10th Annual Carinata Biomaterials Summit

Ian Small & Sheeja George

SPARC Executive Committee

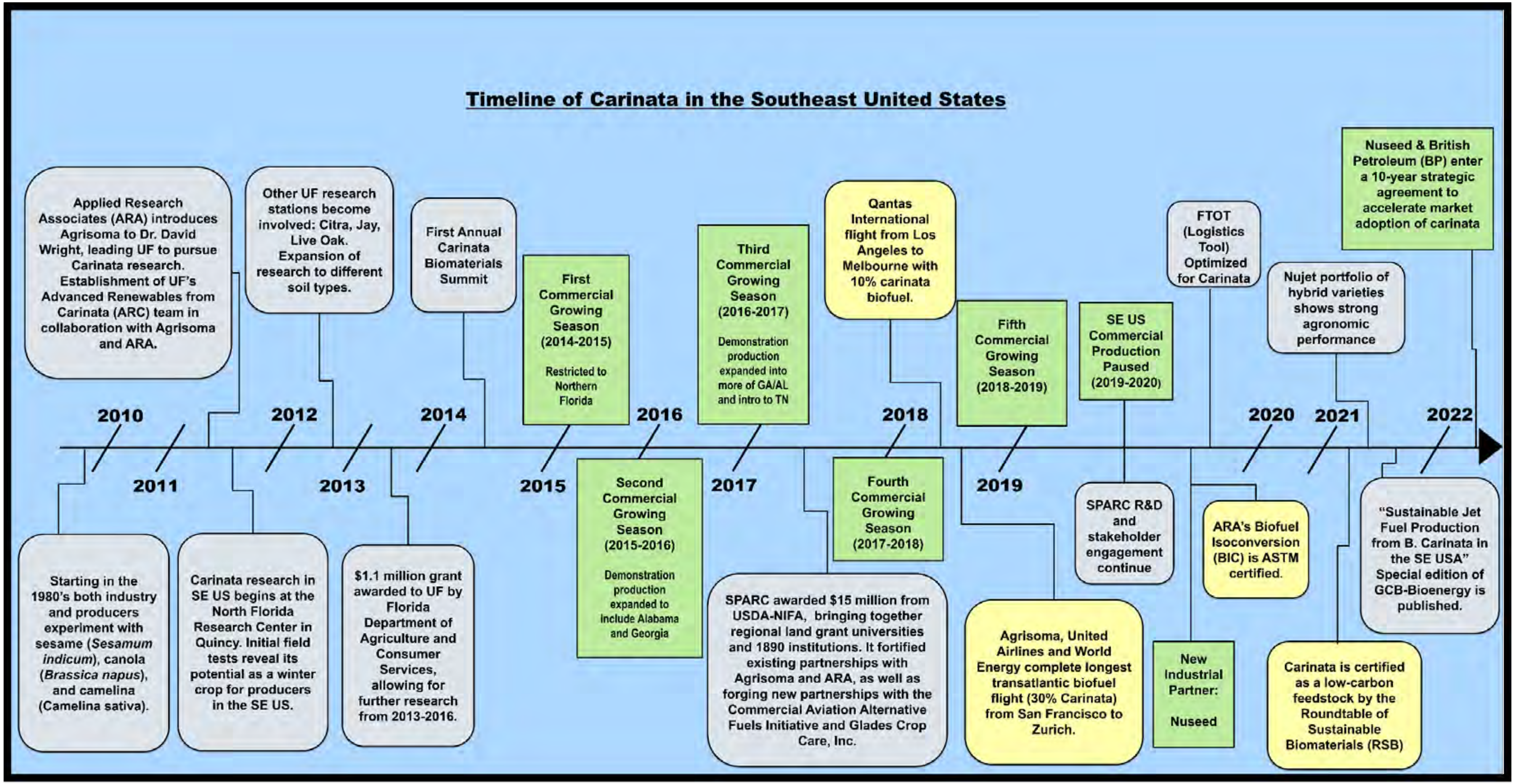
SPARC

nuseed

USDA United States Department of Agriculture
National Institute of Food and Agriculture

David Wright and Chuck Red (ARA)

Reflecting on SPARC Accomplishments & Charting the Path Forward



THE SPARC MISSION

Southeast Partnership for Advanced Renewables from Carinata

SPARC

USDA NIFA

- Remove physical, environmental and social constraints of regional Brassica carinata production as a renewable fuel, bioproduct, and coproduct feedstock
- Ensure stable markets for jet fuel and bioproducts through enhanced values across the supply chain

Feedstock Development

University of Florida, Nuseed, University of Georgia, USDA Agricultural Research Service, Auburn University, agribugs, Mississippi State University, Glades Crop Care Inc., NC State University, RDL Ag Services LLC, Florida A&M University

- Identify adaptable genotypes for the SE US
- Optimize rotation fit of carinata in the SE cropping system
- Develop a comprehensive best management practices tool-kit to support sustainable & profitable crop production

Fuel & Co-product Development

ARA, University of South Florida, University of Florida, BASF We create chemistry

- Demonstrate coprocessing of complementary feedstock
- Enhance value through production of coproducts (C22 & C13 compounds, solvents, chemicals etc.)

Extension, Education, Outreach

University of Georgia, University of South Florida, Florida A&M University, University of Florida, Nuseed, ARA, Glades Crop Care Inc.

- Link research and extension for continuous feedback and project improvement
- Document drivers of adoption; assess stakeholder needs
- Develop extension learning tools
- Stakeholder engagement
- K-12, undergraduate and graduate education in bioenergy
- Internships and career development in the field of bioenergy and bioeconomy

Meal Value Enhancement

University of Florida, University of South Florida, University of Georgia, Nuseed

- Assess nutritional & economic value as high-protein supplement for animal feed
- Enhance profitability through discovery & development of value-added coproducts

System Metrics

University of Georgia, Nuseed, University of Florida, Colorado State University, USDA Agricultural Research Service

- Optimize crop management & rotation strategies for productivity, profitability, & low carbon intensity
- Evaluate ecosystem services through soil health assessment & watershed modeling
- Life cycle assessment

Supply Chain

RCB Altman LLC, University of South Florida, ARA, Nuseed

- Optimize distribution economics and carbon intensity
- Quantify water remediation cost avoidance
- Stakeholder engagement to garner federal and state support for commercial development

Feedstock Development

Workstream lead: Ramdeo Seepaul

KEY ACTIVITIES & OUTCOMES

- **Comprehensive regional research:** 48 site-years, covering 50 acres of studies in 6 states
- **Crop Improvement:** Screened 73 unique carinata genotypes across 48 site years
- **Best Management Practices**
- **Decision Support Tools**
- **Publications:**
  - **35 peer-reviewed articles, 10 agronomy notes, 6 carinata facts, production guide, scouting guide, 25+ posters and oral presentations** at regional and national meetings

Variety Evaluation and Crop Improvement

Current commercial variety Nujet 400 was screened and launched

A new hybrid variety, Nujet 350, is scheduled to be launched in fall 2023

Identified carinata genotypes that are cold tolerant and nitrogen use efficient

Screened **1,150 carinata lines** for dicamba tolerance identified **multiple lines** with high levels of tolerance to dicamba

Screening diverse carinata genotypes for disease tolerance in AL. Credit: Austin Hagan

Weed Management

Identified herbicides for weed control in carinata.

Evaluated the potential weediness and invasiveness risk of carinata.

Quantified the carry-over and injury risk of key herbicides on carinata.

Developed weed emergence models based on weather data to optimize timing for weed control in carinata.

Crop and Pest Management

Generated data for product development for accelerated harvest, pest and disease control, yield prediction and yield enhancement (herbicides, fungicides, desiccants)

Evaluated 20 herbicides under field conditions and identified 8 herbicides that were safe for weed control in carinata

Evaluated 10+ fungicides for disease control

Developed recommendations for managing Sclerotinia stem rot and Alternaria black spot in carinata.

SPARC and Glades Crop Care developed and refined a commercial scouting protocol for pests and diseases.

Glades Crop Care inspecting carinata

Developing Decision Support Tools

Adapted the CROPGRO model, part of the DSSAT V4.7 software, to simulate the growth, development, and yield of carinata

Developed a web-based tool for simulating carinata phenological phases

Phenology and weather tracker web-based tool (http://agroclimate.org/tools/phenology-and-weather-tracker/). Credit: Clyde Fraisse

Carinata Best Management Practices

Research has led to a suit of high impact production practices:

Variety selection based on criteria such as yield, maturity, and frost tolerance

Fertility management including soil testing for P, K, S, Ca, Mg, and micros

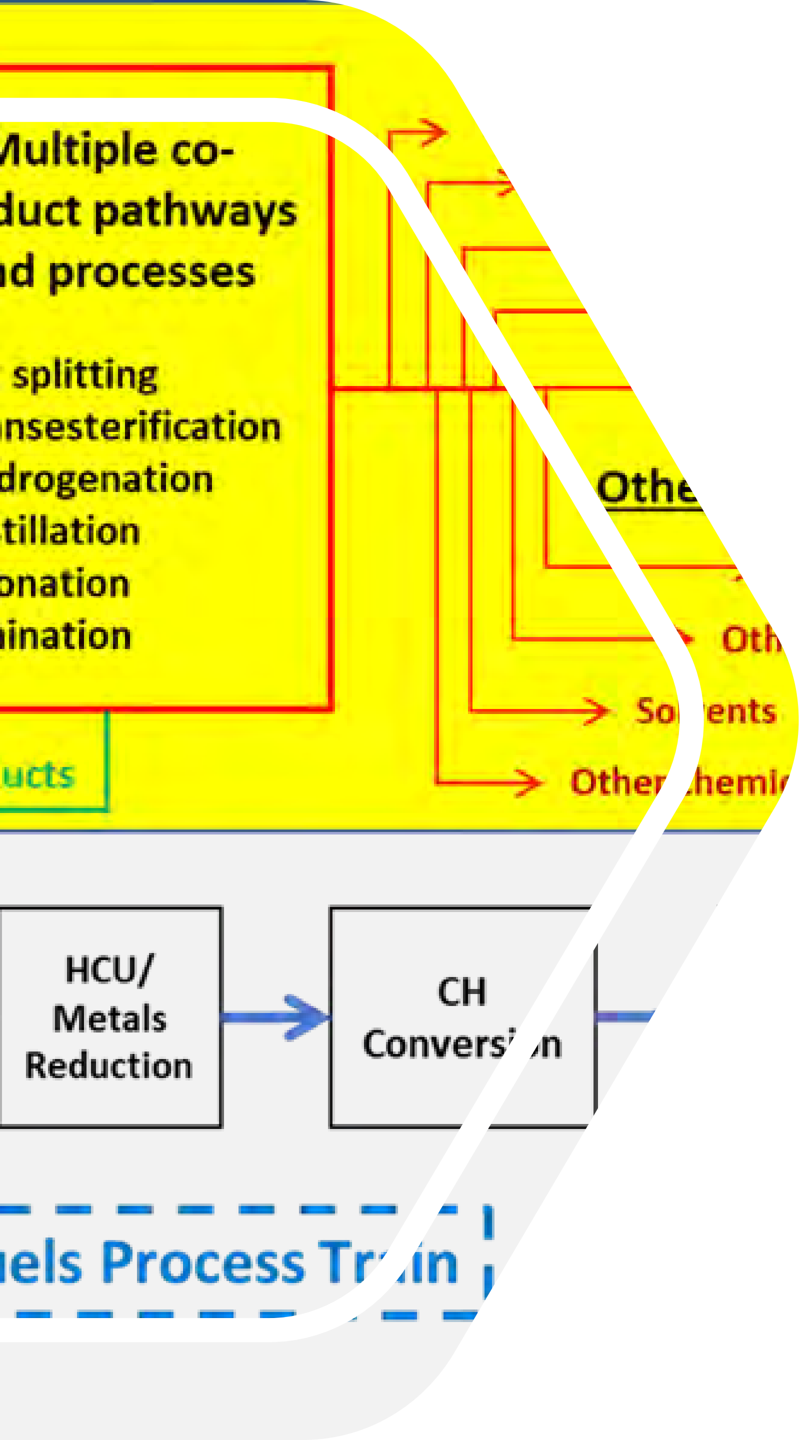
Planting dates

Using a **seeding rate** of 4-5 lbs/ac and a row spacing of 7 to 15 inches

Implementing reduced tillage and ensuring a firm seedbed

Weed control at planting, avoiding wild radish and being cautious with residual herbicides

Recommendations for poultry litter application



Fuel & Co-product Development

Workstream lead: Ed Coppola

Applied Research Associates, Inc.

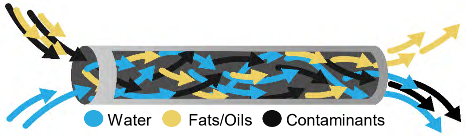
- Engineering & science company Founded in 1979 that provides innovative technologies for government and industry
  - 1700 employee owners
  - FY20 sales of $486M
- Developing and deploying *ReadiFuels* renewable fuel technologies since 2006
- SPARC partner for conversion of Carinata oil into fuels and valuable chemicals

Sustainable Aviation Fuel (CHJ) is Produced by the Biofuels ISOCONVERSION (BIC) Process

Converts fats, oils, and greases from plants, animals, or algae into “drop-in” renewable fuels

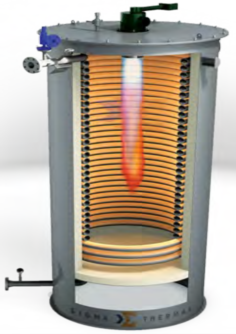
Hydrothermal Cleanup (HCU)

- Removes phosphorus and metals from FOG & other lipids



(CH) - Catalytic Hydrothermolysis

- Supercritical water process
- Produces crude oil with the same hydrocarbon types as petroleum



<2 Minute
Space time Conversion Step

Hydrotreating

- Saturates olefins
- Removes residual oxygenates

Conventional
Refinery Processes

Chevron Lummus Global

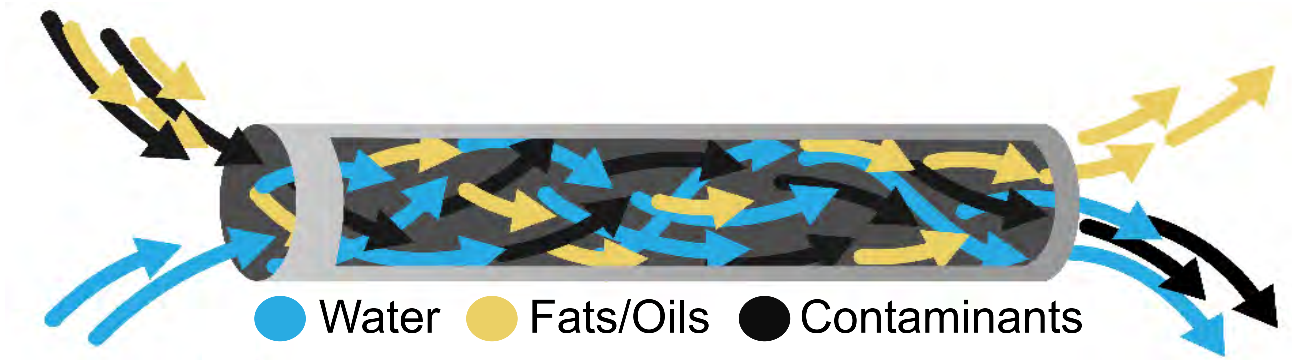
Distillation

- Produces Jet and diesel fuels that meet petroleum specs without blending

ASTM approved CHJ as Annex 6 to D7566 as a 50% blend component in December 2019

Hydrothermal Cleanup (HCU) Technology

- Potential enabling technology for commercialization of Carinata
  - HCU process can be co-located with crushing facilities
- HCU is a single-step solution for removing metals and phosphorus from a wide variety of fats, oils, and greases using typical refinery processes.
  - No yield loss, no solid waste



U.S. Patent 10,071,322 B2 (2018)

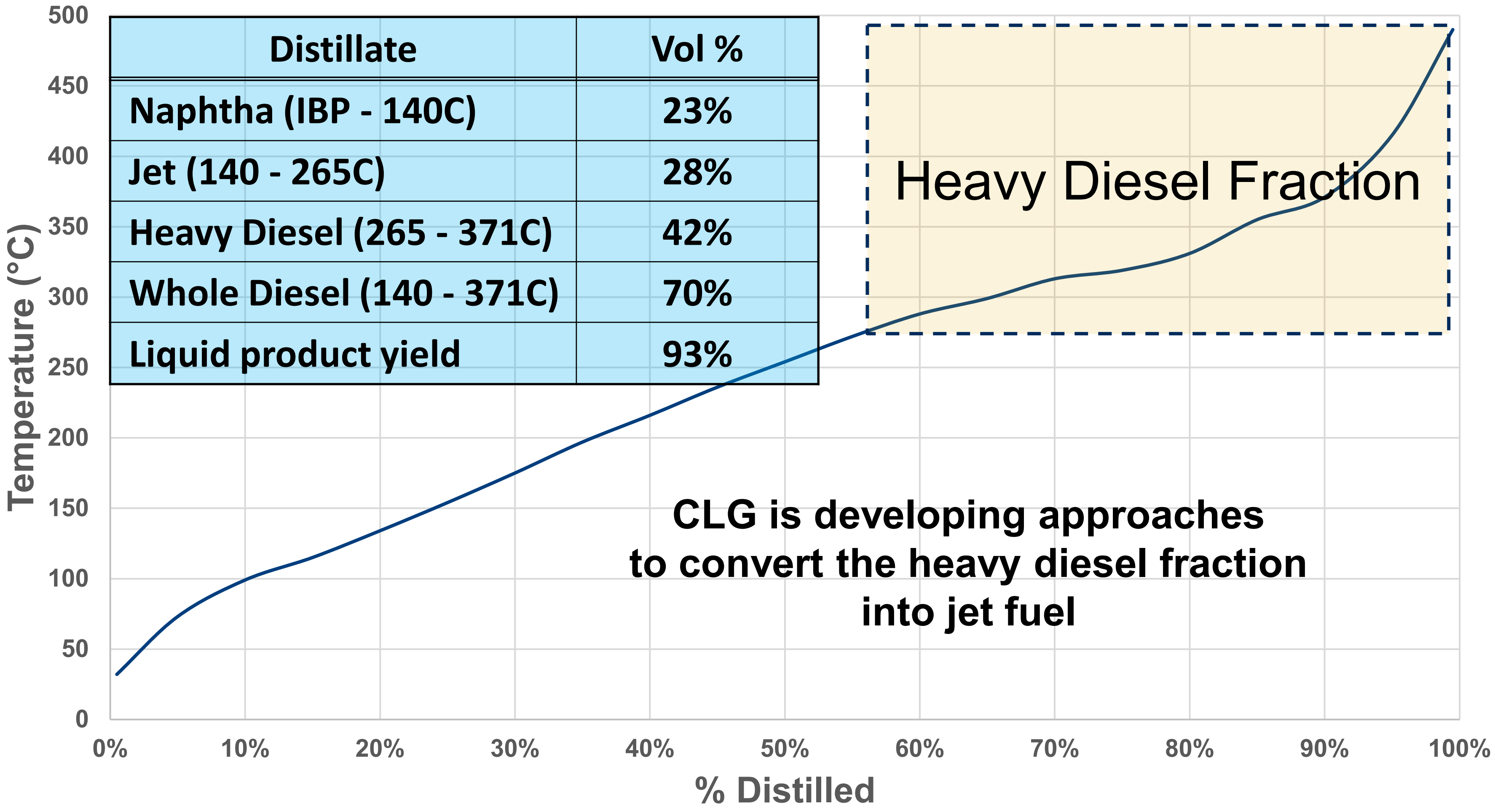
Renewable Fuels From Carinata

- Carinata oil is an excellent feedstock for BIC
- However, commercially carinata may be refined with a blend of lower quality feedstocks
- Demonstrated that carinata oil blended with low cost, low CI feedstocks from the southeast made high quality jet and diesel fuels

Feedstock	% by Volume
Carinata	50
Used cooking oil	20
Distiller's corn oil	10
Tung oil	5
Pongamia oil	5
Peanut oil	5
Brown grease	5

Product Yields from the Carinata Blend

Distillate	Vol %
Naphtha (IBP - 140C)	23%
Jet (140 - 265C)	28%
Heavy Diesel (265 - 371C)	42%
Whole Diesel (140 - 371C)	70%
Liquid product yield	93%



CLG is developing approaches to convert the heavy diesel fraction into jet fuel

Key Jet Fuel Properties from Carinata Blend

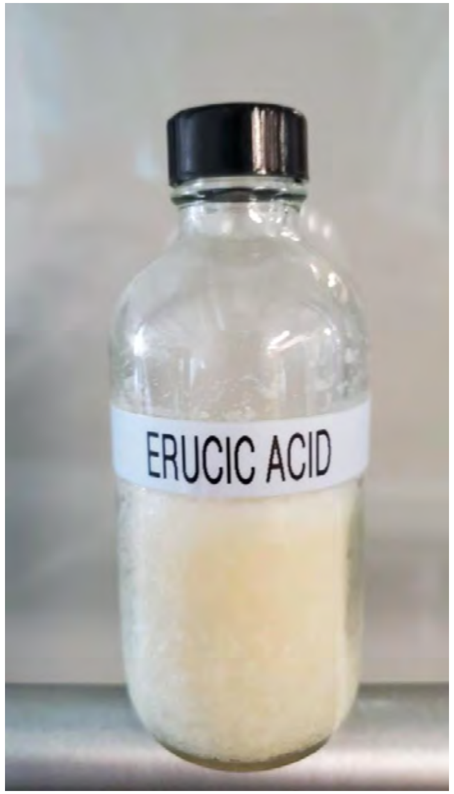
	Method	D7566 Annex 6 Requirements	Jet A-1	Jet A	Units
Cut Points			140 - 249	140 - 265	°C
SG (@60F)	D4052	0.775 – 0.840	0.7922	0.7957	
Sulfur	D5453	Max 15		<0.5	ppm
Flash Point	D56	Min 38	46	48	°C
Freeze Point	D2386	Max -40 Jet A Max -47 Jet A-1	-52	-45	°C
Aromatics	D6379				
Total aromatics		8.0 – 20.0		12.15	% v/v
Distillation	D86				
10%		Max 205	172	176	°C
FBP		Max 300	240	255	°C
Distillation Slope T90-10		Min 40	52	63	°C
Distillation Slope T50-10		Min 15	24	25	°C

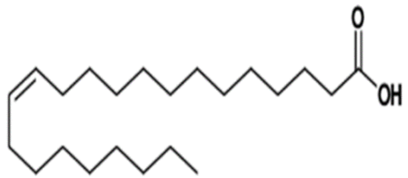
Diesel Fuel Properties from Carinata Blend

	Method	D975 #2 Diesel Requirements	Diesel	Units
Cut Points			140-371	°C
SG (@60□F)	D4052		0.8116	
Sulfur	D5453	Max 15	<0.5	ppm
Flash Point	D56	Min 52	59	°C
Cloud Point	D2500		-4	°C
Pour Point	D97		-9	°C
Cetane Index	D4737	Min 40	62.9	
Viscosity	D445	1.9 – 4.1	2.33	cSt
Aromatics	D5186			
Total aromatics		<35	11.3	% m/m
Monoaromatics			10.9	% m/m
Poly aromatics			0.4	% m/m
Distillation	D86			
90%		282 - 338	330	°C

Most Promising Coproducts

- Erucic acid (C22:1)
  - Oleochemical producer, Ingevity, has fat splitting and distillation systems that can produce commercial volumes erucic acid from carinata
  - Ingevity will consider a commercial demonstration
- Erucic acid derivatives
  - Especially brassylic acid – nylon 1313 precursor
- Behenyl alcohol (C22 – 80°C melting point)
  - BASF provided catalysts & technology to demonstrate >98% yield
  - Emollient, emulsifier, thickener in cosmetics
- Renewable acetic acid or acetate recovery
  - Modeling a Biofuels ISOCONVERSION configuration that greatly improves economics
    - 70-90% reduction in water use & wastewater generation
    - Increase product yields and reduced BOD by 50%





Meal Value Enhancement

Workstream lead: Nicolas DiLorenzo

Carinata Meal

First 3 manuscripts ever published describing its high value as protein supplement for beef cattle

Can be used to replace all other proteins typically used

No negative effects observed

Journal of Animal Science, 2019, 4334–4340

doi:10.1093/jas/skz280
Advance Access publication August 28, 2019
Received: 25 February 2019 and **Accepted:** 26 August 2019
Ruminant Nutrition

RUMINANT NUTRITION

Evaluation of *Brassica carinata* meal as a protein supplement for growing beef heifers[1,2]

Tessa M. Schulmeister,[†] Martin Ruiz-Moreno,[†] Gleise M. Silva,[†] M. Garcia-Ascolani,[†] Francine M. Ciriaco,[†] Darren D. Henry,[‡] Graham Cliff Lamb,[‖] Jose C. B. Dubeux Jr.,[†] and Nicolas Dilorenzo[†,3]

[†]Department of Animal Sciences, North Florida Research and Education Center, University of Florida, Marianna, FL 32446-7906 [‡]Department of Animal and Food Sciences, Texas Tech University, Lubbock, TX 79409-2141, and [‖]Department of Animal Science, Texas A&M University, College Station, TX 77843-2471

[1]We gratefully acknowledge Agrisoma Biosciences, Inc. (Gatlineau, Quebec) for donating the *Brassica carinata* meal pellets used in this study. Appreciation also is expressed to J. P. R. Costa, M. Bueno, O. Helms, J. Folsom, M. Foran, D. Jones, C. Nowell, C. Wood, M. Morgan, and D. Thomas (University of Florida) for their assistance with data collection and laboratory analysis.
[2]Funding for this research was partially provided by the Florida Department of Agriculture and Consumer Sciences, grant # 00112160.

[3]Corresponding author: ndilorenzo@ufl.edu

Evaluation of *Brassica carinata* meal on ruminant metabolism and apparent total tract digestibility of nutrients in beef steers[1,2]

Tessa M. Schulmeister,[†] Martin Ruiz-Moreno,[†] Gleise M. Silva,[†] M. Garcia-Ascolani,[†] Francine M. Ciriaco,[†] Darren D. Henry,[‡] Graham Cliff Lamb,[‖] Jose C. B. Dubeux, Jr.,[†] and Nicolas DiLorenzo[†,3]

[†]Department of Animal Sciences, North Florida Research and Education Center, University of Florida, Marianna, FL 32446-7906; and [‡]Department of Animal and Food Sciences, Texas Tech University, Lubbock, TX 79409-2141; [‖]Department of Animal Science, Texas A&M University, College Station, TX 77843-2471

ABSTRACT: *Brassica carinata* is a new oilseed crop with the potential of producing high-quality jet biofuel. A high-protein meal (~40% crude protein) is obtained as a byproduct of hexane-solvent oil extraction; however, limited research is available on the use of this meal as a protein supplement for beef cattle. A duplicated 4 × 4 Latin square design was used an internal marker. Blood and ruminal fluid samples were collected before providing the protein supplements and then every 3 h, during a 24-h period, to analyze urea nitrogen (**PUN**) and glucose in plasma, as well as ruminal pH, ammonia nitrogen (NH_3-N), and VFA concentrations. Data were analyzed using PROC MIXED of SAS with repeated measures.

Journal of Animal Science, 2021, Vol. 99, No. 1, 1–8

doi:10.1093/jas/skaa383
Advance Access publication November 28, 2020
Received: 31 July 2020 and **Accepted:** 23 November 2020
Ruminant Nutrition

RUMINANT NUTRITION

Characterization of dietary protein in *Brassica carinata* meal when used as a protein supplement for beef cattle consuming a forage-based diet

Tessa M. Schulmeister,[†] Martin Ruiz-Moreno,[†] Gleise M. Silva,[†] Mariana Garcia-Ascolani,[†] Francine M. Ciriaco,[‡] Darren D. Henry,[‡] G. Cliff Lamb,[‖] Jose C. B. Dubeux Jr,[†] and Nicolas DiLorenzo[†,1]

[†]North Florida Research and Education Center, Department of Animal Sciences, University of Florida, Marianna, FL 32446-7906, [‡]Department of Animal and Food Sciences, Texas Tech University, Lubbock 79409-2141, [‖]Department of Animal Science, Texas A&M University, College Station, TX 77843-2471

[1]Corresponding author: ndilorenzo@ufl.edu

Carinata Meal, Not Only for Cattle…

Potential high value in other coproducts derived from carinata meal

Biomass Conversion and Biorefinery
https://doi.org/10.1007/s13399-022-02578-y

ORIGINAL ARTICLE

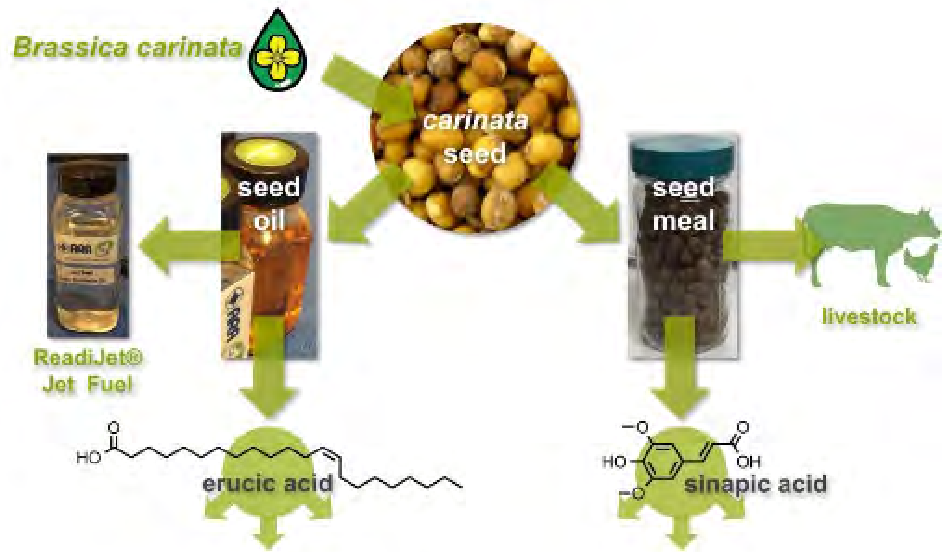
Check for updates

Valorization of *Brassica carinata* biomass through conversion to hydrolysate and hydrochar

Magdalini Tsarpali[1,2] · Jessica Martin[2,3] · John Kuhn[1,3] · George P. Philippidis[2]

Received: 26 November 2021 / Revised: 4 March 2022 / Accepted: 10 March 2022

Abstract
Carinata meal (CM), the biomass residue obtained after oil is extracted from the seeds of the inedible crop *Brassica carinata*, needs to be valorized to enhance the feasibility of sustainable aviation fuel production from carinata oil. Various chemical pretreatment methods (acid, alkali, lime, and peroxide) were tested on CM, which was then enzymatically hydrolyzed to
produce sugar
was obtained
hydrolysis wa
and surface fu
ash content (6.
coal. Both sug
of fuels and cl



foods MDPI

Article

Optimization of the Recovery of Secondary Metabolites from Defatted *Brassica carinata* Meal and Its Effects on the Extractability and Functional Properties of Proteins

V. P. Thinh Nguyen [1,2], Jon D. Stewart [2], Florent Allais [1] and Irina Ioannou [1,*]

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[2] Department of Chemistry, University of Florida, Gainesville, FL 32611, USA; jds2@chem.ufl.edu
* Correspondence: irina.ioannou@agroparistech.fr

Abstract: The sustainable extraction of secondary metabolites from Brassica agro-industrial by-products often involves the use of high concentrations of ethanol, and/or high temperatures, which

Carinata Meal in Dairy Cattle Diets

- Dairy study conducted at NCSU
- First study ever conducted in milking cows
- 11% of carinata meal included in the diet, replacing 5 kg/cow/d of soybean meal
- No effects on milk production or cow health
- Glucosinolates not detected in milk
- Great replacement for soybean meal

Carinata Meal in Beef Cattle Diets

- Study conducted with finishing cattle
- Cattle harvested at a commercial abattoir
- Trained sensory panel from the UF meat laboratory evaluated beef samples
- No differences in meat flavor and other attributes when feeding carinata
- No differences in carcass quality
- Carinata can be used in feedlot finishing diets replacing common protein sources

KEY ACTIVITIES & OUTCOMES

- **6 manuscripts**, Schulmeister et al. (2019a, 2019b, 2021, Tsarpali et al., 2022)
- **5+ graduate students** involved across three institutions (UF, USF, NCSU)
- **4 field days and multiple extension talks highlighting the value of carinata meal** (including international presentations)
- **Several manuscripts from the Meal Team yet to be published** (meal received towards the end of the grant)

Supply Chain Optimization

Workstream lead: Rich Altman

KEY ACTIVITIES

- Test DOT/FAA funded FTOT-tool for **supply chain optimization**
- **Supply chain resilience analysis** including first mile last mile logistics optimization
- Engaged various state agencies to identify additional support pathways for **supply chain development**

Fuel Transportation Optimization Tool (FTOT)

Supply chain team conducted the first ever bottoms-up application of FTOT

For FMLM –8 scenarios were tested for transportation cost along with CO_2 emissions for each scenario to provide data for supply chain development decision making

Economic and Rural Development Efforts

First state funded supply chain development support (AL Dept. Economic Community Affairs in partnership with Auburn)

Engaged GA Economic Development and FL FDACS, USDA Rural Development, NRCS defining added support pathways.

System Metrics

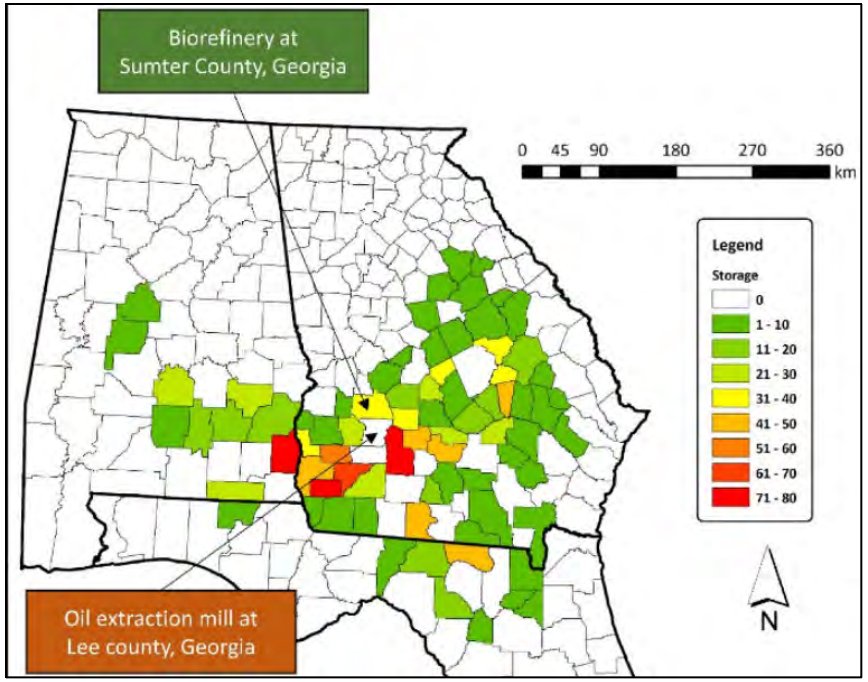
Workstream lead: Puneet Dwivedi

KEY ACTIVITIES

- **Economic evaluation** of SE US crop rotations integrating carinata for SAF production
- **Environmental and economic trade-offs** of carinata SAF were analyzed for the South US
- **Site suitability study** was conducted to estimate carinata production
- **Modeling carbon sequestration and greenhouse gas emission** savings using Daycent
- Developed a **supply chain optimization model** for carinata SAF in the SE US
- Assessed **watershed level impact** of incorporating carinata into SE US cropping systems using the SWAT model

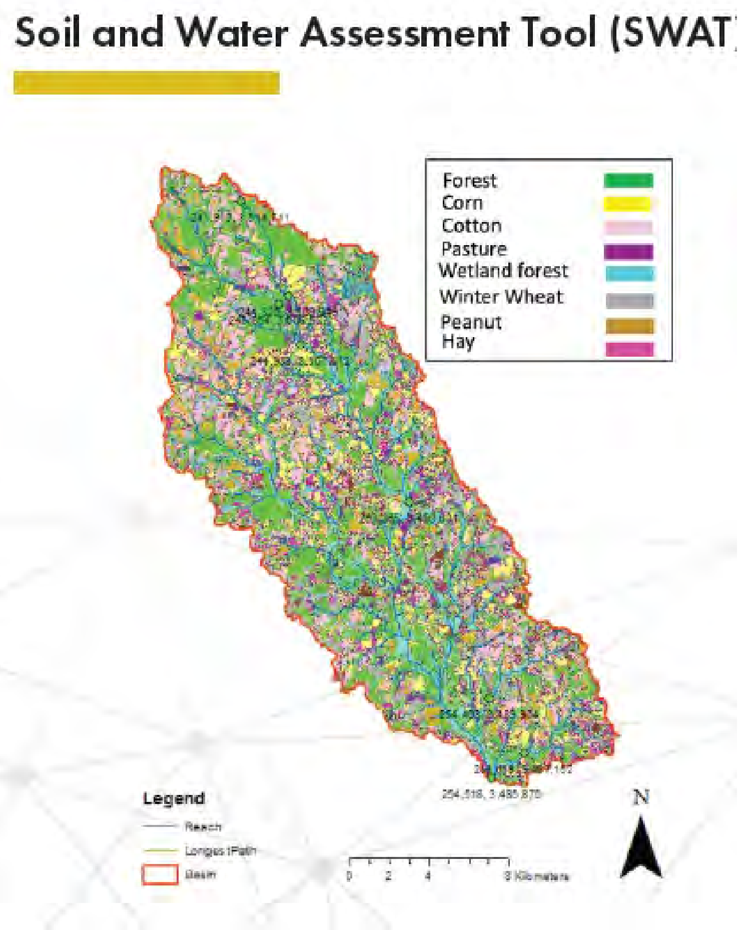
Economic and environmental sustainability metrics of a carinata cropping system and supply chain

- **Site suitability analysis** for the SE (AL, FL, GA) concluded that at least 250 mil gallons of carinata SAF can be produced from the tri-state area
- A **techno-economic analysis** revealed that 65% carbon savings can be achieved at a competitive cost after policy incentives
- **Supply chain optimization** was conducted to better understand how to strategize supply chain infrastructure with respect to distribution of crop yield



Economic and environmental sustainability metrics of a carinata cropping system and supply chain

- Comparative economic analysis of cropping systems with and without carinata revealed that **carinata increased profitability of farmers and eco-efficiency of rotations in the SE US**
- The DayCent model was calibrated to reproduce carinata yield, biomass C:N ratio, emissions in SE US cropping systems to better understand **C sequestration potential**
- Assessed **hydrologic and water quality effects of land use conversion** to carinata as a winter biofuel crop using the SWAT model



Extension & Outreach

Workstream lead: Dan Geller

KEY ACTIVITIES & OUTCOMES

- **Field Days**, GA, FL, AL (2017-2023: 14 delivered)
- Carinata **Production Meetings** GA, FL, AL (2017-2022: 7 delivered)
- **Virtual Cover Crops In-Service Training** (2020: 56 Attendees)
- Annual **Carinata Production Guide** (2017-2023)
- **SPARC Factsheets** (15 published)

Field Days (2017-2023)

14 Annual Field Format 2020-2021

Producers, Extension, Partners

Grower Meetings (2017-2023)

Extension & industry partnership

10+ delivered

Recruitment of new growers

Focused on production information

Virtual Cover Crops In-Service Training (2020)

In lieu of in person events during COVID

56 attendees AL, GA, FL

Extension, Growers, Industry

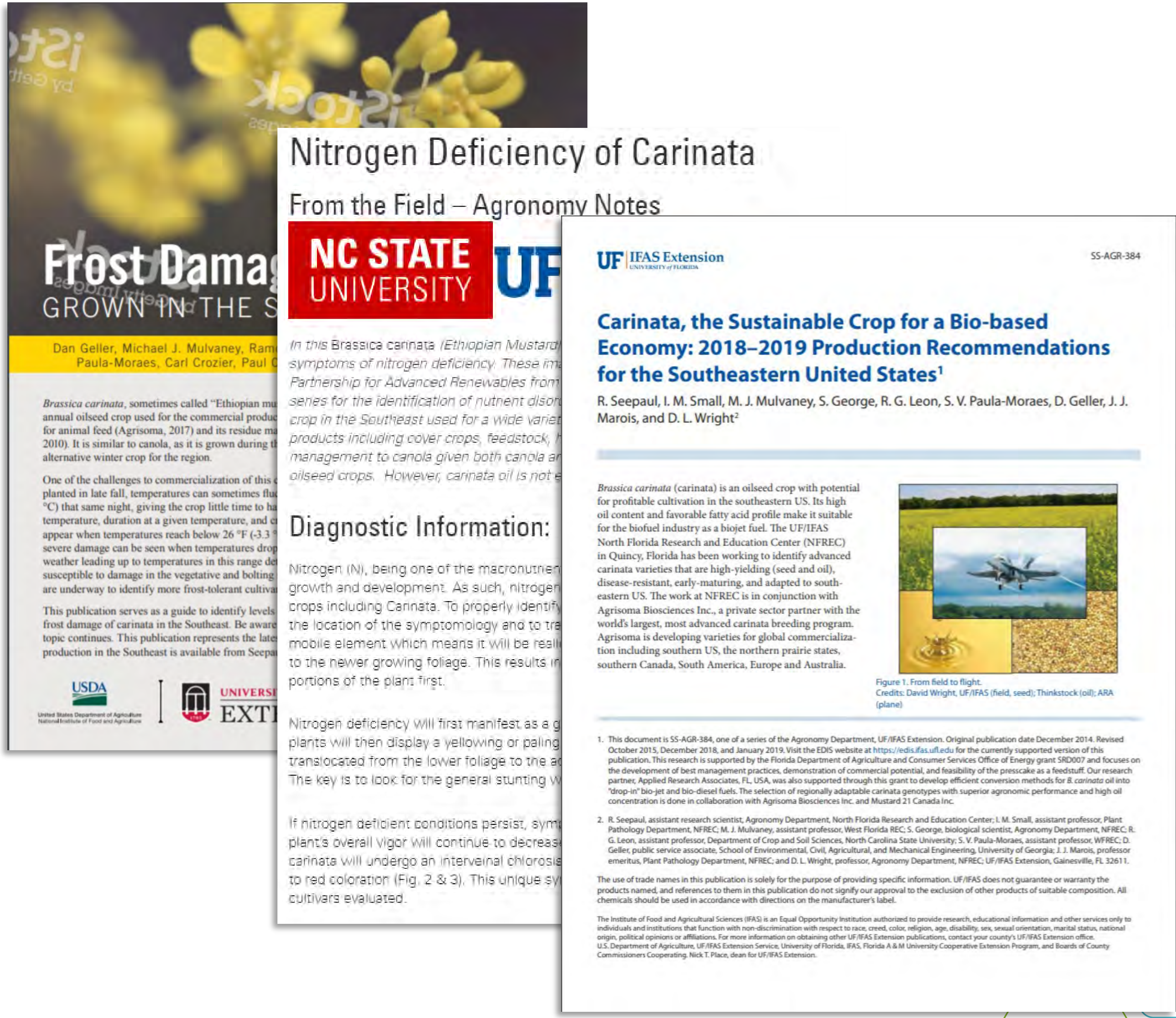
Carinata and other cover crops

SPARC Factsheets

15 factsheets

Annual Carinata Production Guide:

- Rotations
- Disease
- Stand Management
- Pests
- Harvest
- Post Harvest
- Frost Damage
- Nutrient Deficiency
- And More…

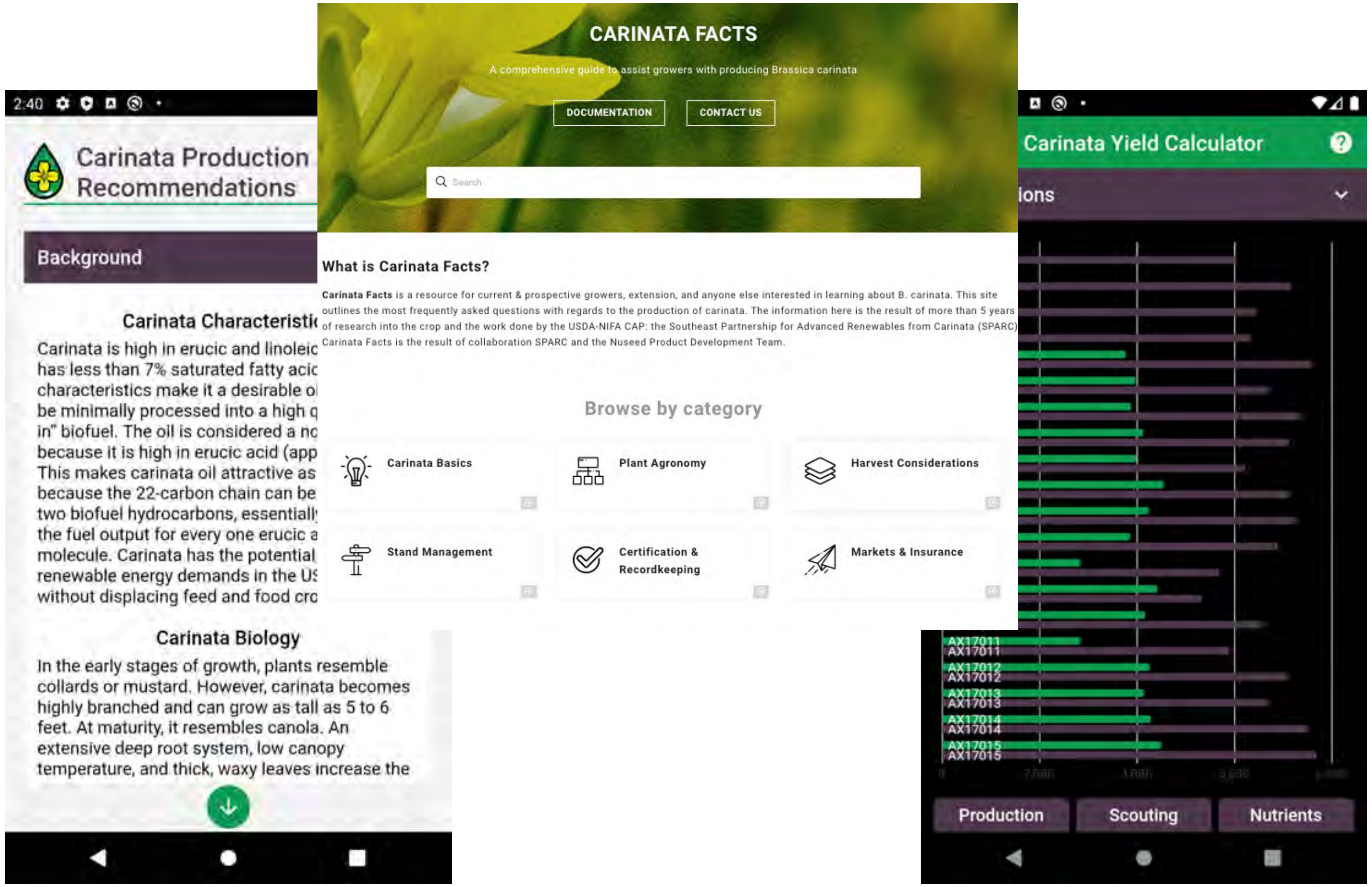


Carinata Mobile App and FAQs

App Available on Google Play

Established CARINATA FACTS

available at https://carinata-facts.org/



Social Science

Workstream Lead: Wendy-Lin Bartels

KEY ACTIVITIES

- Linking research and extension for feedback, learning & project improvement
- Documenting the **drivers of adoption** & assessing **stakeholder needs**
- Facilitating **stakeholder engagement** through outreach activities

SUMMARY OF SOCIAL SCIENCE DELIVERABLES PRODUCED

- 1 Peer-Reviewed **Publication** (2 in prep)
- 11 Conference **Presentations**
- 5 **Fact Sheets**
- 4 Internal Project **Reports** (1 in prep)
- 2 Funding **Proposals**
- **Communications & Outreach Products**
  - 11 Videos (2 in development)
  - 18 Print & Digital Publications
  - 4 Websites
- 4 **Committees**
- 13 +++ **Meeting Design & Facilitations**
- 14 +++ **Listening Events**

Energy Research & Social Science 70 (2020) 101665

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

In pursuit of a homegrown biofuel: Navigating systems of partnership, stakeholder knowledge, and adoption of *Brassica carinata* in the Southeast United States

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[a] School of Forest Resources and Conservation, University of Florida, Gainesville, FL
[b] North Florida Research and Education Center – Suwanee Valley, University of Florida, Live Oak, FL
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ARTICLE INFO

Keywords:
Brassica carinata
Technology adoption
Extension
Oilseed
Biofuel

ABSTRACT

An emerging off-season crop in the Southeast United States (SE US) may provide farmers and industry with a climate-friendly means of enhancing the region's agricultural and bioenergy landscapes. Carinata (*Brassica carinata*) is an industrial oilseed that serves as a feedstock for renewable jet fuel and promises producers financial and soil health benefits. The likelihood of carinata adoption among producers depends on how well this technology fits within the region's complex cultural and socio-economic conditions. This paper examines factors shaping adoption among producers in the SE US, taking into consideration theories of technology adoption that place emphasis on both the individual and complex systemic factors. Findings indicate respondents perceive

SPARC | CARINATA FACTS
Social Science Initiative

Timeline: Establishing Carinata in the Southeastern US

1980s
Industry and producers began experimenting with sesame, canola, and camelina.

2011
Applied Research Associates (ARA) introduced Agrisoma to Dr. David Wright, leading UF to pursue carinata research. UF Established the Advanced Renewables for Carinata (ARC) team in collaboration with Agrisoma and ARA.
Carinata research in the SE US begins at the North Florida Research Center in Quincy, FL. Initial field tests reveal its potential as a winter crop for producers in the SE US.

2012
Other UF research stations became involved: Citra, Jay, and Live Oak. Expansion of research to different soil types.

2013
$1.1 million grant is awarded to UF by Florida Department of Agriculture and Consumer Services allowing for further research from 2013-2016.

2014-2015
1st commerical growing season: Northern Florida

2015-2016
2nd commerical growing season: Demonstration production expanded to include Alabama & Georgia

2016-2017
3rd commerical growing season: Demonstration production expanded into more of Alabama and Georgia and into Tennessee

2017-2018
4th commerical growing season

2018-2019
5th commerical growing season

2019-2020
Production Paused

First Annual Carinata Biomaterials Summit is held.

SPARC is awarded $15 million from USDA-NIFA, bringing together regional land grant universities and 1890 institutions, fortifying existing partnerships with Agrisoma and ARA, as well as forging new partnerships with the Commercial Aviation Alternative Fuels Initiative & others.

Qantas International flight departed from Los Angeles to Melbourne with 10% carinata biofuel.
Agrisoma, United Airlines and World Energy completed longest transatlantic biofuel flight (30% Carinata) from San Francisco to Zurich.
SPARC R&D and stakeholder engagement continues.

New industrial partner: Nuseed.
ARA's Biofuel Isoconversion was ASTM certified.
FTOT was optimized for Carinata.

Cite as: Rigsby, D., Christ, B., and W. Bartels 2021. **Timeline: Establishing Carinata in the Southeast US.** *Carinata Facts Social Science Initiative: Issue 2.* SPARC Project Fact Sheet
For more information contact: wendylin@ufl.edu

USDA National Institute of Food and Agriculture U.S. DEPARTMENT OF AGRICULTURE
UF IFAS UNIVERSITY of FLORIDA
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SPARC | CARINATA FACTS
Social Science Initiative

Expanding Knowledge Exchange at Carinata Field Days

Field days offer an opportunity to provide hands-on demonstration and training for producers, policymakers, and industry partners alike. Stakeholders engage in meaningful conversation over generative themes, coffee, and robust field studies. However, theory surrounding adult learning and engagement suggests traditional approaches to field days could be re-imagined to make them more impactful. This fact sheet aims to outline considerations for a knowledge exchange approach to field days.

Figure 1: Field day participants examining a carinata study.

In Review (2016-19)

The SPARC project held a number of field days during the first three years of programming. These locations spanned the tri-state area, including: Jay, FL, Quincy, FL, Milstead, AL, and Tifton, GA; with attendance ranging from 25 to 70 participants. Following exit surveys, participants indicated that they were satisfied with the events. However, participants and organizers both recognized there was room for improvement in the field day format. Could *Extension systems reevaluate their approach to field days in order to enhance learning and knowledge exchange?*

Building a Dialogue

A key component of enhancing the learning and knowledge exchange during field days is creating space for dialogue and reflection. While the presentation format allows for opportunities to highlight information, and Q&A sessions provide feedback and clarification, neither allow stakeholders to guide the conversation to support their own decision making processes and highlight their specific concerns.

To create such an approach, we can borrow from the Kolb's Learning Cycle. Kolb's framing orients learning in a cyclical process of discovery. Learners move from concrete experience with a subject to reflective observation, reflecting on their own experiences, challenges, and successes. Next, learners use abstract conceptualization to identify knowledge and relevant take-aways they can utilize in their own lives. Finally, participants engage in active experimentation when they discuss which aspects they could put into practice within the particularities of

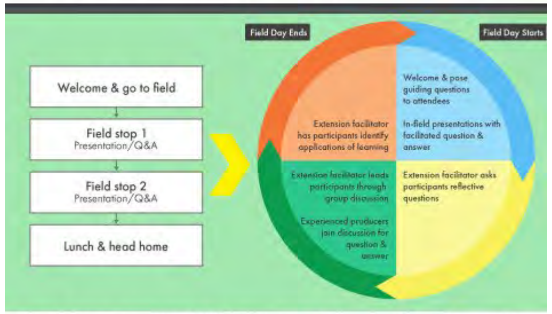

Figure 2: Illustrates two approaches to field day. The left is a conventional approach while the right diagram applies Kolb's Learning Cycle to the engage and enhance knowledge sharing among participants.

SPARC
ALL-TEAMS MEETING

Halloween Special: Who is afraid of the Inflation Reduction Act?

> Monday, 31th October
> 2:00 - 3:30 p.m. EST

SPEAKERS

Chris Cassidy
Renewable Energy Advisor
US Department of Agriculture

Alison Pokrzywinski
Product Development Manager, NA

AGENDA

2:00-2:05	Welcome Statements
2:05-2:15	Icebreaker
2:15-2:40	*Inflation Reduction Act, Chris Cassidy*
2:40-3:05	*Commercial Carinata Update, Alison Pokrzywinski*
3:05-3:30	Project Updates

Questions? Concerns? Feedback?
Contact: rigsbyd@ufl.edu

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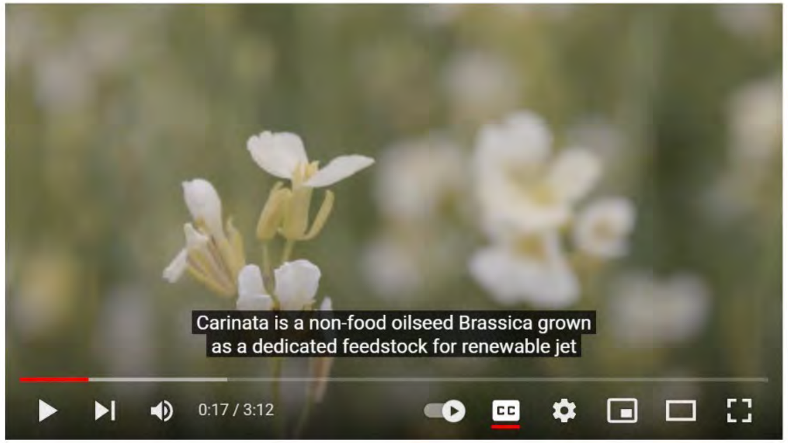
YouTube Search



What to Consider when Harvesting Carinata.

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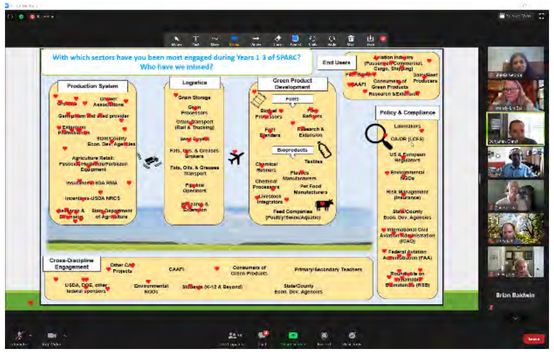
SPARC | SCOPING REPORT

Considerations for future carinata commercialization

Executive Summary

Carinata is well-suited to the South US as a winter crop. It is a promising sustainable aviation fuel (SAF) and renewable diesel feedstock that can provide more than 60% greenhouse gas (GHG) savings. By introducing a "cash-cover crop" in the off-season, we diversify our southern cropping systems, create a new revenue stream for the producers, and enhance soil and water health.

Thanks to Dylan and Ben!



Education & Workforce Development

Workstream lead: George P. Philippidis

SUMMARY OF EDUCATION & WORKFORCE DEVELOPMENT ACTIVITIES

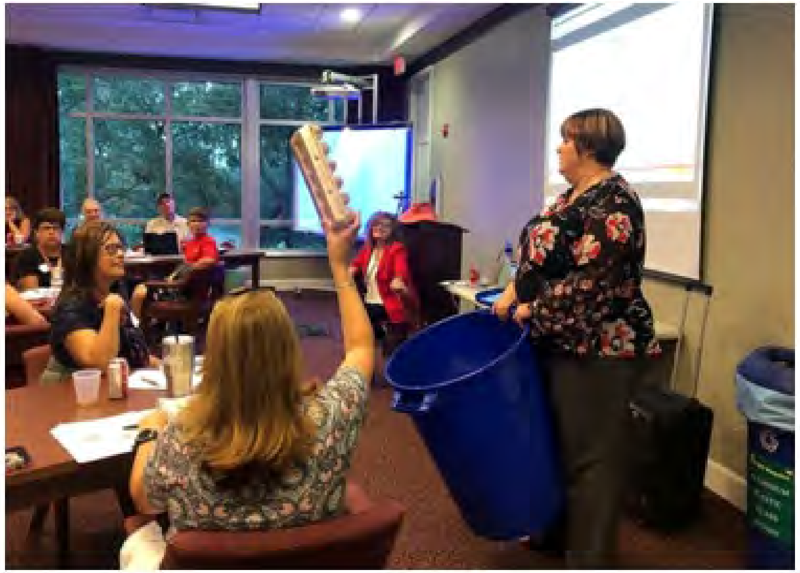
- K-12 **teacher education & training**
- 2 SPARC-wide **webinars**
  - Carinata co-products
  - Life cycle assessment, economics, and supply chain of carinata conversion to Sustainable Aviation Fuel (SAF)
- 60+ **students trained** in carinata research
- **Curriculum development**

K-12 teacher education & training

Seminars on sustainability, sustainable agriculture, and carinata

Over 1,000 teachers in 6 school districts in the Tampa Bay area

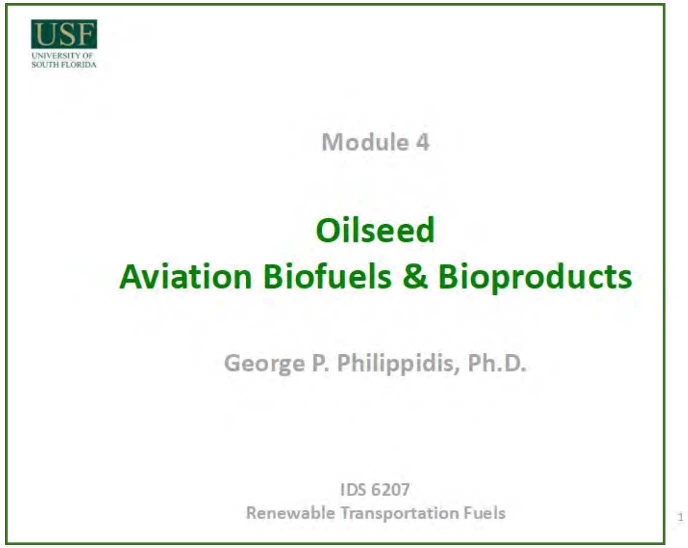
Material to incorporate into curriculum



Curriculum development

Created Sustainable Aviation Fuel module for incorporation into the graduate course “Renewable Transportation Fuels” (IDS 6207) at the University of South Florida

- Sustainable agriculture
- Conversion of carinata oil to SAF
- Coproduct development
- Conversion of carinata meal to renewable sugars
- Use of carinata meal hydrolysate for algae cultivation



Students and Postdoctoral Associates

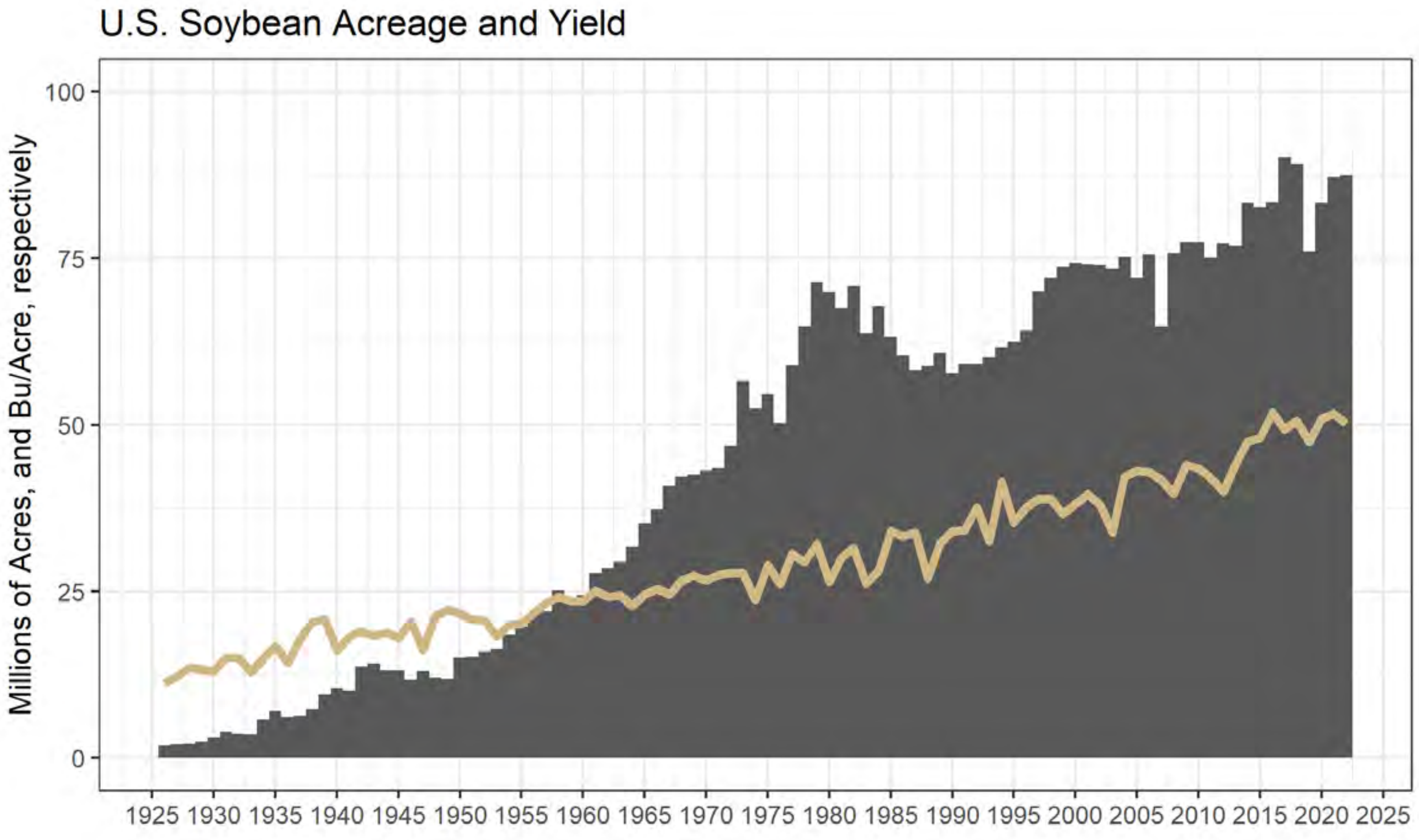
70+ Interns, Students & Postdocs

Expanding SPARC

New partners and collaborators

Key Activities

- Expanded to include two additional academic institutions as partners
  - Purdue University
  - Colorado State University
- Pursued funding opportunities with new collaborators
  - Texas A&M
  - Additional USDA ARS colleagues



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