mechanical University

Georgia Tech

Case Western Reserve University

MIT School of Engineering

NSF

Agenda

- Meet & Greet
- Why CASFER's Mission Matters in Your RET Journey?
- RET 2026 Calendar
- Your Onboarding Essentials

RET Support Team

Zaida Gracia

Senior Director for Workforce Development, Education, Outreach, & Engagement

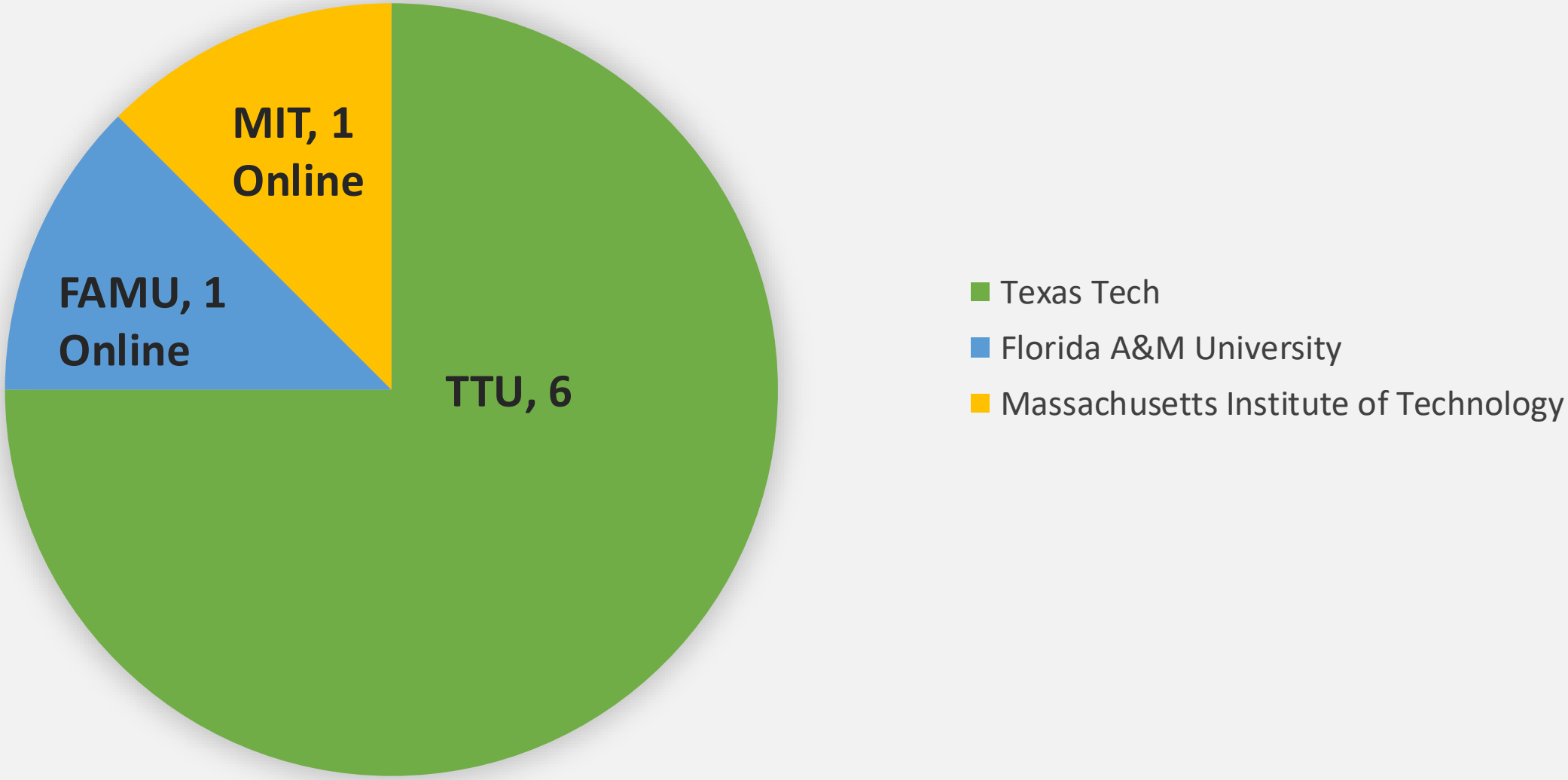
Feliza Mercado

EWD Program Manager

Sungwon Shin

Educational Consultant & Curriculum Expert

RET Participants

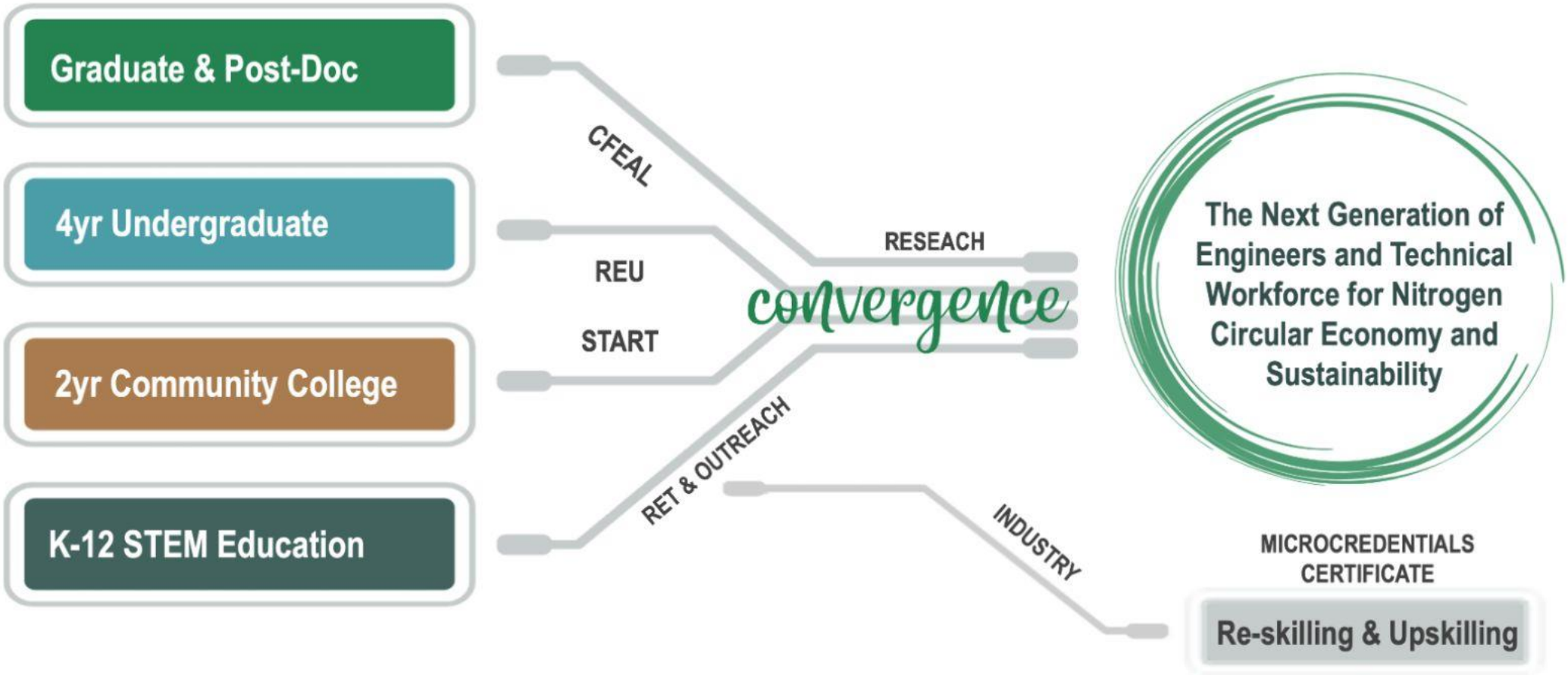


Meet and Greet

We'd love to get to know you!

- ✓ Grade Level & Subject Area
- ✓ Hobbies & Interest
- ✓ How did you first hear about CASFER?
- ✓ What do you hope to learn or gain from your experience this summer?

CASFER's mission is to grow the next generation STEM Workforce



RET Journey

Exposure to Research

Inspire with New Ideas

Teacher Empowerment

Onboarding Checklist

Onboarding Checklist

- ❑ Setting up your TTU email account
- ❑ Required Trainings
- ❑ Mentor-mentee pairings
- ❑ Respond to Pre-Survey
- ❑ Facilities Information
- ❑ RET Schedule of Activities

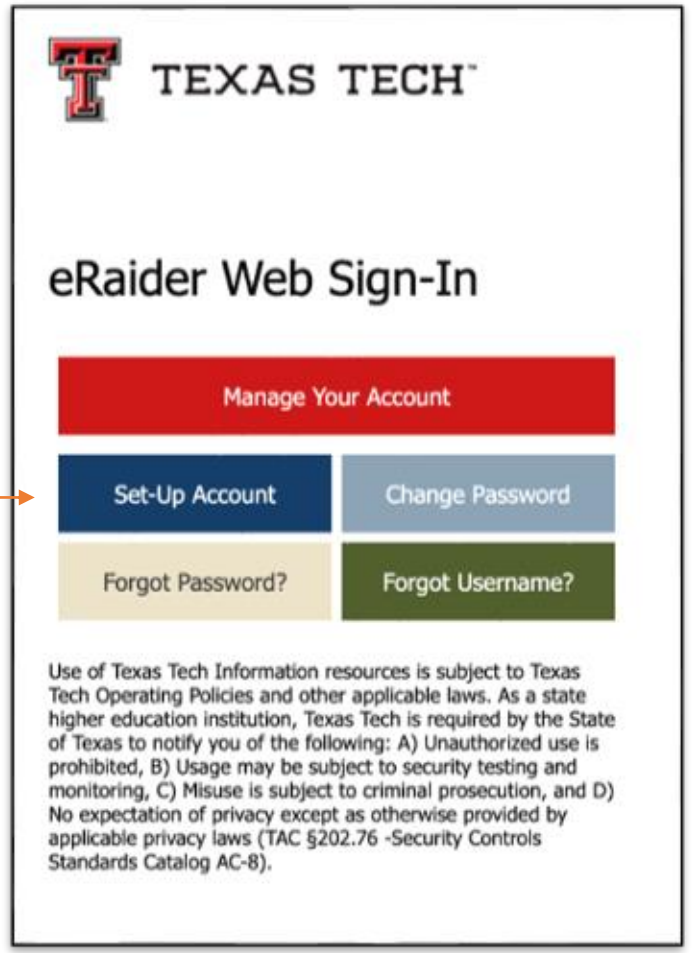
01 – Setting Up Your TTU Account

An email from TTU with important information will arrive shortly.

Please check your personal email account(s) inbox / spam folder.

Website: https://eraider.ttu.edu/default.aspx

Select Set-Up Account



02 - Required Trainings

1. **Visit the EHS Website:**

- Go to the Environmental Health & Safety (EHS) portal (https://www.depts.ttu.edu/ehs/Training/index.php) and follow the “Online Enrollment Steps.”
- Fill out the formulary using your TTU credentials (your TTU email and R-number).

2. **Enroll in and Complete the Following Courses:**

Even if we won’t work directly with all of these hazards, it’s important to understand the protocols for emergencies:

- Autoclave Safety
- Biological Safety
- Bloodborne Pathogens (BBP)
- Compressed Gas Safety
- Flammable Liquid Safety
- Lab Safety
- Magnetic Field Safety

3. **Submit Your Certificates:** Once you’ve finished each course, please email the certificates to Christian at alv12192@ttu.edu

03 – Mentor-Mentee Pairings

Texas Tech RET Participants	Mentors
Alyssa Krafsur	Dr. Neidy Ocuane & Sergio Arango
Romel Agno	Dr. Juan Carlos Muñoz & Dylan Moreno
Dabnee Mosher	Dr. Balaji Rao
Robert Gentry	Sergio Arias
Lupe Ferrell	Dr. Feliza Mercado
Melissa Sharp	Zenifar Haque
Online RET Participants	**Mentors**
Angel Ayala (MIT)	Dr. Ariel Furst
Cynthia Holloway (FAMU)	Dr. Katherine Milla

04 - RET Program (Pre-Survey)

CASFER RET Program Survey

Please scan the QR code below to share your feedback. This survey helps us understand your background and goals for participating in the program.

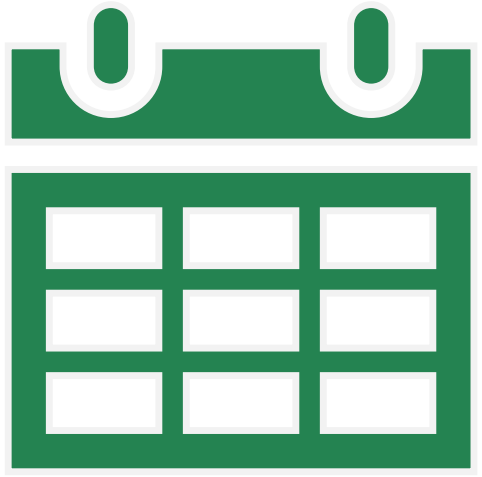
Time to complete: 10 minutes

Your input helps us improve future RET cycles.

05 – Facilities Information

- You can **leave belongings at this conference** room while you are in seminars or in the labs.
- Next to the conference room there is a **kitchen area** that has a refrigerator and a microwave, so you can bring your lunch.
- While a Zoom link is included for remote participants at MIT and FAMU, **attendance in person is required for all TTU participants.**
- **Conference Room Hours** is from 8:30am to 5:00pm.
- Please **do not lock the conference room door** (We do not have a key for it).

06 – RET Schedule of Activities



- A printed RET Calendar was included in your welcome kit.
- Please note that the **digital calendar** remains the most up-to-date resource for room changes.

06 – RET Schedule of Activities

- RET 2026 Calendar
- Hybrid sessions
- Weekly Check-in Sessions
- June 16 – Neurodiversity Awareness in the Classroom
- June 17 – Pedagogy Seminar on Entrepreneurial Mindset
- July 6 -10 – Break (No training)
- July 20 – 22 - Practice Sessions
- July 23 - All RET participants will present their research on **July 23rd.** This includes creating a **CASFER-formatted poster** and delivering an **oral presentation** via PowerPoint.
- July 24 – RET Lunch & Final Evaluation

Institutions

CASFER Poster

Thrust

Synergistic Effects of Microalgae and EGROW Co-Application on Nutrient Leaching Reduction and Soil Nutrient Retention

CASFER
An NSF Engineering Research Center

Adeiza Adonuja, Tarek Abichou, Odemari Mbuya, Ahmed Mohamed B, Katherine Milla, Amita Jain, Christian Alvarez-Pugliese Gerardine G. Botte, Matthew G. Siebecker, Lindsey C. Slaughter and Rao Balaji

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Introduction

A combination of E-GROW (an electrochemically treated waste activated sludge) and Soil Microalgae is a potential nitrogen-phosphorus hybrid fertilizer. Unlike inorganic fertilizers, E-GROW and Soil microalgae has a slow release of nutrients and potential to improve soil dynamic properties (soil structure, moisture holding capacity, bulk density, nutrient leaching). E-GROW and Soil microalgae The combination of E-GROW with living microalgae represents breakthrough convergence of abiotic and biotic fertilizer enhancement technologies, requiring integration across biological nitrogen fixation, soil microbiology, nutrient cycling, and plant-soil interactions.

The objective of this study was to evaluate the synergy between E-GROW and Soil Microalgae as a potential hybrid fertilizer to enhance nutrient retention and reduce nutrient leaching.
Together, E-GROW and microalgae may provide a sustainable fertilizer strategy that supports nutrient recycling while reducing nitrate and phosphorus losses to groundwater and surface water bodies.

Methodology

The following treatments were evaluated in column study:

Equal volume of water was added to all treatments and leachates were collected and analyzed for N and P.

National Science Foundation under Grant No. 2133576.

Results

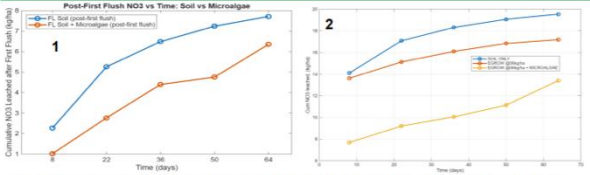


FIGURE 1 and 2 : SYNERGISTIC EFFECT OF CO-APPLICATION OF EGROW + MICROALGAE ON NITRATE LEACHING

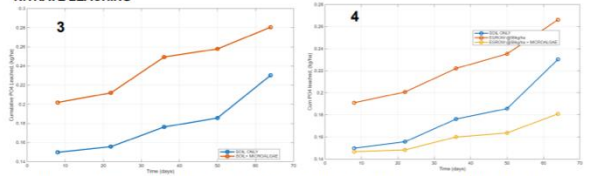


FIGURE 3 and 4 : SYNERGISTIC EFFECT OF CO-APPLICATION OF EGROW + MICROALGAE ON PHOSPHATE LEACHING

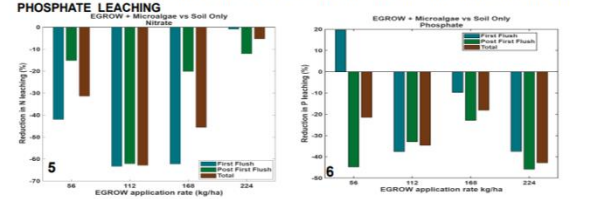


FIGURE 5 AND 6: SYNERGISTIC EFFECT OF CO-APPLICATION OF EGROW + MICROALGAE ON NUTRIENT LEACHING REDUCTION (%)

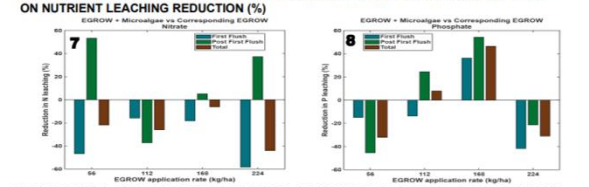
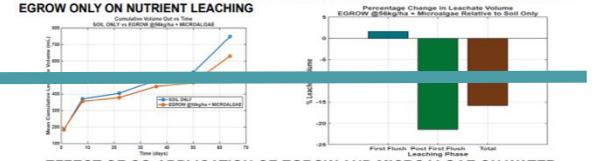


FIGURE 7 AND 8: SYNERGISTIC EFFECT OF CO-APPLICATION OF EGROW + MICROALGAE VS EGROW ONLY ON NUTRIENT LEACHING



EFFECT OF CO-APPLICATION OF EGROW AND MICROALGAE ON WATER HOLDING CAPACITY

Discussion

- The co-application of EGROW and microalgae reduced nitrate leaching in several treatments compared with EGROW alone. This suggests that microalgae may improve nitrate retention or uptake, thereby reducing nitrate movement through the soil column. The reduction was more noticeable for nitrate than phosphate, indicating that the combined treatment may be more effective for controlling nitrogen loss.
- For phosphate, the response of EGROW + microalgae was inconsistent across treatments. This suggests that phosphate leaching was controlled by several interacting factors, including soil properties, phosphorus mobility, amendment rate, and nutrient interactions. Unlike nitrate, phosphate is less mobile and more likely to bind to soil particles, which may explain the variable response.
- When compared with soil only, EGROW + microalgae reduced nitrate and phosphate leaching at some rates but not consistently across all treatments. Negative values indicate reduced nutrient loss relative to soil only, while positive values suggest increased nutrient release or weaker leaching control.
- When microalgae was evaluated relative to EGROW alone, the results showed that its added effect depended on application rate and nutrient type. Negative values indicate that microalgae improved nutrient retention when combined with EGROW, while positive values suggest that microalgae increased nutrient release or reduced the leaching-control effect at that rate. Overall, the results suggest that microalgae can enhance EGROW performance, but its effectiveness depends on soil conditions, nutrient behavior, and treatment rate.

Key Findings

- EGROW + microalgae reduced nitrate leaching in several treatments compared with the EGROW alone.
- Microalgae improved nitrate retention, reducing nitrate movement through the soil column.
- EGROW + microalgae reduced nitrate leaching from application rates 56 kg/ha to 168 kg/ha, whereas phosphate leaching reduced from application rates 112 kg/ha to 224 kg/ha.
- EGROW + microalgae reduced phosphate leaching from application rates 112 kg/ha to 224 kg/ha
- The reduction in nutrient leaching was more for nitrate than phosphate.
- Microalgae enhanced soil water-holding capacity by gradually improving soil hydraulic properties; however, the experimental period may have been too short for this effect to fully develop and significantly reduce nutrient leaching.

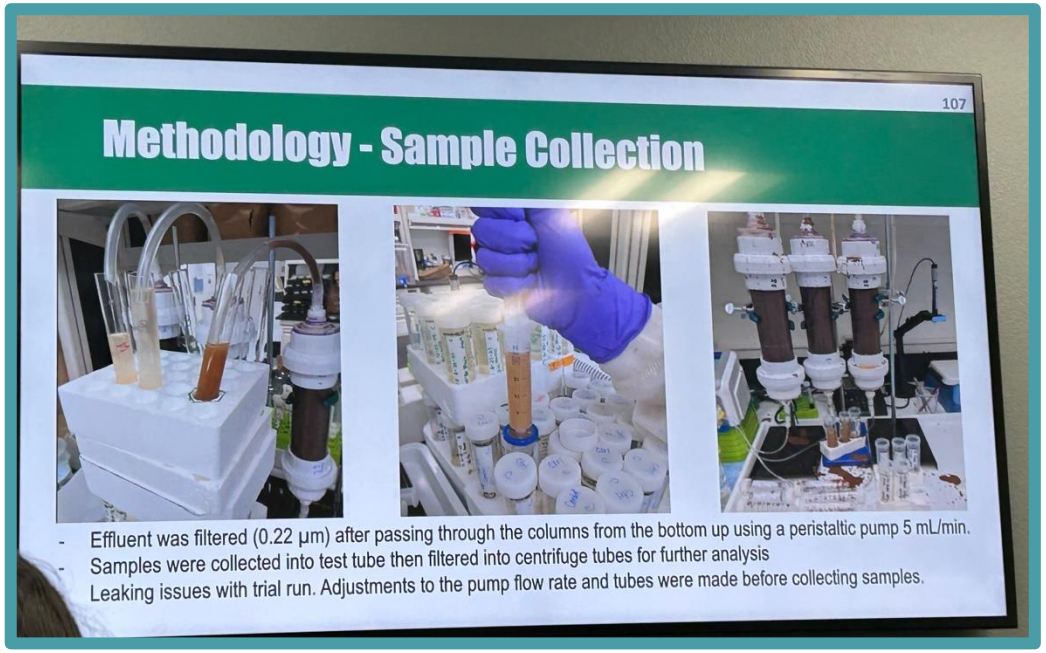
Thrust Interactions

Accessing the CASFER Poster Template

- Go to casfer.us/resources
- More Downloadable Resources
  - CASFER PowerPoint Template
  - CASFER Zoom Background

Presentation Day

- July 23rd - RET Presentation
- Approximately 20 – 25 minutes per RET
- Present your poster, research, and K-12 lesson plan



Contact Information

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Connect with us on our socials!

LinkedIn:

X:

Instagram: casfer.erc