



SUSTAINABLE BIOECONOMY
FOR ARID REGIONS

SUSTAINABILITY OF GUAYULE-BASED NATURAL RUBBER PRODUCTION



KEY POINTS OF INTEREST

- > Increased profitability with less water required
- > Minimum guayule rubber selling price required is \$3.04/kg for a net present value of zero over 30 yrs of production
- > Minimum rubber selling price assumes the co-product revenue is generated by selling bagasse at \$0.10/kg and resin at \$1.00/kg
- > Global warming of guayule rubber is 11 kg CO₂ eq per kg rubber, or 19,458 kg CO₂ eq per hectare

EXECUTIVE SUMMARY

- > SBAR research has generated an integrated model that enables concurrent assessment techno-economics and life cycle impact assessment. The model includes all aspects of the guayule to rubber process with detailed agricultural and biorefining model. The biorefinery produces three products: natural rubber, bagasse, and resin.
- > The current results show that the system can meet economic parity with reduced environmental impact than traditional natural rubber systems when the co-products (bagasse and resin) can be moderately valorized.
- > The modeling work is being used to identify critical areas for further research and development to support commercialization of this drought-tolerant desert crop.

SBAR HIGH-IMPACT ACCOMPLISHMENTS

- > Demonstrated guayule as a sustainable commercial crop for the American Southwest.
- > Developed a unique integrated model that includes guayule agriculture from planting to processor, an integrated TEA/LCA model, and advanced water LCA methods for application in arid regions.
- > Designed sustainable biomass supply chain optimization, including the location of processing facilities, transportation, and harvesting logistics.
- > Increasing farm profitability with optimal crop rotations and machinery scheduling.
- > Completion of the BENCO model: a dynamic tool that supports evaluation of the economic, financial, and resource implications of crop adoption.

POINT OF CONTACTS

- > **Jason Quinn.** CSU. Fort Collins, CO. jason.quinn@colostate.edu
- > **Clark Seavert.** AgBiz Innovations. Surprise, AZ. agbizinnovations@gmail.com
- > **Kim Ogden.** UArizona, Tucson, AZ. ogden@arizona.edu
- > **Neng Fan.** UArizona. Tucson, AZ. nfan@arizona.edu
- > **Maryfrances Miller.** NMSU. Las Cruces, NM. franniem@nmsu.edu
- > **Trent Teegerstrom.** UArizona. Tucson, AZ. tteegers@ag.arizona.edu

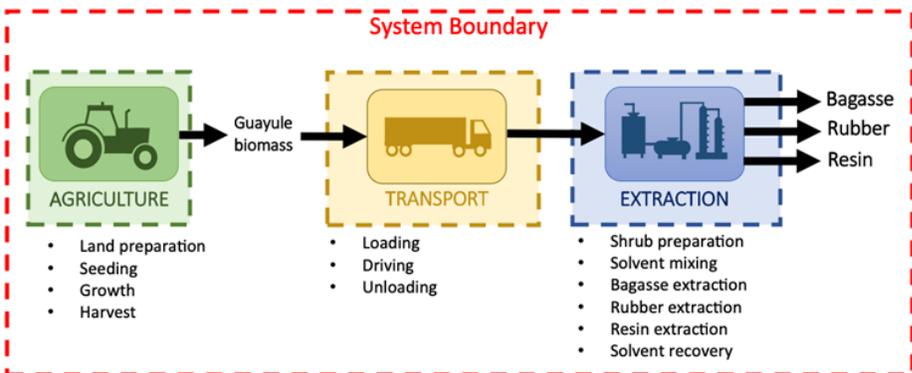


Fig. 1. Process model diagram of guayule rubber, resin, and bagasse production.

FUTURE WORK AND NEEDS

- > Drive the technology towards commercialization through results-based, focused research and development.
- > Evaluate co-product systems for trade-offs that can be used to enhance and direct future research.
- > Investigate water use intensity of the optimal cropping systems for guayule.
- > Optimize guayule harvest under extreme weather and disruptive events.
- > Update enterprise budgets to reflect current circumstances.
- > Estimate regional economic impact for crop adoption under different scenarios.
- > Partner with regional growers to establish break-even prices for guayule and existing crops using the BENCO model. (BENCO – break-even for new crop options)

For more information: <https://sbar.arizona.edu>



Any opinions, findings, conclusion or recommendation expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture. Grant #: 2017-68005-2686