



**Yield10 Bioscience, Inc.**

(NASDAQCM:YTEN)

Ladenburg Thalmann Technology Expo 2019

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

**May 30, 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

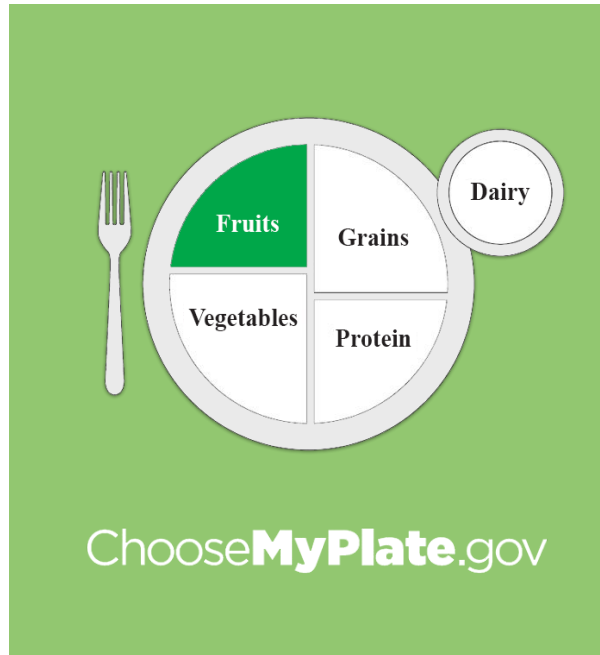
- ✓ Completed seed bulk up, permitting and contracting for 2019 Field Tests for evaluation of seed yield traits in oilseed crops; on track to initiate planting in Q2
  - ✓ Second generation C3003 in **canola** (Canada)
  - ✓ C3004 in **Camelina** (Canada)
- ✓ Progressing characterization of C3007 CRISPR 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>

# Seed Sector History: Transition From Chemistry to Biology

Insect and herbicide resistance gene traits enabled the farmer to increase revenue

Patent protected gene traits concentrated revenue in the hands of a few players and drove margins

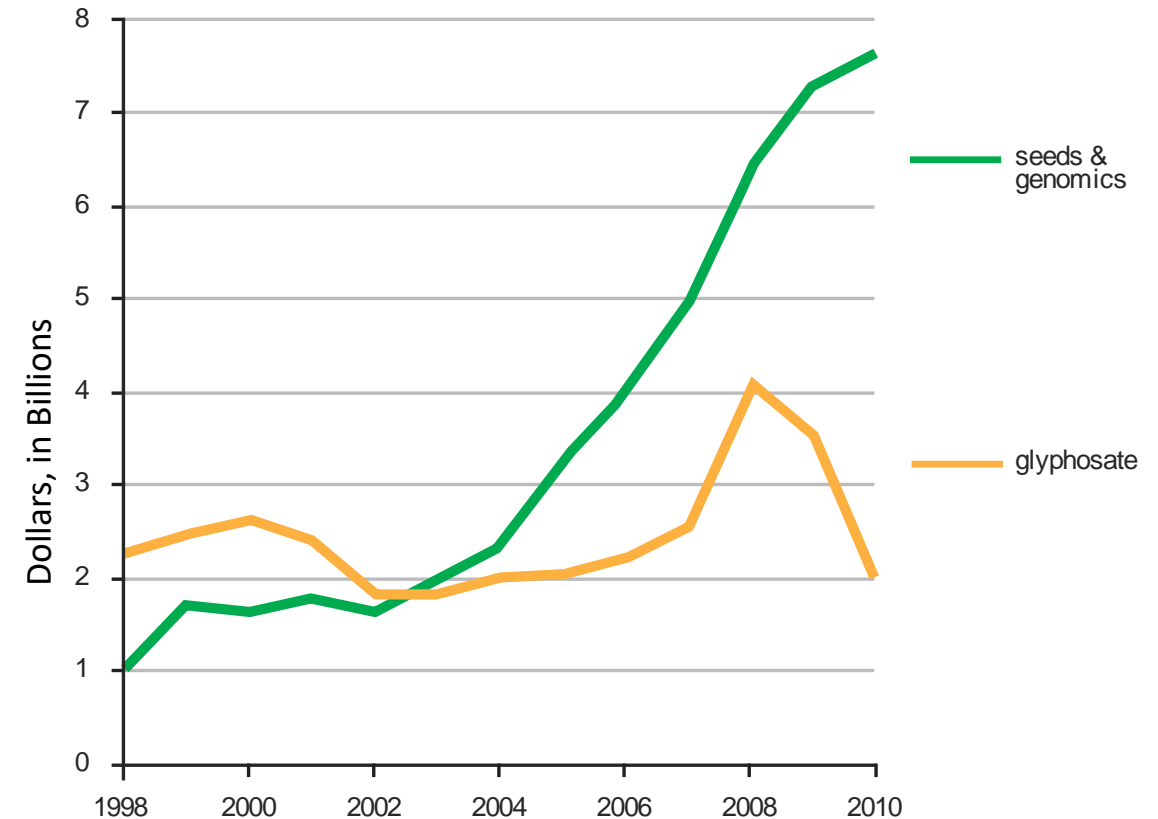
- First gen microbial genes were very successful
- Next?

Monsanto drove revenue and shifted margins from commodity chemicals into seeds and traits

**Monsanto Marks Record Sales and Gross Profit in Seeds and Genomics Segment in Fiscal Year 2017, Fueled by Excellent Technology Adoption<sup>1</sup>**

Seeds and Genomics                      \$10.9 billion

Ag productivity (glyphosate)    \$0.9 billion



<sup>1</sup> <https://monsanto.com/news-releases/monsanto-marks-record-sales-and-gross-profit-in-seeds-and-genomics-segment-in-fiscal-year-2017-fueled-by-excellent-technology-adoption/>

# North American Seed Sector Opportunities

Crop	N. America Acres (in millions)	Yield10 Activity	Seed Sector Structure
Canola**	20	Yes	Consolidated value chain, dominated by stacked input traits, path to market through licensing
Soybean	85	Yes	
Corn	90	Yes	
Cotton	13.5	No	
Camelina	potential	Yes	Commercial “white space” Opportunity to participate directly in the seed business or downstream in feed/food products
Wheat	72	Research	
Rice	potential	Research	
Sorghum	5.8	License	Large specialty seed businesses usually dominated by 1 or 2 players, path to market through licensing
Alfalfa	16.6	No	

- Rice – ~400 million acres (ex NA). Challenging China and India markets – **Editing may hold promise**
- Wheat – ~530 million acres (~45 million acres in N. America) – **Editing may hold promise**
- \*\* Canola is underinvested in by the majors due to their focus on corn and soybeans



## Yield10 technologies enable multiple paths to value creation



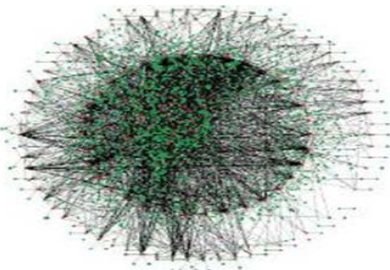
### North American Commodity Crops

- 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

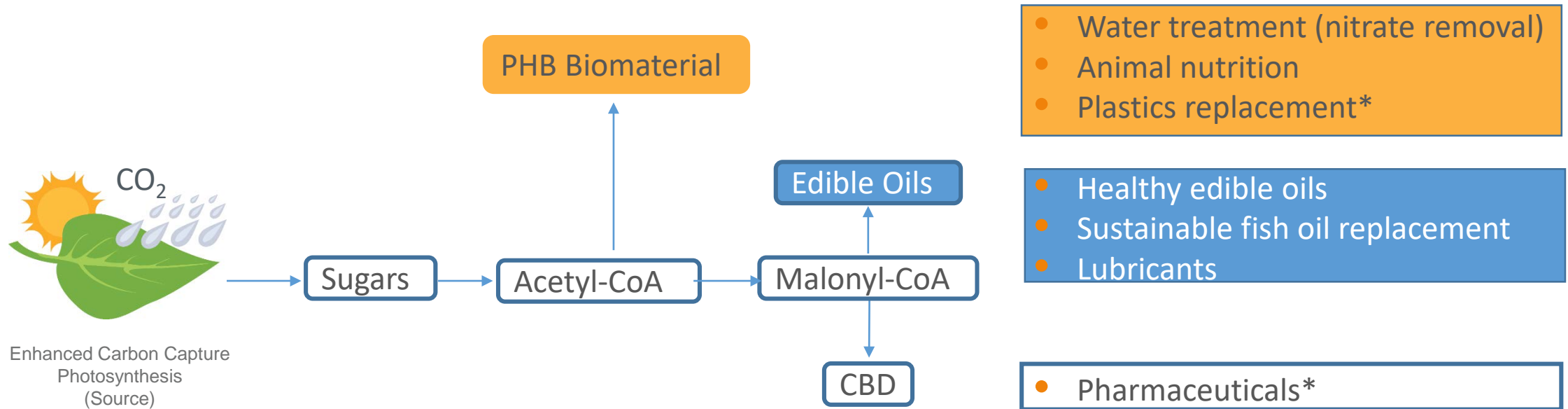


### Technology Platforms

- “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

# Potential Niche Crop Product Targets

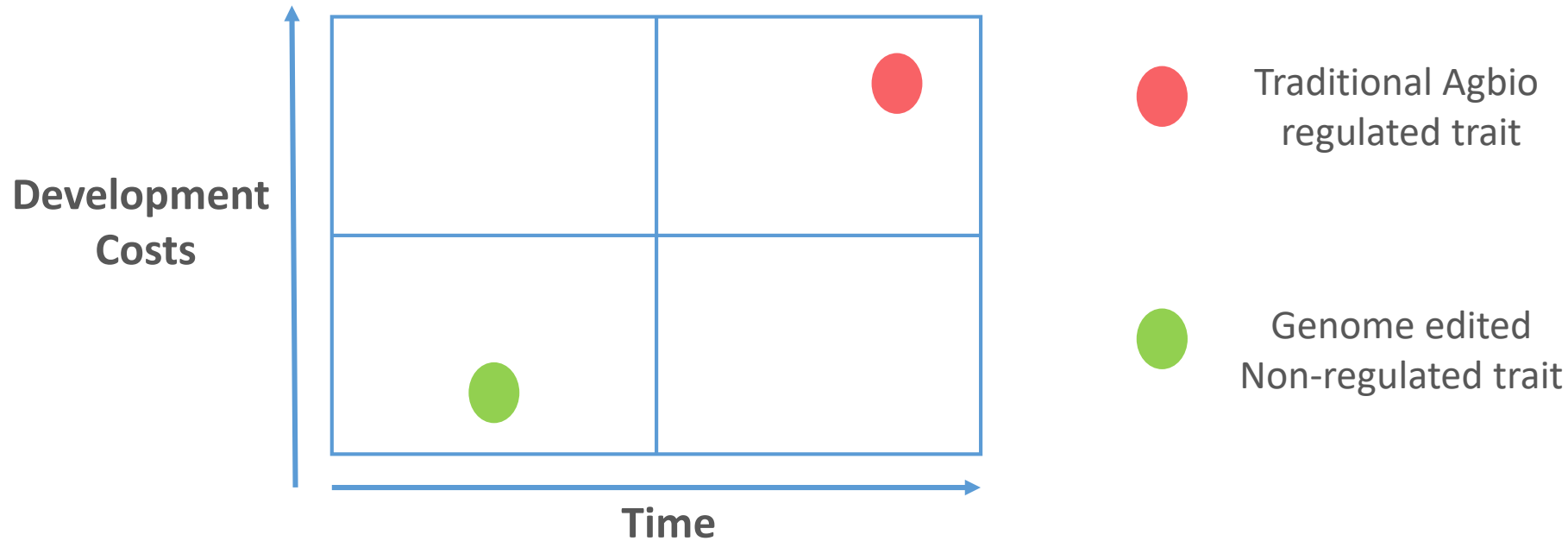
- Product targets under consideration
  - Focus on development of differentiated products
  - Leverage patented yield, oil content and product traits
  - Partnerships with participation in the downstream business where we add value



\* Technology provider

# Impact of Genome Editing – Non-regulated Traits

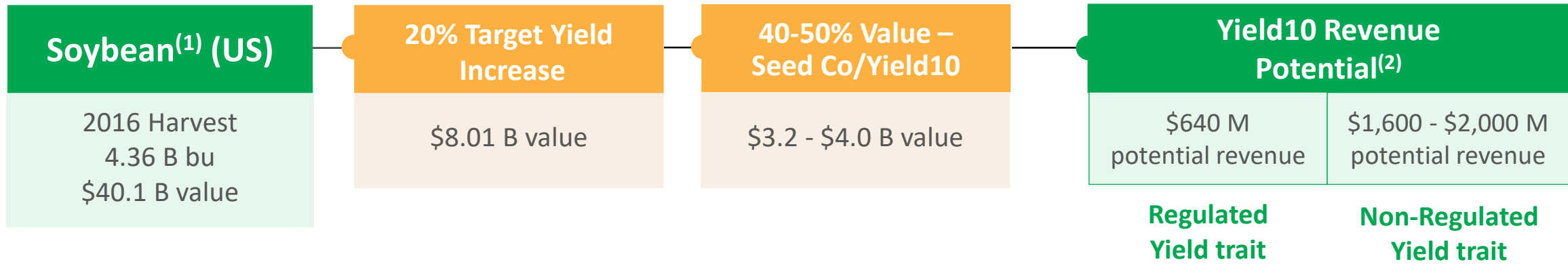
A yield trait enables increased crop revenue, where ~60% of the trait value-add goes to the farmer



- 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.

# Yield10 Path and Timeline to Value Creation

2017-2018	2019-2020	2021-2023
<i><b>“emerging”</b></i>	<i><b>“growing”</b></i>	<i><b>“harvesting”</b></i>
Company launch	Build reputation as innovator	Product revenue
Establishing GRAIN 1.0 trait discovery platform	The “Trait Factory” GRAIN 2.0 platform and CRISPR	Expand range of trait targets (e.g. nitrogen use, pod shatter, etc.)
Focus on trait discovery	Traits in commercial development	Traits on clear path to market
Camelina Platform	Development in: canola, soybean, corn, wheat and rice	Expand deployment of traits geographically and in additional crops
Portfolio of traits	Prioritize genome-edited traits	Gen 2 traits and trait stacks
First affiliations	Form revenue generating collaborations, partnerships	Highly sought after partner for trait discovery and development

# 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



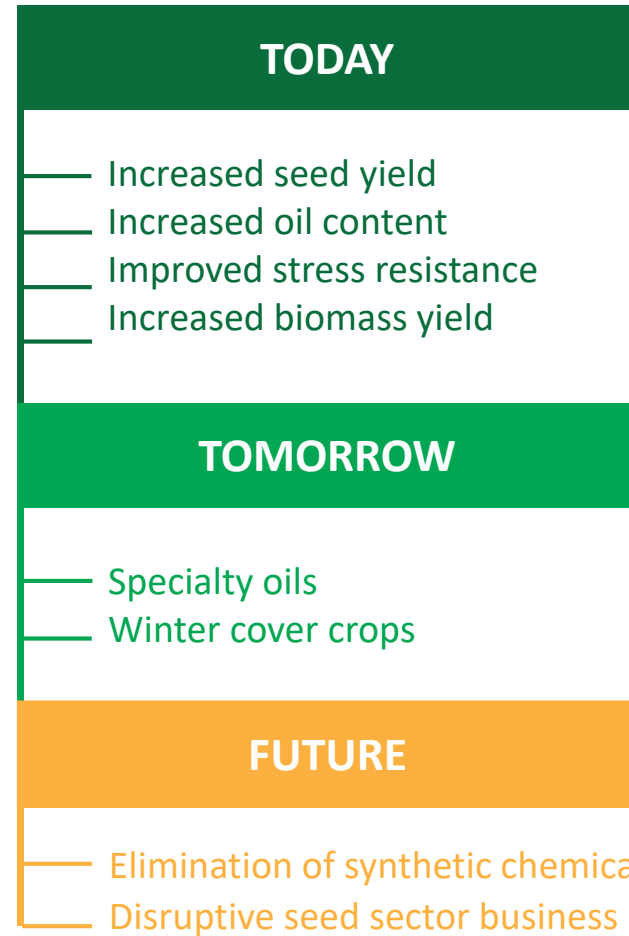
Yield10 research partner for evaluation of novel yield traits in wheat

Many additional opportunities exist for licensing and/or partnerships



# The Yield10 Trait Factory

Yield10 combines advanced discovery with genome editing to develop valuable traits



**BIG DATA**

# New Tools Enable the Development of Exceptional Performance Traits

Working to translate the identification of novel yield traits to valuable commercial outcomes

Examples of Yield10's traits and impact on crop yield in growth chamber and greenhouse studies:

C3003/C3004 traits: 23% - 65% increase in seed yield in oilseed crops (e.g. Camelina)

C4001, C4003 traits: 70% increase in photosynthesis, over 150% increase in biomass (e.g. switchgrass)

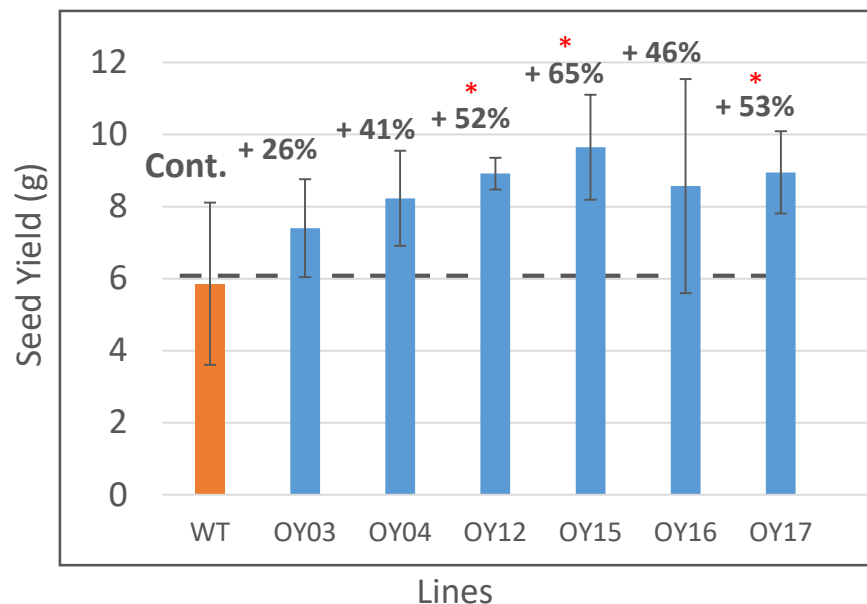
C3005 advanced synthetic biology trait: 128% increase in seed yield in an oilseed crop (e.g. Camelina)

- Current biotech traits (~470 million acres<sup>1</sup>) provide yield protection
- Yield10 has generated proof points demonstrating step-change improvements in yield
- Genome-editing is a key tool to deploy new traits and unlock the value created using our GRAIN technology platform and metabolic engineering approach
- Our business model is to optimize acreage in which our traits are used through licensing for the major crops, canola, soybean and corn
- In addition, Yield10's traits are broadly applicable to a wide range of food, feed and biomass crops

# Expression of C3004 Significantly Increases Seed Yield in Camelina

## Developing strategies to deploy C3004 as a nonregulated trait in key crops

Seed yield impact of C3004



Student's t-test, \* $p < 0.05$ ; Data average of 3 to 4 plants per line



Control

+C3004

Up to 65% increase  
in seed yield in  
C3004 plants

- High yield C3003 Camelina plants enabled identification of C3004
- Engineer increased activity of C3004 alone in Camelina >> seed yield increase up to 65%
- Field testing planned for 2019, accelerate C3004 trait into canola and soybean
- Develop non-regulated, genome-edited versions of C3004 for key crops

# 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

<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

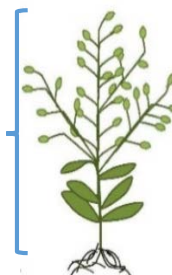
Planting to begin soon pending suitable weather conditions

## Field Test C3003 in Canola

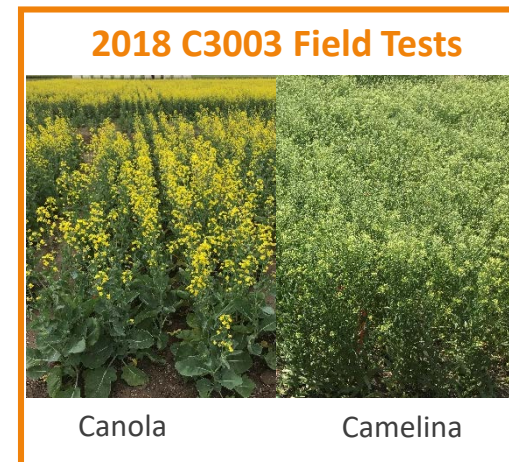
Objective: Generate multi-site field data to identify commercial quality events and data to drive partnership discussions

- 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

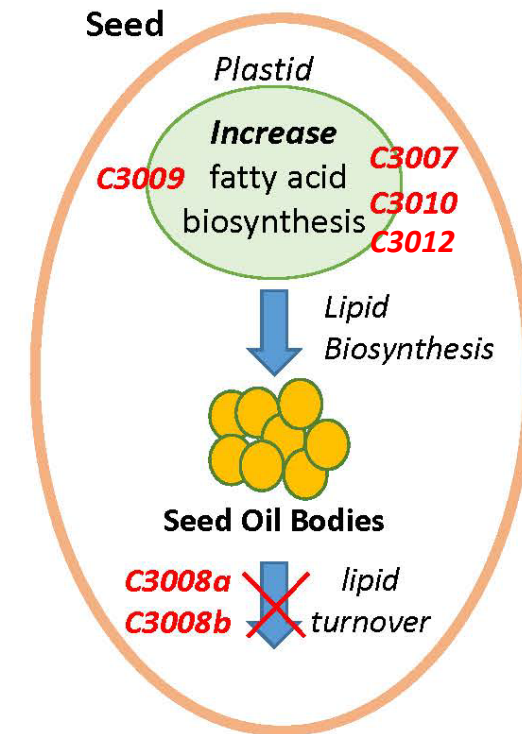


# Genome Editing Targets for Increasing Oil Content

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





# Update: C4000 Series Traits for Wheat and Rice

## Focus on CRISPR genome-editing strategies for key food crops

**Opportunity:** Large global acreage (~950 mm acres), highly fragmented market, no dominant players

**Challenge:** Public concern around GMO technologies in staple food crops

**Yield10 Approach:** Deploy yield traits using CRISPR genome-editing of novel targets identified using GRAIN platform

- C4000 series traits produced significant increases in photosynthesis and biomass yield when tested in switchgrass
- Conduct testing of C4000 series in wheat and rice
- Characterize GE plants and collect initial seed yield data in 2019
- Identify collaborative opportunities to test traits in commercial varieties

## 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*
  - *Generate field data and field grown seed in 2019 field testing program*
  - *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
- Build our intellectual property portfolio
- Communicate our scientific innovations in technical presentations and papers



**Yield10 Bioscience, Inc.**

(NASDAQCM:YTEN)

Ladenburg Thalmann Technology Expo 2019

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

**May 30, 2019**

