



Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)

Investor Presentation

Yield10 is developing new technologies to achieve step-changes in crop yield to enhance global food security

June 2019



# Safe Harbor Statement\*

The statements made by Yield10 Bioscience, Inc. (the “Company,” “we,” “our” or “us”) herein regarding the Company and its business may be forward-looking in nature and are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements describe the Company’s future plans, projections, strategies and expectations, including statements regarding future results of operations and financial position, business strategy, prospective products and technologies, timing for receiving and reporting results of field tests and likelihood of success, and objectives of the Company for the future, and are based on certain assumptions and involve a number of risks and uncertainties, many of which are beyond the control of the Company, including, but not limited to, the risks detailed in the Company’s Annual Report on Form 10-k for the year ended December 31, 2018 and other reports filed by the Company with the Securities and Exchange Commission (the “SEC”). Forward-looking statements include all statements which are not historical facts, and can generally be identified by terms such as anticipates, believes, could, estimates, intends, may, plans, projects, should, will, would, or the negative of those terms and similar expressions.

Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified and may be beyond the Company’s control, you should not rely on these statements as predictions of future events. Actual results could differ materially from those projected due to our history of losses, lack of market acceptance of our products and technologies, the complexity of technology development and relevant regulatory processes, market competition, changes in the local and national economies, and various other factors. All forward-looking statements contained herein speak only as of the date hereof, and the Company undertakes no obligation to update any forward-looking statements, whether to reflect new information, events or circumstances after the date hereof or otherwise, except as may be required by law.

**\*Under the Private Securities Litigation Reform Act of 1995**

“Yield10 develops high value seed yield traits for the agriculture and food industries”



# Leadership Team

**Oliver Peoples, Ph.D.**  
CEO

- Dr. Peoples is a founder of the field of metabolic engineering, the forerunner of synthetic biology and an experienced entrepreneur and biotechnology executive with over 30 years of experience in science and technology innovation, intellectual property development and commercialization. Dr. Peoples led the development of Yield10's research and business focus

**Kristi Snell, Ph.D.**  
VP Research & CSO

- Previously VP of Research and Biotechnology at the Company with over 20 years of experience and industry recognized expertise in metabolic engineering of plants and microbes for the production of novel products and increased plant yield
- Following her post-doctoral research at MIT, Dr. Snell joined Metabolix in 1997 where she has led the plant science research program since its inception

**Charles Haaser**  
VP, Finance & CAO

- Joined the Company in 2008 as corporate controller and was named chief accounting officer in 2014
- Has more than 30 years of senior accounting management and executive experience with public technology-based companies
- Strong professional background includes technical accounting, SEC financial reporting, Sarbanes-Oxley and tax compliance

**Lynne Brum**  
VP, Planning & Communications

- Joined the Company in 2011 as vice president marketing and corporate communications
- Has more than 25 years experience in the life science industry including roles in corporate communications, investor relations, financial planning and corporate development

# Recent Accomplishments

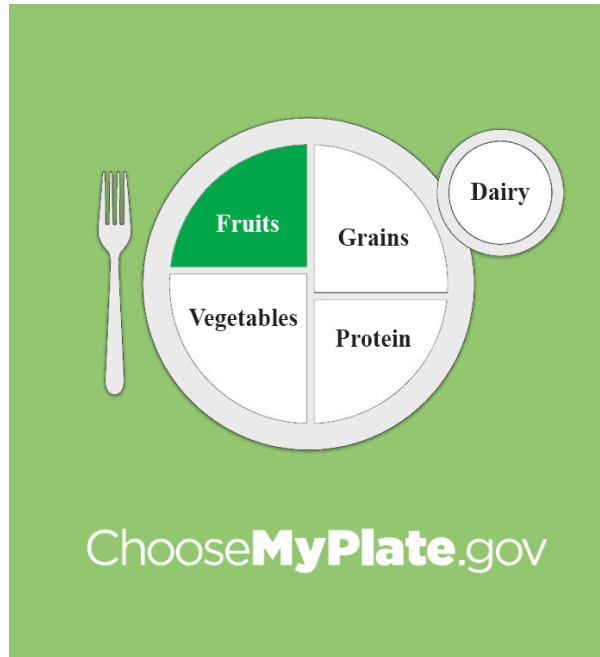
- ✓ Completed seed bulk up, permitting and contracting for 2019 Field Tests for evaluation of seed yield traits in oilseed crops; on track to initiate planting in Q2
  - ✓ Second generation C3003 in **canola** (Canada)
  - ✓ C3004 in **Camelina** (Canada)
- ✓ Progressing characterization of C3007 CRISPR edits in **canola** lines and produced first **canola** lines containing C3004 trait (based on the Camelina gene)
- ✓ Began early development program in **corn** to evaluate 6 novel yield traits including C3003, C3004, C3011, C4001, C4002, C4003
- ✓ Progressing work with C4000 series to obtain seed yield data in **rice** and **wheat**
- ✓ Received a Notice of Allowance from US PTO covering the use of C3003 to increase seed yield in crops
- ✓ In-licensed additional technology to boost oil content in crops (C3012) from University of Missouri based on new IP developed by Dr. Jay Thelen and his team
- ✓ Raised \$2.6 M in registered direct offering of common stock priced at market



# Yield10: A Compelling Market Opportunity

Yield10 develops high value seed yield traits for the food industry

The global population is expected to increase to 10 billion people by 2050<sup>1</sup>



Global Food and Ag is a ~ \$5 trillion market today

Milling/Food Manufacturers | Seed Co | Farmers | Supermarket

Food production has to increase by 70-100% by 2050<sup>1</sup>  
Increased overall demand, increased protein consumption



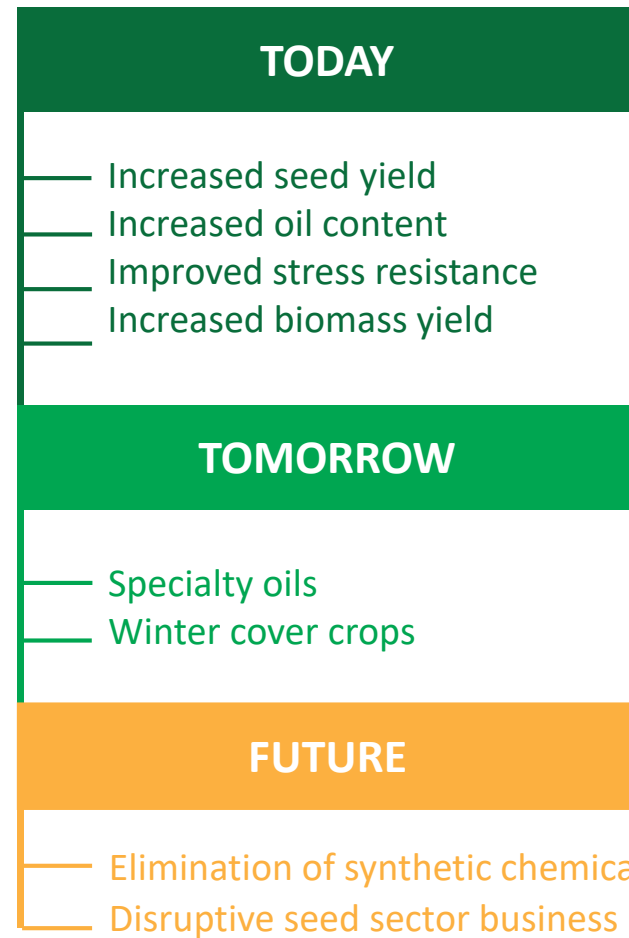
Breakthrough grain crop yield traits are essential for global food security

Traits increasing yield by 10-20% would be disruptive to the seed industry

1. <https://www.mckinsey.com/~media/McKinsey/Industries/Private%20Equity%20and%20Principal%20Investors/Our%20Insights/Global%20agriculture%20many%20opportunities/Global%20agriculture%20many%20opportunities.ashx>

# The Yield10 Trait Factory

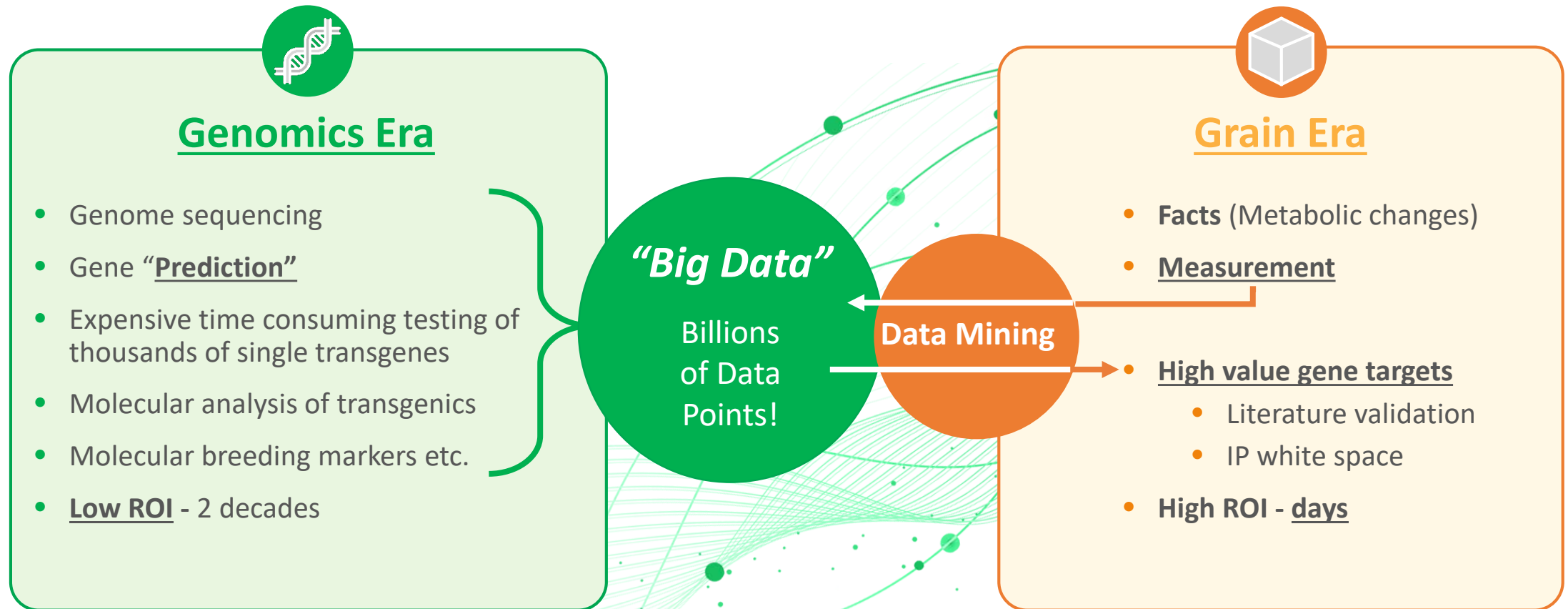
Yield10 combines advanced discovery with genome editing to develop valuable traits



**BIG DATA**

## GRAIN 3.0 (Gene Ranking Artificial Intelligence Network)

- On some level a plant phenotype or trait reflects altered metabolism due to genetic variation
- GRAIN uses metabolism to rationally mine genomics data





## Yield10 technologies enable multiple paths to value creation



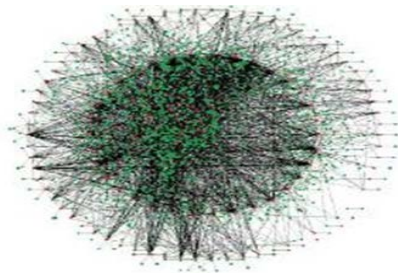
### North American Commodity Crops

- Accelerate deployment with Ag majors
- License agreements with milestones and participation in downstream economics



### Specialty and Niche Crops including Nutritional Oils

- Focus on development of high value products in food and animal feed
- Participation in the downstream business

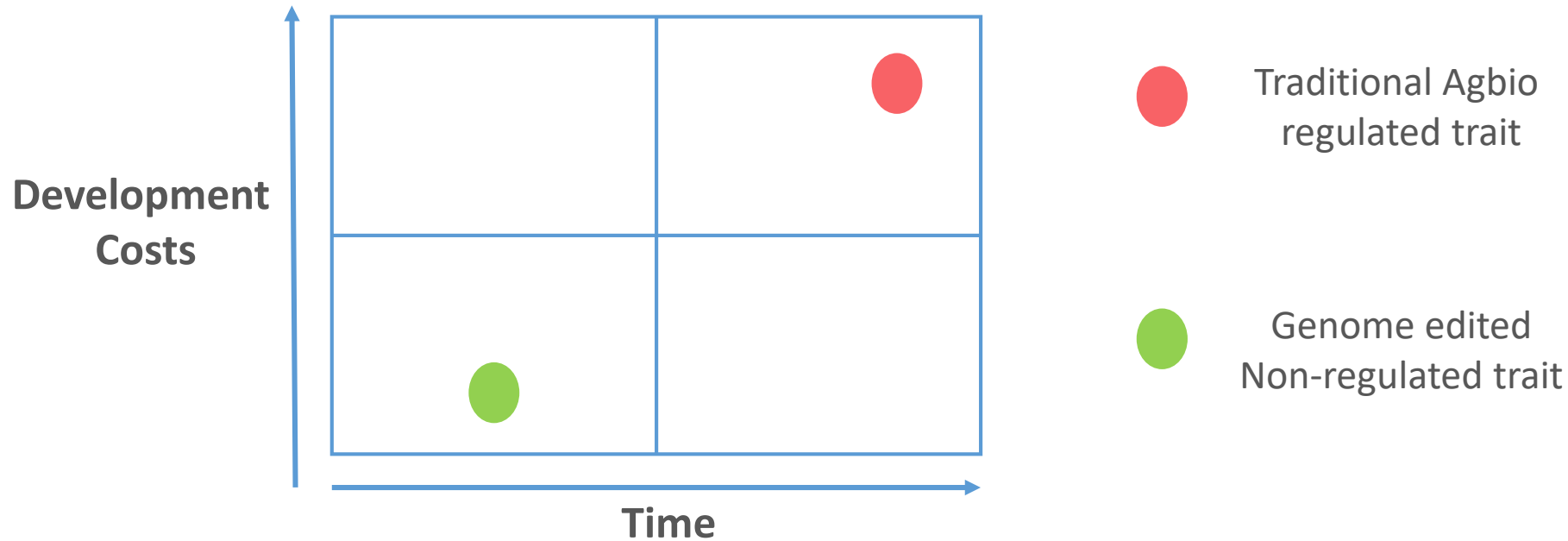


### Technology Platforms

- “GRAIN” unique approach to identifying gene combinations for editing
- Non-dilutive funding and relationships with leading plant scientists
- R&D support for partner funded programs

# Impact of Genome Editing – Non-regulated Traits

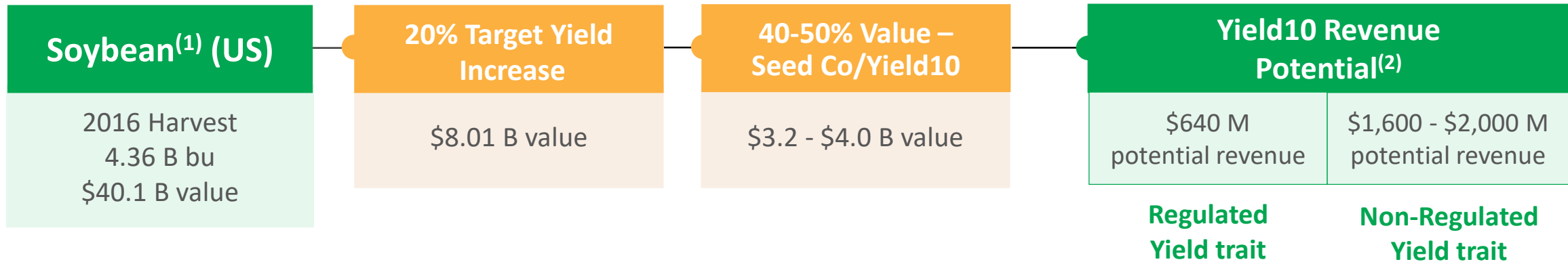
A yield trait enables increased crop revenue, where ~60% of the trait value-add goes to the farmer



- Genome editing of traits (CRISPR) reduces cost/eliminates a regulatory barrier
- Enables new business models for some crops and crop attributes
- Enables crop diversification – opportunities for farmers

# Potential Revenue Impact of Genome-Editing

## Genome-editing could dramatically increase revenue to trait innovators



- CRISPR/Cas9 License in place with BROAD/Corteva
- Success with USDA-APHIS approvals of single and multi-gene edits in Camelina validates Yield10's capabilities
- GRAIN platform and proprietary high yield plants identify novel targets in major crops for editing
  - e.g. C3004 identified in C3003 Camelina enables up to 65 % increase in seed yield
  - e.g. C4004 identified in C4001 and C4003 switchgrass currently being edited in rice and wheat

1. [https://www.nass.usda.gov/Newsroom/2017/01\\_12\\_2017.php](https://www.nass.usda.gov/Newsroom/2017/01_12_2017.php);  
High Plains/Midwest AG Journal, Jan. 19, 2017

2. Assumptions: Yield10 target of 5-12% of the value add for yield traits; used 8% in calculations. Deployment of yield trait through genome editing and non-regulated path (through USDA-APHIS) could enable Yield10 to capture greater proportion of value add based on faster time to market and lower development costs.

# Affiliations Expand Testing of Traits in Key Crops

Leveraging crop expertise of Ag players to deploy Yield10 traits in commercial germplasm, collect field testing data on crop yield performance and provide path to commercial licensing



In-house expertise in Camelina, canola and rice  
Access to expertise in soybean and corn



Bayer CropScience

Research license to C3003 and C3004 for evaluation and field testing in elite soybean lines



Research license to C3003, C4001, C4002, C4003 and C4029 for evaluation and field testing in elite forage sorghum

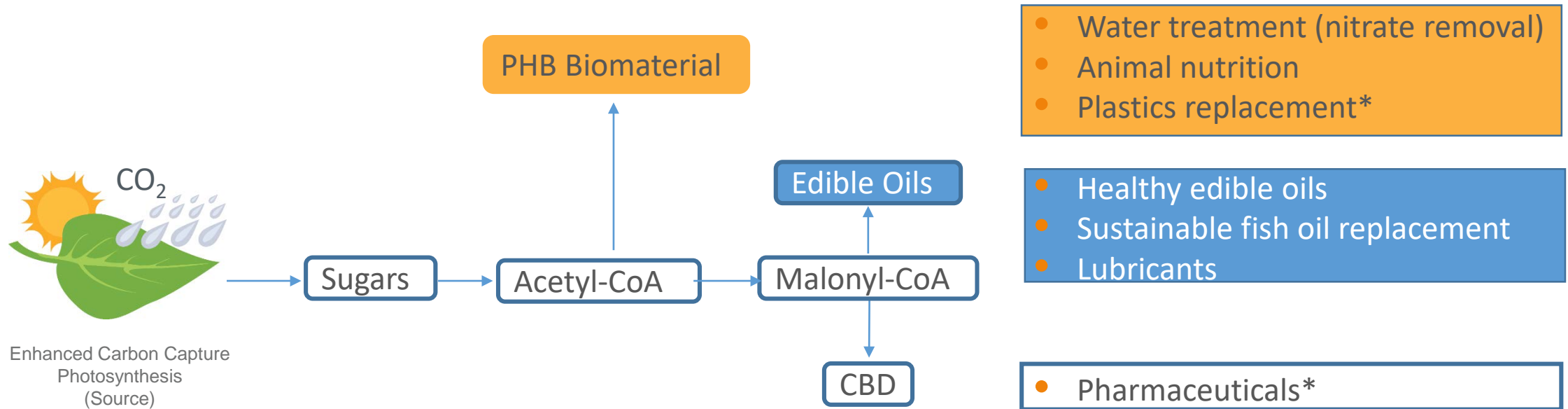


Yield10 research partner for evaluation of novel yield traits in wheat

**Many additional opportunities exist for licensing and/or partnerships**

# Potential Niche Crop Product Targets

- Product targets under consideration
  - Focus on development of differentiated products
  - Leverage patented yield, oil content and product traits
  - Partnerships with participation in the downstream business where we add value



\* Technology provider



# Camelina Platform: PHA Biomaterial Production

Cash cover crops improve the sustainability of food and feed production and increase revenue for farmers

- Cover crop targets: Camelina, Penny cress and Brassica (oilseeds)
- PHA biomaterial co-product adds economic value, enables farmer revenue, increased protein and edible oil production

Yield10: Camelina trait development, regulatory approval and seed processing

Yield10 traits for increasing seed yield (C3003, C3004) and oil content (C3007-12)

Breakthrough technology to produce PHA Biomaterials in *Camelina sativa*

- The commercial threshold of 10% PHB of seed weight has been demonstrated in Camelina
- North American based production/processing/markets reduces regulatory timelines and risk

# Business Potential of Crop Based PHA Biomaterials

**Production of PHA in  
cover crops  
Camelina platform**

**Yield10 PHA Markets :**  
**Animal feed**  
**Water treatment<sup>2</sup>**

**Co-products: oil and  
protein - scale with  
the market**

**Production volume at  
maturity: >10-20  
billion lbs/year**

**Acreage potential  
at maturity:  
20-30 million in US<sup>1</sup>**

**Partner Co's  
Plastics replacement  
markets<sup>3</sup>**

**Projected time  
to initial  
commercialization:  
4-6 years**

**Lifetime of patents  
>20 years**

<sup>1</sup> Note this represents a significant seed acreage opportunity, N. America canola acreage ~ 20 million acres

<sup>2</sup> Florida has 2.6 million on-site septic systems (12% of US total)

<http://www.floridahealth.gov/environmental-health/onsite-sewage/index.html>

<sup>3</sup> Global plastics, a major source of environmental pollution reached 350 million tons in 2017

[https://www.plasticseurope.org/application/files/5715/1717/4180/Plastics\\_the\\_facts\\_2017\\_FINAL\\_for\\_website\\_one\\_page.pdf](https://www.plasticseurope.org/application/files/5715/1717/4180/Plastics_the_facts_2017_FINAL_for_website_one_page.pdf)

# Clean Water: PHA Water Treatment Applications

## PHA is a natural part of the nitrogen and phosphate cycle in water treatment facilities

- PHA acts as a substrate and carbon source for denitrifying bacteria
  - ~3.3 lbs of PHA will remove 1lb of nitrate<sup>1</sup> from water
- Denitrifying bacteria convert nitrate to nitrogen releasing it back into the air
- A PHA nitrate removal system is self-regulating, requires minimum maintenance
  - Monsanto BIOPOL documents 1997: “PHA, an easy to handle-system with high **CONVENIENCE**”
  - The septic system market is large with good value-in-use
  - A sustainable economic solution can be leveraged to guide regulations and enable broader adoption

### Potential Markets

Market Segment	Key Metrics
Recirculating aquaculture systems	20 ktpa for tilapia and salmon smolt globally
Distributed On-Site WWT Systems (OWTS)	Florida has ~2.5M septic systems, ~75 kg nitrate/yr each

<sup>1</sup> 1000 gallons of water containing 10mM Nitrate = ~5 lbs of nitrate

# Yield10: Rich Pipeline of Trait Genes in Development

Many opportunities exist for licensing and/or partnerships

Yield Traits	Target Crops	N. A. Acreage Potential
<b>Seed yield: carbon conversion efficiency traits</b>		
C3003, C3004 <sup>1</sup> , C3011	canola, soybean <sup>2</sup> , corn, sorghum	200 million
<b>Oil enhancing traits<sup>1</sup></b>		
C3007, C3008a, C3008b, C3009, C3010, 3012	canola, soybean	110 million
<b>Seed and biomass yield: gene regulator traits<sup>1</sup></b>		
C4001-C4003	wheat <sup>3</sup> , rice <sup>3</sup> , corn and sorghum	140 million
C4004	wheat, rice	45 million
C4029	sorghum	5 million
PHA Biomaterial	Camelina	20-30 million

<sup>1</sup> traits accessible with genome editing; not regulated by USDA-APHIS, could be regulated by EPA and/or FDA and/or regulated in EU, Canada

<sup>2</sup> An additional 130 million acres of soybean potential in S. America

<sup>3</sup> Market for rice is fragmented; est. 2 million acres US; 400 million acres ex-US

# 2019 Field Testing Plan for C3003 and C3004

Planting to begin soon pending suitable weather conditions

## Field Test C3003 in Canola

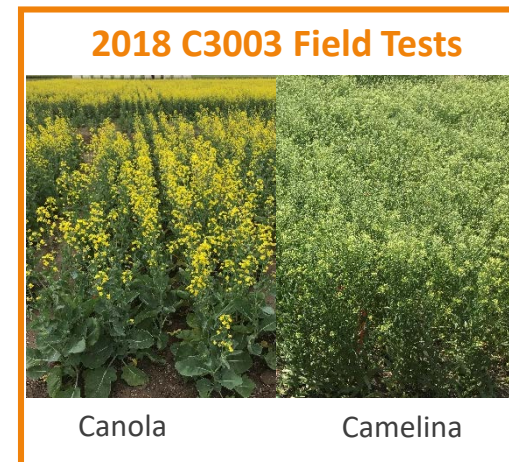
Objective: Generate multi-site field data to identify commercial quality events and data to drive partnership discussions

- Test C3003 Gen 2.0 in canola
- Generate field grown seed for 2020 field tests
- Scaling up C3003 to make more canola events for testing and crossing into elite varieties
- Continue to support Bayer/Monsanto in evaluation of C3003

Gen 1,  
expressed  
throughout  
plant



Gen 2,  
seed  
specific



## Field Test C3004 in Camelina

Objective: Generate multi-site field data to validate impressive seed yield results (up to 65% increase) obtained in growth chambers

- Collect agronomic and initial seed yield data
- Generate field grown seed for 2020 field tests
- Generate data to drive partnership discussions
- Continue work to deploy trait in canola and corn



Control +C3004

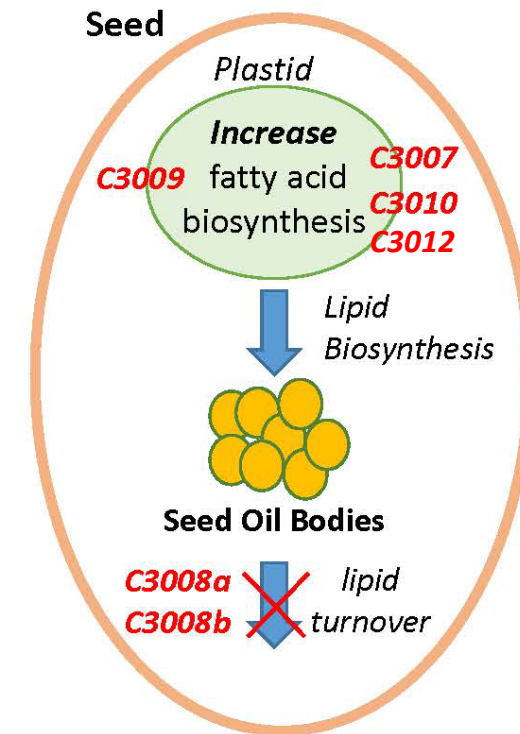


# Genome Editing Targets for Increasing Oil Content

Specialty oils: Cost of goods is driven by seed yield/acre x seed oil content

Goal: Develop the best combination of gene edits to maximize oil/acre

- **C3008a:** US field tests of non-regulated lines planned in 2019
- **C3008a, C3008b, C3009**
  - Completed editing of three distinct genes of Camelina designed to increase oil
  - Received confirmation of nonregulated status from USDA-APHIS Sept. 2018
  - US field tests of non-regulated lines planned in 2019
- **ACCase Pathway Technology including C3007 (BADDC), C3010, C3012**
  - Signed exclusive license to technology and IP from MU in 2018
  - Expanded scope of license with additional technology and IP in 2019
  - C3007 is a novel negative regulator, obtained edited canola lines
  - C3010 may increase the enzymatic activity of ACCase
  - C3012 may act alone, or in combination with C3007



## Yield10 is working to advance our crop yield technologies and build collaborations

- Continue commercial development of C3003 in canola and other crops (soybean, corn)
  - *Focus on C3003 development in canola through creation of additional events and testing in elite germplasm*
  - *Support Bayer/Monsanto in development of C3003 and C3004 traits in soybean*
  - *Continue independent evaluation of C3003 in soybean, rice and corn*
- Report data from C3004 Camelina 2019 field tests, fast-track into canola and corn
- Report progress on oil boosting traits using CRISPR genome-editing
- Report progress on C4000 series traits in wheat and rice
  - *Support Forage Genetics in forage sorghum*
- Secure revenue generating Ag industry collaborations
- Develop the business plan and partnerships for the Camelina platform
- Build our intellectual property portfolio
- Communicate our scientific innovations in technical presentations and papers



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