

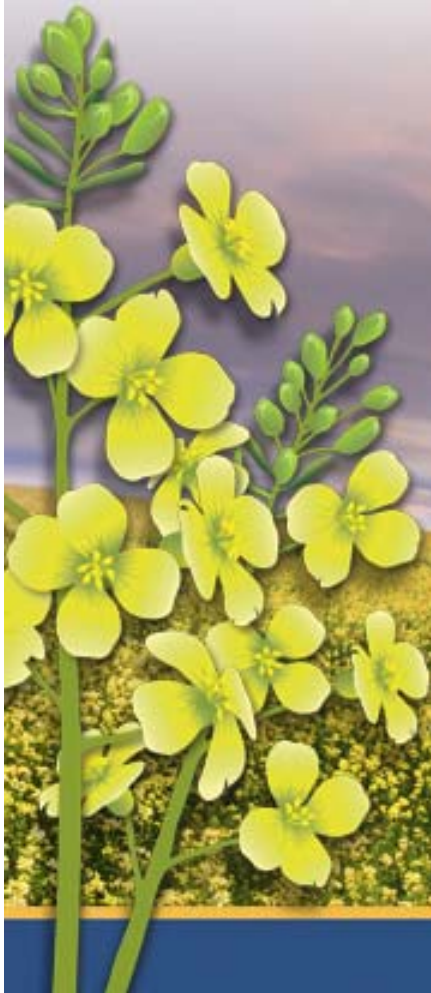


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Sustainable Energy Founded in Agriculture

NSF Workshop on Food, Energy, Water

The Role of Sustainable Oilseeds in Renewable Energy Policy



Introduction to Agrisoma



- We are a crop company that has developed an international program for our *Brassica carinata* “Resonance® brand” seeds – a “drop-in” feedstock product for agriculture
- We have commercialized Resonance with sales on over 20,000 acres of commercial farming: end products of oil used by the biofuels industry and the meal product sold into commercial feed lots
- We are scaling the crop using an established agricultural value chain model to build a secure, economic and sustainable feedstock supply



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Oilseeds and Renewable Energy:

A Growing Biofuels Industry Needs Renewable Oil

- Agriculture supplies the feedstock for biofuels
- Biodiesel growth significant: 0.7 B gal 2003 - 4.5 B gal 2013 - 2020 is 7 B gal (key drivers sustainability, non-food, low carbon intensity)
- Emerging biojet = 30 B gal of demand (global mandate - no food crop use)
- Need to preserve food production capacity and make better use of marginal land
- Crops that offer rotation options and a good fit within farming are the winners



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Brassica carinata (“Carinata”)

- An oilseed crop with high oil content (42 – 46%)
- Grows under tough conditions on marginal lands
- Tolerates heat and drought
- Established agronomic practices
- A ‘drop-in’ product for farming



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Carinata: Certified Sustainable Production

Good Farming, Economic Feedstock

- A non-food cousin to Canola, but unique in tolerance to heat, cold, drought and disease
- Produces oil with superior cold flow biodiesel, efficiencies in bio-jet manufacturing
- High protein meal by-product – excellent animal feed
- Does not displace existing crops, but provides a option for marginal lands and second cropping rotations (low ILUC)



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Sustainable

Has demonstrated the operation of a management system that is compliant with the requirements of:

Roundtable on Sustainable Biomaterials

Standard: RSB-STD-11-01-001; RSB-STD-11-20-001; RSB-STD-11-20-002

The scope of this certificate shall be limited to:

Production of *Brassica carinata* (Ethiopian Mustard)

Production and Chain of Custody compliance with the EU Renewable Energy Directive (EU RED)

This RSB certificate was issued under accreditation by a RSB recognized certification body for compliance with the RSB standards and the RSB certification systems.

Certificate Code: SCS-RSB/PC-0004



One of five crops certified by RSB and only
crop certified for North American Production



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Our Business:

Selling Resonance Seed Products



- Seed sold to farmers in 22.5 kg units (50 lb bags)
- Currently 2 registered commercial varieties (A100, A110) in Canadian and US
- Label registrations for multiple seed protection products
- Industry standard inventory production and management system



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Resonance Variety Development Program



- Focus on developing new varieties with greater yield per acre and improved agronomic traits
- Currently evaluating more than 6000 new DH lines/year
- Extensive trialing carried out in multiple environments
- Agronomic trials carried out with University collaborations (SDSU, U of FL)



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Resonance® Crop Performance

- Commercial production over 4 years in diverse environments in Canada, USA, South America and Europe
- More than 20,000 acres of production to date with over 150 growers
- Planted, harvested and transported with existing farm equipment
- Excellent yields in marginal soil zones under extreme environmental stress



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Regulatory & Sustainable Production of Biofuels:

Required approvals



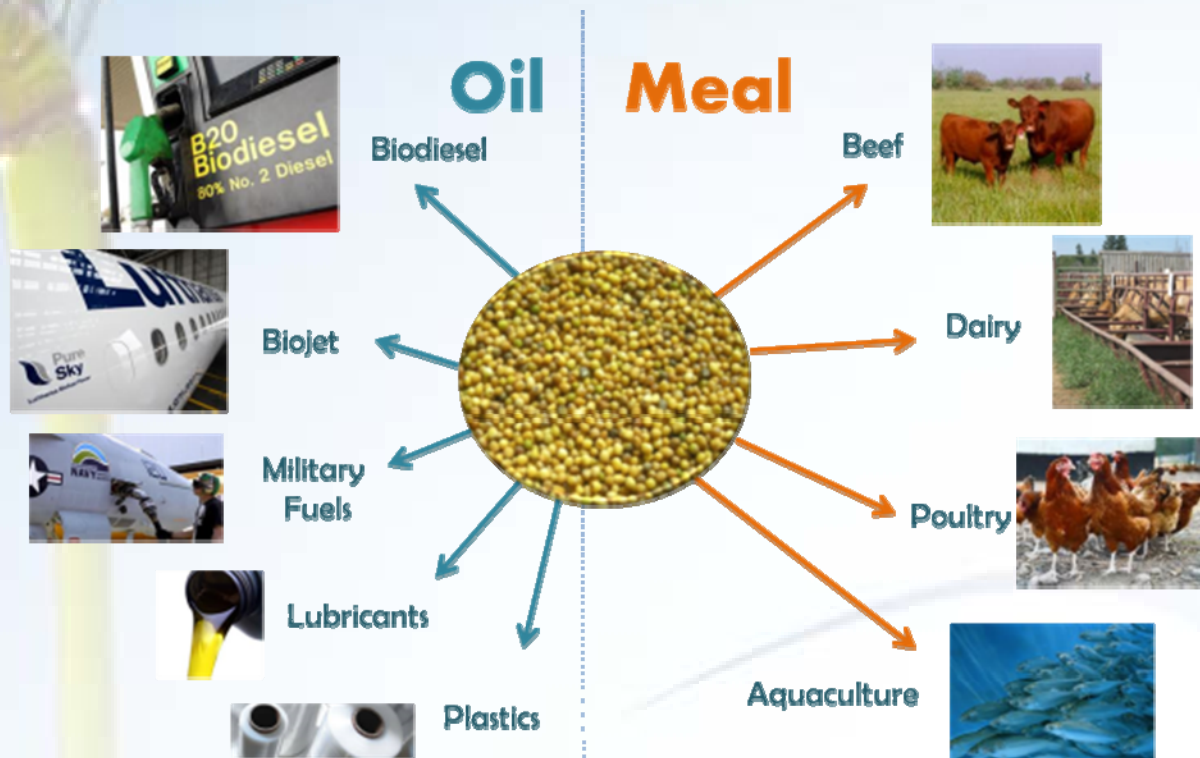
- **USA:** Carinata LCA meets and exceed the 50% GHG reduction under EPA Models (D4, D6, Biomass Diesel)
- **Canada:** Approved as an Advanced Biofuels Feedstock under Alberta RFS, exceeding 50% GHG reduction
- **EU:** RSB Certification recognized under EU Renewable Energy Directive (RED)
- **South America:** double cropping under same protocols that provide RSB certification in North America
- Cultivation in rotation provides for even lower LC GHG and a very low ILUC and CI, e.g., double cropping in Florida, France, Uruguay



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Oil and Meal Products from Resonance Grain



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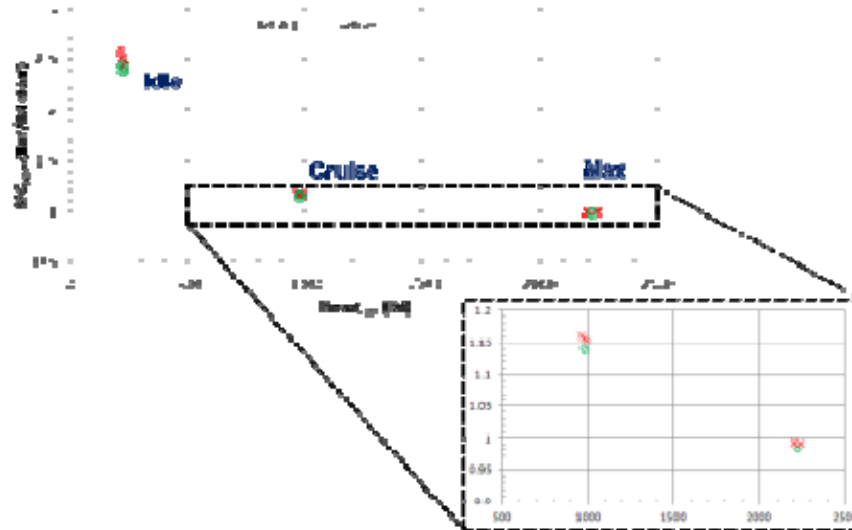
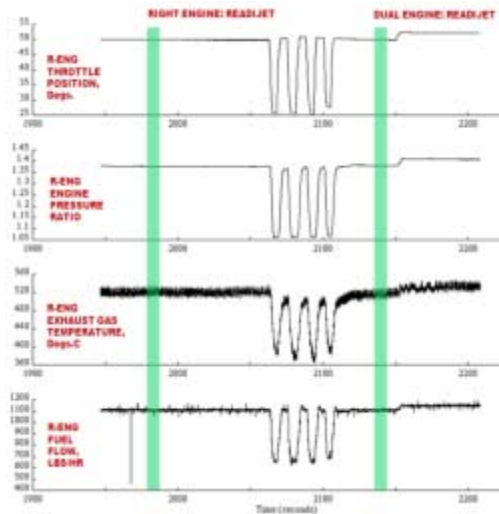
Making Biojet Real: Clean, Efficient and Carbon Neutral Flight



The world's first civilian flight powered by 100% biofuel made from Resonance took off over Canada's capital, as a collaboration between Canadian and US partners



Resonance Carinata 100% Biojet Performance at 37,000 feet



RIGHT ENGINE: READJET, YTD. CAPTURE



TEST AIRCRAFT: NRG FA-20 (S-100)
DATE: 20 OCTOBER 2012
ALTITUDE: 37,000 feet
AIRSPEED: 250 knots

1.5% Improvement in Fuel Consumption during steady state operation using 100% Biojet relative to Jet A1



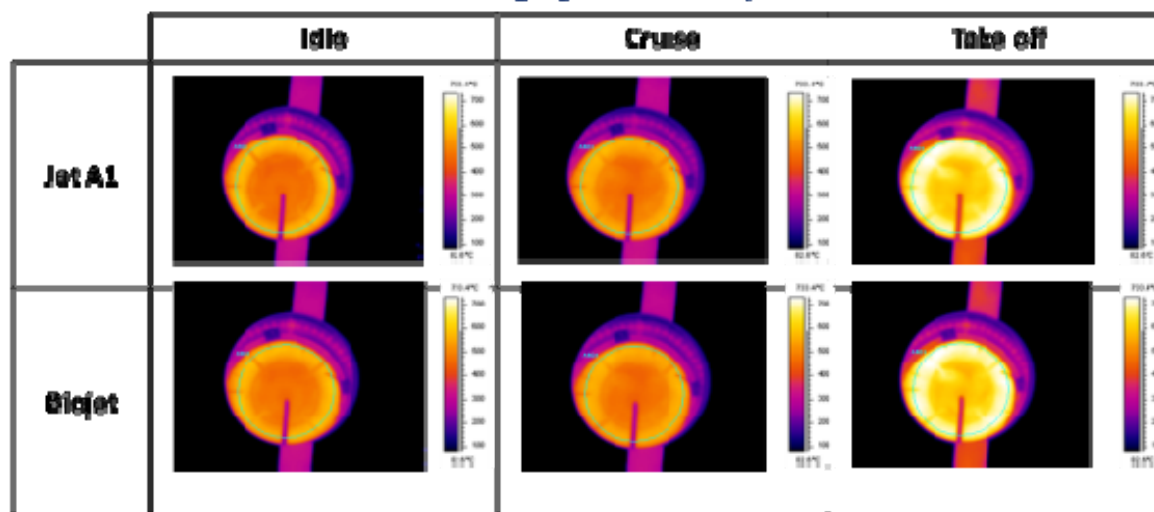
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100% Biojet Engine Performance



Infra-Red Imaging - Metal Temperature



No Differences in
Engine
Temperature
Under Multiple
Loads

Throttle Condition	Jet A1		Biojet	
	Maximum	Average	Maximum	Average
Idle	598.494	510.434	595.041	514.900
Take off	741.942	647.998	743.913	646.279
Cruise	584.011	511.331	584.615	510.807

100% Biojet: Burns Cleaner and More Efficiently without Modifications



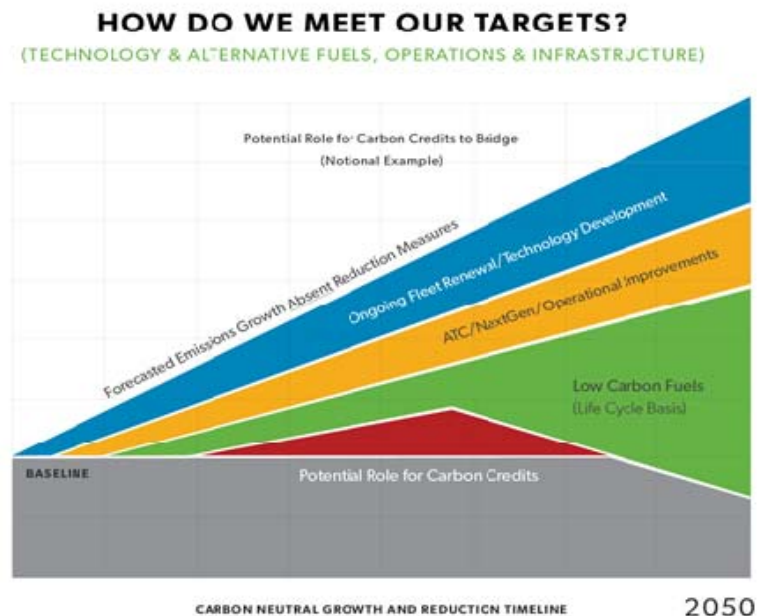
- 100% Biojet provides a measurable increase in fuel economy
- Particulate and Black Carbon Reduced > 50%
- Significant reduction in CN and NO using Biojet relative to Jet A1
- No modifications to fuel system, engine or maintenance



Aviation: A Growing Industry Limited by Emissions

Global Aviation Targets

- From 2009 until 2020: average 1.5% efficiency improvement per year,
- From 2020: Capping emissions growth from aviation,
- By 2050: halving net emissions based on 2005 levels.



What do Agriculture and Aviation need to Produce and Use Sustainable Feedstock ?

Minimum Criteria:

- Non- Food
- Low Indirect Land Use Change
- Sustainable Production – e.g., RSB Certified
- Competitive Economics

Aviation

Reality Criteria:

- Scalable within existing farming operations
- Economics: farmers get paid, feedstock price right, positive margins in the chain
- Ability to use existing infrastructure

Agriculture



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Renewable Carbon: Plant Derived Oil is an Ideal Feedstock

- Waste streams provide a source of carbon but scalability is limited
- Dedicated feedstock supplies require significant infrastructure to deliver both scale and reliability
- Agriculture is an industry that operates at massive scale with least cost models across the supply chain
- Agriculture also operates on a global basis with long term supply agreements that reduce volatility

**Feedstock from Agricultural Sources
Represent an Ideal Supply of Carbon**

Building a Sustainable Feedstock Supply Chain



Seeds Business

- HI Gross Margin
- Lowest Risk
- Effective Inventory Management



Farming

- Variable Gross Margin
- Highest Risk
- Look for crop options to mitigate commodity swings



Elevation & Transportation

- Thin Gross Margin
- Volume Dependant
- Need rapid flow through system



Crusher

- Huge volumes
- Fluctuating Margins that can go Negative
- Meal value key component



Biofuel Manufacturer

- Margins swing significantly
- Feedstock costs
- Regulatory environment

In addition to minimum criteria of non-food, RSB & low ILUC, the commercial value chain has to work for each step



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Our Value Chain Partners: World-Class Scale



100 years of business
9 inland high throughput terminals
20 crop input locations
Alliance Grain Terminal (Vancouver
with 2.3 Million MT of capacity)
Coverage of over 70 MM acres of
farmland



Since 1998, largest producer of OP
Canola seeds
Proven cost efficient management of
seed production and inventory

SMDC / M21:



World's largest specialty production group for mustard crops
Directly involved in Carinata production with levy rights, incentivizing production
Access to all the growers in the 16 million acres of dry brown soil zone



Sustainability as an Opportunity for Innovative Business Models

Sustainable and scalable feedstock options exist:

- Aviation needs to look at new business models that can leverage the sustainable advantage agriculture delivers
- Agriculture is recognizing the potential for dedicated industrial use crops, the need for sustainable production and new income options

The Technology to Produce Sustainable Aviation Fuels is in Place - Large Scale Sustainable Aviation Fuels will require Innovative Business Solutions that Rewards both Sectors



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Thank You

Michael Lindenbaum

mlindenbaum@agrisoma.com

