Sustainable Bio-Economy for Arid Regions

Alix Rogstad
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Project Mission

Build a sustainable bio-economy for arid regions to improve quality of life in rural communities and Native Nations.

We Achieve This by:

• Optimize production of guar and guayule as a viable source for biofuel and bioproducts in arid regions of the Southwest

• Engage growers, producers, and industry in new crop production within the region

• Training the next generation of scientists, producers, and researchers to accept and generate jobs in bioproduct and biofuel fields

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Partners

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Management Team

- **Kim Ogden** – Principal Investigator & Project Director
- **Alix Rogstad** – Project Director (Operations)
- **Colleen McMahan** – Associate Project Director
- **Dennis Ray** – Feedstock Development & Production
  - **Pete Waller**
- **Catie Brewer** – Post-Harvest Logistics & Co-products
- **Jason Quinn** – System Performance & Sustainability
- **Sara Chavarria** – Education
- **John Idowu** – Extension & Outreach (NM)
- **Blase Evancho** – Extension & Outreach (AZ)

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External Advisory Board

- **Chris Cassidy** – USDA, Rural Development
- **Matt Chavez** – Independent Grower, New Mexico
- **Steve Csonka** – Commercial Aviation Alternative Fuels Initiative (CAAFI)
- **Mark DeDecker** – Bridgestone Americas, Inc.
- **Gary Deen** – Double D Farms, Arizona
- **William Goldner** – USDA, National Institute of Food and Agriculture
- **John Holladay** – Pacific Northwest National Laboratory
- **Chris Kuzdas** – Environmental Defense Fund
- **Homer Marks** – Southwest Indian Agriculture Association, Tohono O’odham Nation
- **Newt McCarty** – New Mexico State University, Extension Educator
- **Jaroy Moore** – Texas A&M Agrilife Research & Extension Center
- **Alex Muraviyov** – Guar Resources
- **Paco Ollerton** – Tierra Verde Farms, Arizona
- **Matt Payne** – West Water Research, Inc.
- **Bob White** – Bridgestone Americas, Inc.

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Major Accomplishments

- Developed Reporting and Evaluation Plans
  - First round of project evaluation occurred Aug 2018
  - Second round of project evaluation will occur this week (Sep 2019)
- External Advisory Board – 15 people; initial board formed 2018; meets 3 times/year
- Initiated all aspects of research plan – 5 Components
- Successful Outreach
  - Directly through workshops/presentations (1,461 ppl)
  - Tabling events (2,312 ppl)
  - Website visits since Jul 2018 - Jun 2019 (3,319)
  - Summer youth activities and internships (567 ppl)
Highlights: Feedstock Development & Production

- Guayule and guar field experiments established in 7 locations
- Irrigation field experiments established in 3 locations
- Highest rubber yield obtained with drip at 75% ET replacement (preliminary results)
- Aim and Poast herbicide studies are complete, pursuing 24c SLN labels; documented toxicity of Paraquat on guayule seedlings
- 2,074 transformations performed on LEAFY RNAi construct as a promising target for genetic modification
- 3 publications in process; 11 presentations provided; 3 student awards won

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Highlights: Post-Harvest Logistics & Co-Products

- Finalized hybrid optimization models for facility location and transportation
- Initiated decision framework for smart biomass supply chain for guayule and guar
- Identified 17 major terpenes in guayule resin and 3 minor metabolites (including 1 new natural product)
- Completed guar biochemical composition analysis
- 3 publications in process; 33 presentations

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Highlights: System Performance & Sustainability

- Generated integrated guayule and guar agriculture and processing models
- Quantified environmental impact of agriculture and processing of guayule to raw natural rubber and guar to guar gum
- Quantified costs/benefits for agriculture and processing of guayule and guar
- 3 publications in process; 11 presentations; 2 student awards won

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Highlights: Education

- Modified and expanded relevant biofuel lessons for application in arid regions
- Recruited 2\textsuperscript{nd} cohort of SBAR Fellows and Teacher Mentors
- Train the Trainer event hosted at NMSU in July 2019; 32 participants
- Developed and hosted a summer professional development workshop for teachers and graduate fellows
- Curriculum and lessons are under development
- 11 presentations

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Highlights: Extension & Outreach

- SBAR was 1 of 2 projects selected by NMSU for a Research Exhibition and Reception in Washington DC
- Arizona Extension and Bridgestone hosted a guayule field day; over 30 participants
- 4-H Biofuel summer camp hosted in Tucson, AZ; 20 youth participants
- Second cohort of Project Puente interns completed summer session
- 38 presentations; 1 student award won
Next Steps & Future Plans

■ On-going Research
  – *Year 2 field trial results anticipated this fall (AZ & NM)*
  – *New irrigation project initiated this fall and spring*
  – *Potential co-products identified within guayule resin*
  – *Sustainability models integrated; life-cycle analysis underway*

■ Education and Extension & Outreach
  – *Phase 2 of Teacher Professional Development (Jun 2019)*
  – 8-10 interns supported next summer (2020)
  – *Ramping up 4-H workshops in AZ & NM in 2020*

■ Annual SBAR Retreat
  – *Hosted in Tucson area, August 2020*

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