Sustainable Energy Founded in Agriculture
Agrisoma:

• We are a crop company that develops and sells seeds of *Brassica carinata* – a “drop-in” product for agriculture
• We have commercialized Resonance® Carinata - a sustainable, non-food crop that delivers high quality industrial oil
• We are scaling the crop through leveraging the current agricultural value chain using well established partners and business models
Why Resonance Carinata Works:
Familiar, Proven and Backed by an Established Value Chain

• **Familiar:** Unlike other new energy crops, Carinata leverages the Canola experience to enable rapid scaling – we are the cousin to Canada’s most successful recent crop

• **Proven:** Over 10,000 acres with 70 growers and increasing, oil being used by largest biodiesel manufacturer in the USA, meal sold into beef markets, proven sustainable and low carbon footprint – the only crop in this elite class that is the new standard for sustainable biofuel feedstock

• **Backed by Value Chain Investment:** using the commitment of established global, commercial partners (Canterra, Paterson) and grower organizations (SMDC / M21) Carinata is a profitable crop of choice for all of the value chain participants
Agrisoma’s Brand

• An oilseed cousin to Canola
• Tolerates heat, cold & drought
• Non-food oil – superior cold flow biodiesel, bio-jet
• High protein meal – excellent animal feed
• Certified sustainable under the Roundtable on Sustainable Biomaterials
• A “drop-in” product for farming
High Value Products from Resonance Grain

- Oil
  - Biodiesel
  - Biojet

- Meal
  - Beef
  - Dairy
  - Swine
  - Aquaculture

- Additional Products
  - Military Fuels
  - Lubricants
  - Plastics

AGRIsoma
Sustainable Energy Founded in Agriculture
Our Commercial Value Chain
World-Class Scale

Seed → Farming → Elevation Transport → Processing Oil & Meal → Fuel Manufacturing
Critical Milestones Achieved

Commercial: From Farming to Fuel
• Two years of commercial seed sales with marketing and customer support
• Grain management program in place including sales and delivery of carinata oil and meal
• Carinata biodiesel in retail pumps with largest biodiesel manufacturer in USA

Regulatory: Multiple Regulatory Approvals in Place
• Regulatory meal approval in N. America—protein by-product certified for feed use
• Sustainability certification – RSB awarded certification, only one of four crops certified globally, AB and BC certification, EPA RFS 2 petition pending, CA certification underway

Scaling: Partners and Support for Global Scaling
• Commercial partnerships for Carinata production - southern prairies and northern tier U.S.A., Southeastern U.S.A., France, Uruguay & potentially Australia
Current Marketing Focus

Northern Tier plains production expansion
- Contracting program for limited acres in Canada and northern U.S. to be rolled out in late January and early February.
- Contracting focused on eastern region of production zone, optimizing logistics.

South Eastern US winter production
- First year commercial production, 3000+ acres in Florida, Georgia and Alabama
- Carinata oil produced to support ARA US Navy 100% fuel certification project

Continue to drive for improved value creation
- Test and advance locally adapted, higher yielding germplasm
- Enhance meal value - suitable for dairy and poultry markets, regulatory studies initiated
- Focus on competitive advantage - oleochemistry applications and drive biojet capacity
- Leverage low Carbon Intensity and low-ILUC status in key markets (California, BC, EU)
Current Marketing Focus

Seeding and Fertility
- Timing and rate: similar to canola, slightly higher seeding rates. i.e. 6 to 8 lbs per acre.
- Seed treatments: Prosper Evergol & Helix Vibrance, Lumiderm/Fortenza labelled for cutwork control.
- Follow canola fertility 35 lbs N to 110 lbs N. Recommend an average of 65lbs N.

Crop Protection
- Herbicides: Glyphosate / Clean Start burndown, trifluralin/Treflan, Assure II, Muster Gold.
- Fungicides: Lance for sclerotinia and alternaria
- Insecticides: Matador and Coragen

Continue to drive for improved value creation
- Straight cut, best Brassica for shatter tolerance
- Leave the crop until the plant stems turn golden/brown
- Desiccation: Heat labelled for all types of Mustard.
Several agronomy studies currently underway.

1. Crop Sequence (includes all *Brassica* species)

2. *Brassica carinata*: Seed Rate X N in Weedy / Low-Weed Conditions
Crop Sequence Study

Year 1: Plots of chem-fallow, wheat, and lentil seeded (2013, 2014)
Year 2: Yellow mustard, camelina, carinata, oriental mustard, and canola are seeded on each stubble type (2014).
Year 3: Durum wheat seeded on Brassica species to determine impact of oilseed crop on succeeding cereal crop.
Crop Sequence Study

Conducted at Scott, Swift Current, and Lethbridge
Lead: Johnson; Collaborators: Gan, Swift Current; Blackshaw, Lethbridge
2014 Good growing conditions at all locations
Sclerotinia very prevalent at Scott in 2014 study
Only one year of results; very preliminary
Will be repeated 3 times at each location
In total, we will have 9 site-years of data
Crop Sequence Study

2015 Results (very preliminary)
• Swift Current and Lethbridge, previous crop stubble had an effect on the following oilseed crop yield
• Scott site demonstrated no effect of previous crop stubble.
• Fallow plots yielded better than Lentil or wheat stubble plots at Lethbridge and Swift Current
Crop Sequence Study

- Study will continue 3 more years.
- In 2015, will have completed:
  - The first year of Year 3 phase / effect of oilseed crop on succeeding durum crop
  - and a second year of Year 2 phase / effect of preceding stubble on subsequent oilseed crop.
Seed Rate X Nitrogen rate in Weedy / Low Weed Conditions

Locations: Scott, Swift Current, Lethbridge
Lead: Johnson; Collaborators: Gan, Swift Current; Blackshaw, Lethbridge.

Factorial Study:
Weedy / Low Weed (Edge fall applied);
Nitrogen Rate (Low / Recommended / High);
Seed Rate (50, 100, 150, 200, 300 seeds m⁻²) Seeding rates work out roughly to 2.5, 5, 7.5, 10, and 15 lbs / acre.
Weed control by seeding rate interaction on yield. Scott. 2014

\[ y = -0.0003x^2 + 0.1563x + 50.069 \]
\[ R^2 = 0.8752 \]

\[ y = -0.0005x^2 + 0.2995x + 12.75 \]
\[ R^2 = 0.9725 \]
Fertility X Seed Rate Interaction on Seed Yield.
Scott. 2014.

B. carinata yield (bus/acre) vs Seeds per m2

Low, Reg, High

Graph showing the interaction between fertility and seed rate on seed yield for B. carinata.
Weed Control X Seeding Rate Interaction on Weed Biomass. Scott. 2014.

70% reduction in weed biomass
Fertility X Seeding Rate Interaction on Weed Biomass. Scott. 2014.

Weed biomass (g m²) vs Seeds per m²

- Low
- Reg
- High
Contract Agronomy Studies

- Seeding Rate (1.5, 3, 6, 9, 12 lbs/acre). 5 treatments
- Soil Fertility (0, 40, 80, 120, 160, 200 kg/ha). 6 treatments
- Crop Protection (Muster timing X adjuvant repeat). 13 treatments.
Effect of Seeding Rate on B. carinata Yield.
Vanguard 2014.

\[ y = -0.0613x^2 + 3.1524x + 26.557 \]

\[ R^2 = 0.9906 \]

$8.80:$1.00
$4.40:$1.00
$3.73:$1.00
$4.67:$1.00
Brassica carinata N response
(Adapted from Johnson et al. 2014. CJPS and unpublished data)

Assumptions:
N fertilizer cost = 65 cents/lb
Carinata Price = $ 9.50 / bushel

N input for maximum yield 189 kg ha⁻¹
Herbicide / Weed Control Projects

1. Authority (sulfentrazone)
2. Assure / Muster tank-mix studies
Authority in B. carinata mustard

- Registration has not yet been submitted
- Have seen injury when soils get saturated
- Lower rate will probably be considered further in 2015
Authority in Mustard, Scott, 2013
Effect on Crop Injury

% Visual Injury

Mustard Species

Carinata
Oriental
Yellow

0  70  105  140  210

0.0  5.0  10.0  15.0  20.0
Authority in Mustard, Scott, 2013
Effect on Seed Yield

Cross-hatched bars are statistically lower than the untreated check.

Mustard Species

- Carinata: 77.3, 77.6, 73.1, 70.1
- Oriental: 56.3, 60.5, 59.7, 59.1
- Yellow: 33.7, 35.7, 38.7, 35.0

Yield (bushels/acre)
Authority in Mustard, Scott, 2013
Effect on plant stand

Cross-hatched bars are statistically lower than the untreated check.
Assure / Muster in *B. carinata*

- Assure II and Muster Toss-N-Go are registered in *B. carinata*.
- 2012 data raised some concerns about tank-mix and crop injury (was it due to adjuvant, timing?)
- Additional studies conducted in 2014
  - Scott, Stewart Valley
Study 2: Assure / Muster tank-mix studies

• Applied 1 and 2X rates of Assure and Muster tank-mix either with Sure-Mix or Merge adjuvant at 2, 4 and 6-leaf stage of B. carinata.

• Also, had a weed-free check for comparison.
Assure / Muster tank-mix in B. carinata – Scott, 2014 Seed Yield

Leaf stage

B. carinata yield (bus/acre)
Assure / Muster tank-mix in B. carinata – Scott, 2013 Seed Yield

Yield (bus/acre)

Carinata Leaf-Stage

2-lf  4-lf  6-lf  Untreated
Assure / Muster tank-mix in carinata – Scott, 2014

Seed Yield

Yield (bus/acre)

Leaf-Stage

2-lf

4-lf

6-lf
Assure / Muster tank-mix in carinata – Scott, 2013

Seed Yield

Yield (bus/acre)

Carinata Leaf-Stage

2-lf

4-lf

6-lf
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Resonance Energy Feedstock
Growing Fuel on the Farm