



# Yield10

B I O S C I E N C E

Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)

Ladenburg Thalmann 2018 Conference Investor Presentation

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

**October 2, 2018**

# 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, 2017 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 Bioscience (NasdaqCM:YTEN) is developing technologies to enhance global food security**

- Headquartered in Woburn, MA USA
- Oilseeds center of excellence in Saskatoon, Canada

## **Yield10 optimizes photosynthesis and carbon flow in crops to increase yield**

- Yield10 is targeting step-change (10-20%) increases in seed yield
- Technology based on >17 years of cutting edge crop metabolic engineering research
- >16 recent patent applications for increased crop yield

## **Yield10 focuses on its core strengths of advanced bioscience and innovation**

- Discover and de-risk yield technologies for canola, soybean and corn
- Major North American biotech crops ~200 million acres/year

# Leadership Team

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

- Dr. Peoples is an experienced entrepreneur and biotechnology executive with over 30 years of experience in science and technology innovation 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

# Yield10: A Compelling Market Opportunity

**“Yield10 develops technology for food and feed crops to produce higher yields”**

## Aligned With Compelling Megatrends

**Global Food Security**.....increasing demand/increasing protein consumption

**Health and Wellness**.....improved nutrition

**Food Safety and Sustainability**.....“farm to fork” value chain



June, 2015 GA/EF/3242  
**Food Production Must Double by 2050**

**Food and Ag an ~ \$5 trillion market today**  
**Production has to increase by 70-100% by 2050<sup>1</sup>**

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

# Recent Accomplishments

- ✓ Harvesting underway for 2018 field tests of C3003 and C3008a
- ✓ Signed exclusive worldwide license agreement with University of Missouri for advanced technology for boosting oil content in oilseed crops (C3007, C3010) and named inventor, Jay Thelen, Ph.D., to the Scientific Advisory Board
- ✓ Signed non-exclusive research license with Broad Institute and Pioneer, (Corteva Agriscience division of DowDupont) for CRISPR-Cas9 genome-editing technology
- ✓ Published and presented research highlighting Yield10 Camelina platform technology and 2 case studies for projecting yield outcomes
- ✓ Reported first research results on seed yield with C3004 trait in Camelina
- ✓ Signed research license with Forage Genetics for evaluation of 5 traits in sorghum
- ✓ Received confirmation of nonregulated status from USDA-APHIS based on submission of “Am I regulated?” letter for triple gene edited Camelina line

## 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

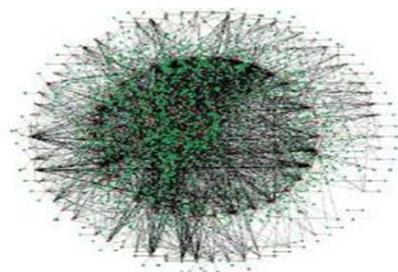


### Specialty and Niche Crops including Nutritional Oils

- Focus on development of high value products in food and animal feed
- Develop a non-regulated path to market with participation in downstream economics

### 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

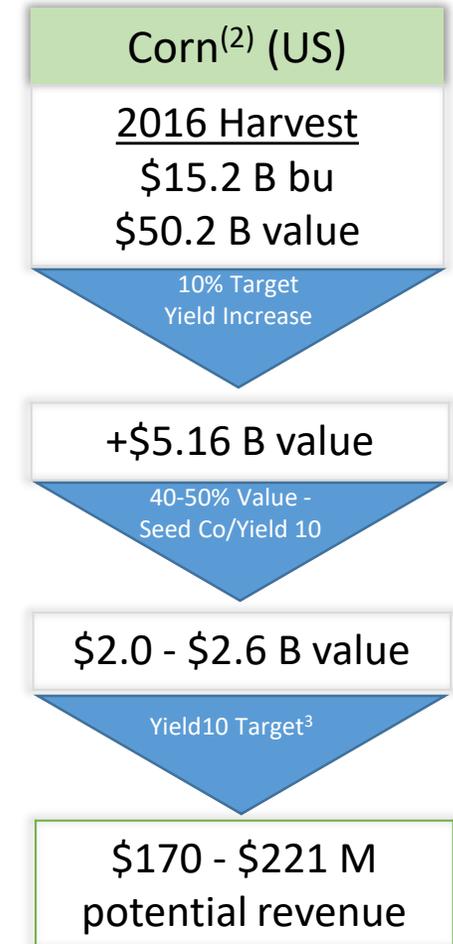
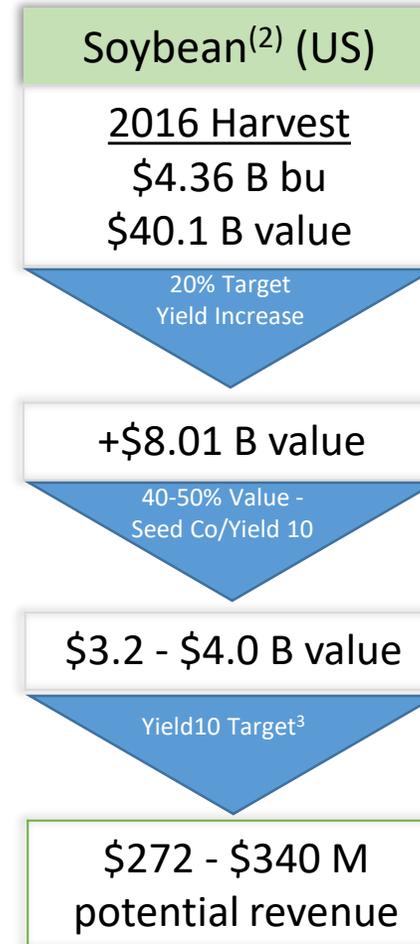
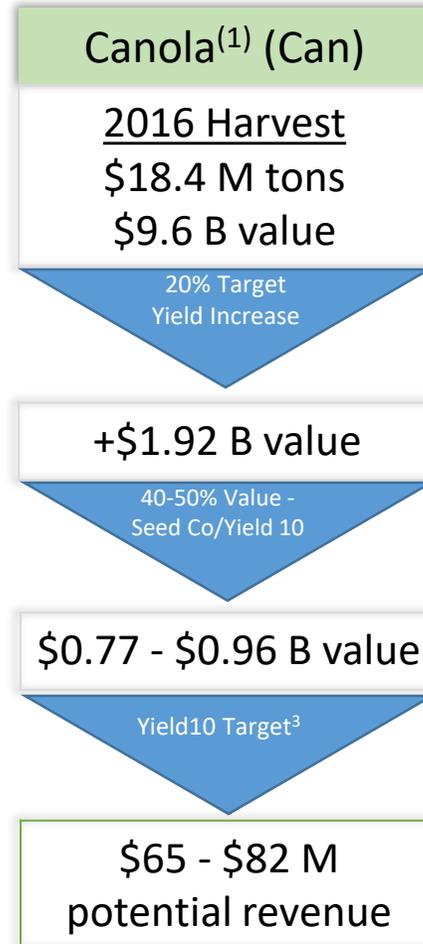


# Value Creation Model: Seed Yield and Oil Content

## Yield10's gene traits may enable value creation through step-change increases in crop yield

*An illustrative example of the annual revenue opportunity for Yield10's canola, soybean and corn gene traits based on the 2016 harvest.*

*For Soybean: Additional market opportunity emerging for High Oleic soybean oil. As genome editing traits deployed, a role for genome editing traits to boost oil biosynthesis (in range of 20%) could drive additional value for growers and Yield10.*



USDA projected on-farm corn price 2016-2017 is \$3.30/bu  
 USDA projected soybean price for 2016-2017 is \$9.20/bu  
 AAFC projected canola price 2016-2017 is \$520/tonne

1. <http://www.statcan.gc.ca/daily-quotidien/161206/dq161206b-eng.htm>

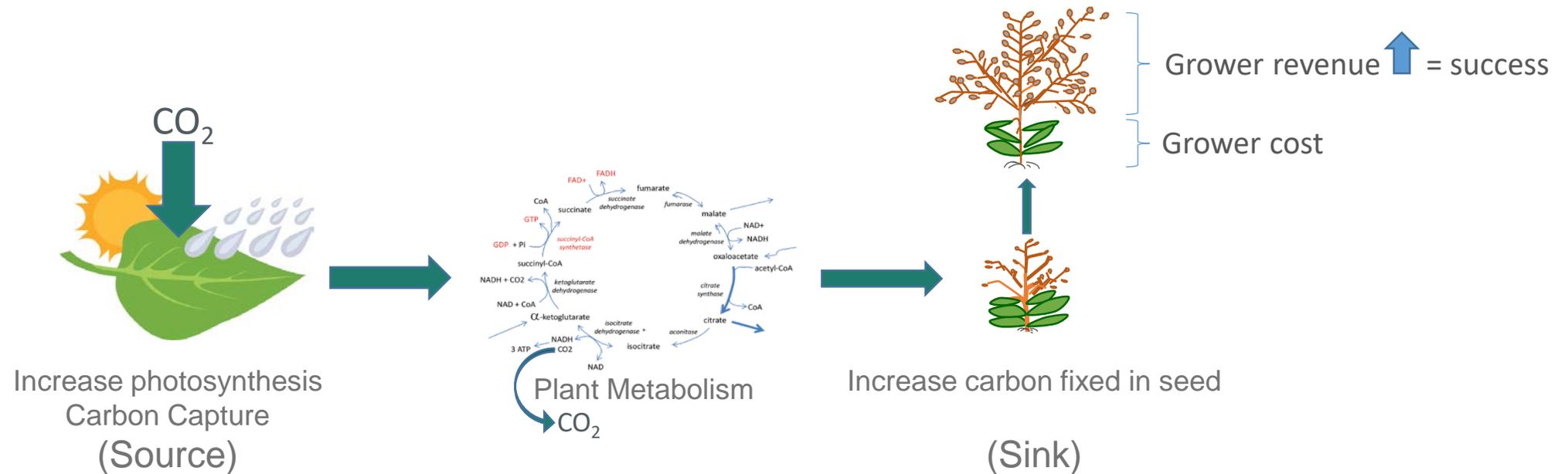
2. [https://www.nass.usda.gov/Newsroom/2017/01\\_12\\_2017.php](https://www.nass.usda.gov/Newsroom/2017/01_12_2017.php);

High Plains/Midwest AG Journal, Jan. 19, 2017

3. Yield10 target of 5-12% of the value add for yield traits; used 8.5% in calculations

# Yield10: Our Technology Approach

Increasing inherent crop yield is a complex two step carbon optimization problem



- Increasing crop yield is an extremely complex and challenging problem
- Technology Approach: **Increase photosynthetic carbon capture and target more carbon to seed**
- Value creation: Enhanced productivity and revenue per acre of land

- Yield10 is developing the GRAIN (Gene Ranking Artificial Intelligence Network) Platform
- Yield10 has several traits from the GRAIN platform in the development pipeline
  - C3003/C3004 traits: 23% - 65% increase in seed yield in oilseed crops
  - C4001, C4003 traits : 70% increase in photosynthesis, over 150% increase in biomass
    - These genes have also shown early promise in rice and wheat
  - C3005 advanced synthetic biology trait: 128% increase in seed yield in a C3 oilseed crop
    - This is a key scientific validation of the yield potential of Yield10's advanced metabolic engineering approach
- Established first research licenses to evaluate traits with seed sector
- Yield10's internal efforts are focused on major North American crops (corn, soybean and canola)
- Yield10's unique capabilities and traits can be applied to many staple crops
  - Rice, wheat, millet, grain sorghum, potato, cassava, sweet potato, and others

# “GRAIN” Trait Gene Discovery Platform

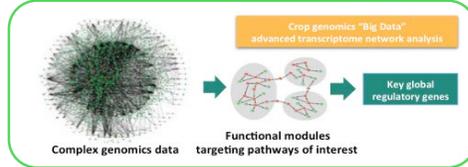
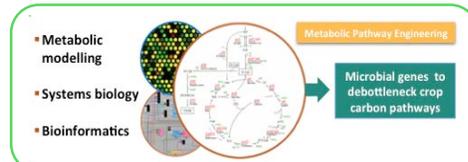
## GRAIN: Gene Ranking Artificial Intelligence Network



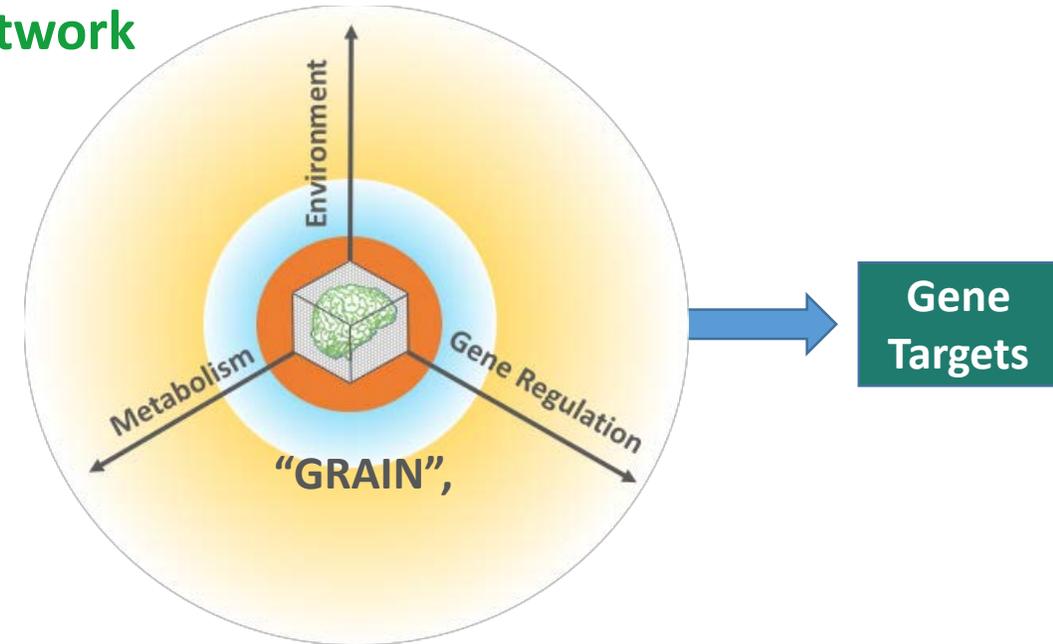
“roadmap”  
analogy



### “Crop Smart Carbon Grid”



“T3 Platform”



- We are developing “GRAIN”, a “Waze” or “Google Earth”-like system for identifying gene targets
  - Metabolic engineering or synthetic biology, the “Crop Smart Carbon Grid” (carbon capture/conversion infrastructure)
  - Transcriptome network analysis, the “T3 Platform” (gene regulators or traffic lights) – C4001-C4003 traits
  - Powerful feedback loops incorporating data from high yield lines
- We have several gene targets from GRAIN platform in our development pipeline

# Yield10: Rich Pipeline of Trait Genes in Development

## SUMMARY OF TRAITS IN DEVELOPMENT

### Business Area

### Current Status

#### Seed Yield Traits-Regulated

C3003	Camelina canola, soybean field trials, sorghum transformations starting up
-------	--

#### Seed Yield Traits-Non-Regulated

C3004	Camelina testing underway – field trials 2019
-------	---

#### Oil Enhancing Traits-Non-Regulated

C3007	Camelina, canola editing underway
C3008a	Camelina non-regulated <sup>1</sup> status achieved; at field testing stage
C3008a, C3008b and C3009 combinations	Camelina, editing completed and nonregulated status confirmed by USDA-APHIS
C3010	Completed in-license
Additional oil traits and combinations	Research in progress

#### Yield Trait Improvement Discovery Platform

C4001	Wheat, rice, sorghum underway and corn transformation next step
C4002	Sorghum underway, Corn transformation next step
C4003	Wheat, rice, sorghum underway and corn transformation next step
C4004	Editing in rice and wheat underway
C4029	Sorghum underway

Metabolic engineering traits C3003/C3004: enhance carbon flux and seed yield

Metabolic engineering traits C3007,8, 9 and 10 –increased oil content –niche oil market opportunities

Key element of the GRAIN discovery platform, Transcription factors – seed and biomass yield, stress tolerance

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

<sup>1</sup> not regulated by USDA-APHIS, could be regulated by EPA and/or FDA and/or regulated in the EU, Canada

# 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
	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 – focus on identifying genome editing targets

Many additional opportunities exist for licensing and/or partnerships

# 2018 Field Tests for C3003 and C3008 Traits

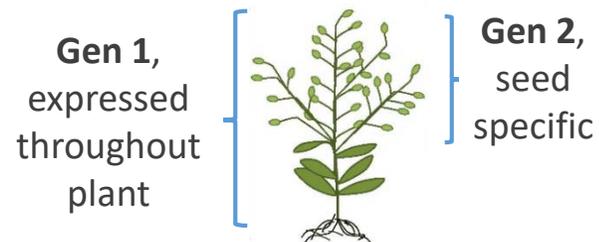
## Conducting Field Tests of C3003 in Camelina, canola; Bulk-up soybean seed

Generate technical data and determine the best way to deploy C3003 in canola and soybean

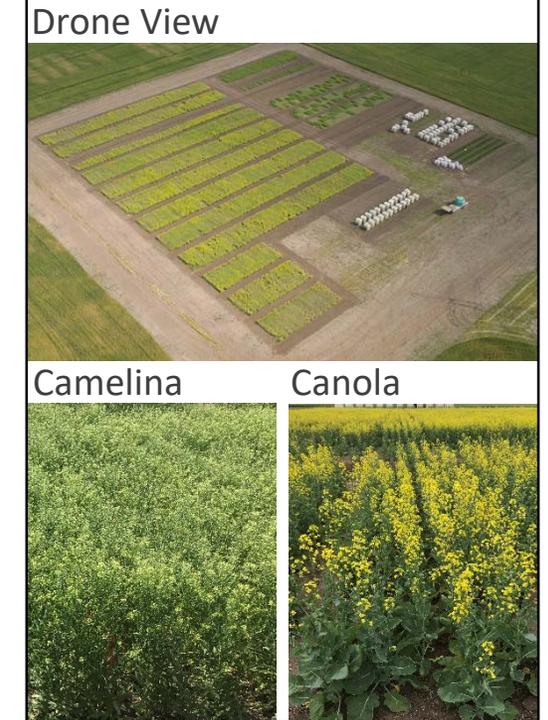
- Test C3003 Gen 2.0 and Gen 2.1 in Camelina
- Test C3003 Gen 1.0 and Gen 2.0 in canola
- Grow C3003 Gen 1.0 and Gen 2.0 soybean to generate field grown seed for 2019
- Multiple sites in Canada
- Harvesting in progress, expect to report data in Q4

## Conducting Field Test of Genome-edited C3008 in Camelina

- C3008a may be a useful target to increase oil yield and improve lipid quality
- First field test of this trait in 2018 at site in the US
- Harvesting completed, expect to report data in Q4

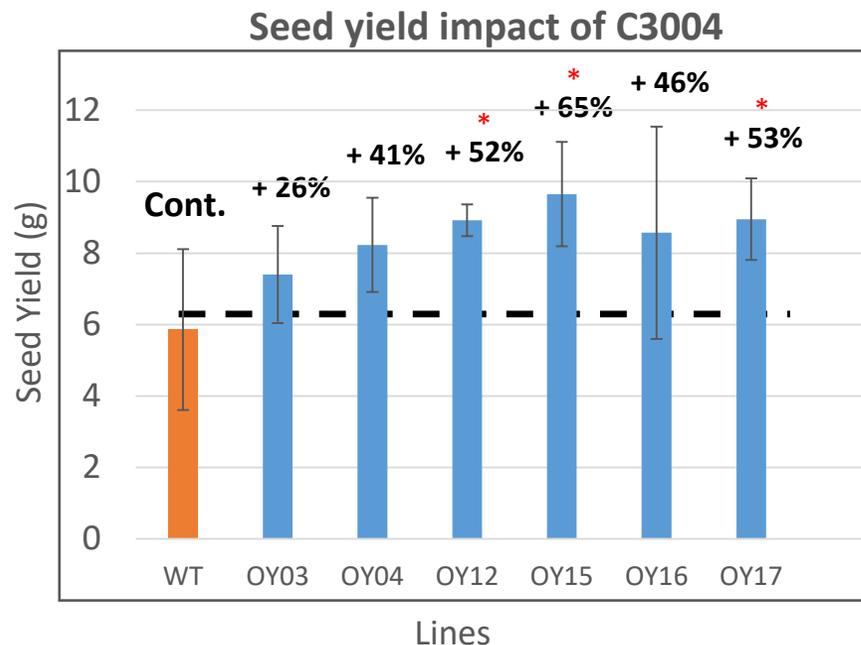


## 2018 C3003 Field Tests



# Expression of C3004 in Camelina Increases Seed Yield

The unique mechanism of C3003 enables more discovery and innovation



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



Control +C3004)

- C3004 has altered expression in Gen 1 C3003 Camelina plants
- Up to 65% increase in seed yield observed in C3004 plants compared to control
- Field testing planned for 2019, accelerate C3004 trait into soybean and canola
- Develop data for C3004 + C3003 combinations
- Develop the best strategy to create non-regulated versions of C3004 for key crops

REGULATION

## USDA greenlights gene-edited crops

Agency says techniques like CRISPR are equivalent to traditional plant-breeding methods

by Melody M. Bomgardner

APRIL 9, 2018 | APPEARED IN VOLUME 96, ISSUE 15

**c&en**  
CHEMICAL & ENGINEERING NEWS

## Gene-edited plants and animals are GM foods, EU court rules

Landmark decision means gene-edited plants and animals will be regulated under the same rules as genetically modified organisms

US edition ▾  
**The Guardian**

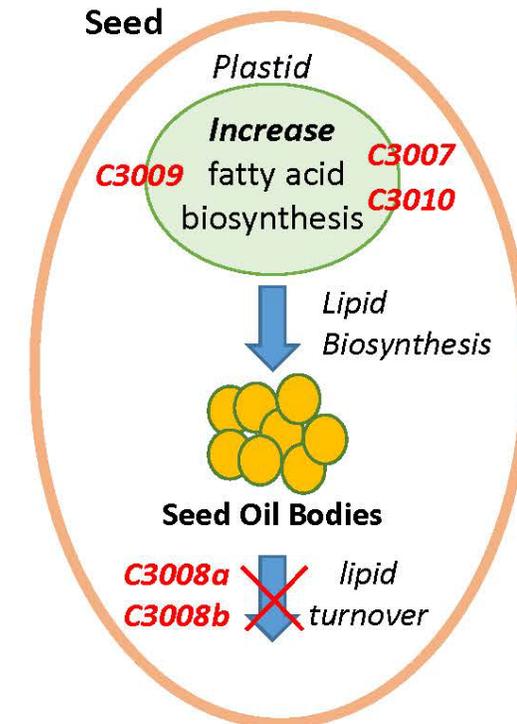
- Signed non-exclusive research license with Broad/Pioneer (Corteva Agriscience division of DowDupont) for CRISPR-Cas9 technology
- Novel crop yield targets accessible through CRISPR differentiate our portfolio of traits
- “GRAIN” trait gene discovery platform identifies “**Smart Editing Targets**”
- Obtaining non-regulated status reduces development costs and timelines<sup>1</sup>
- USDA reiterated stance supporting innovation and deployment of genome-edited crops after EU court decision

# Genome Editing Targets for Increasing Oil Content

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

Targeting 5 different genes to develop the best combination of gene edits to maximize oil/acre

- **C3008a**: US field tests of non-regulated lines in progress, data in Q4
- **C3008a, C3008b, C3009**
  - Completed editing of three distinct genes of Camelina designed to increase oil
  - Simultaneous editing of 9 genes (3 target genes present in 3 copies each)
  - Submitted “Am I regulated?” letter to USDA-APHIS in May 2018
  - Received confirmation of nonregulated status from USDA-APHIS Sept. 2018
- **C3007 (BADC) and C3010**
  - Completed exclusive license to technology and IP from MU
  - C3007 is a novel negative regulator, editing in Camelina and canola is ongoing
  - Also licensed C3010 which may increase the enzymatic activity of ACCase



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

- Continue progress on C3003 with additional constructs and crops
  - Report field testing results of C3003 in Camelina and canola in 4Q 2018
  - Support Bayer/Monsanto in development of C3003 and C3004 traits in soybean
  - Continue independent evaluation of C3003 in soybean and rice
- Continue to build data set on C3004, fast-track into canola and soybean, and evaluate the trait in 2019 field tests
- Advance oil boosting traits using CRISPR genome-editing
- Progress C4000 series traits into key crops
  - Continue work with C4000 series traits in rice and wheat, begin work on C4000 series traits in corn
  - Progress genome-editing of select C4000 series traits in rice
  - Support Forage Genetics in forage sorghum
- Secure Ag industry collaborations and non-dilutive sources of funding
- Build our intellectual property portfolio
- Communicate our scientific innovations in technical presentations and papers

## **“Yield10 develops food and feed crops to produce higher yields with lower inputs of land, water or fertilizer”**

**Leverages a large historical investment in advanced metabolic engineering into the Ag space**

- >16 recent patent applications for increased crop yield

**Applying a productive technology/knowledge base with genome editing**

**Establishing a track record of execution and significant, near-term milestones**

- Data from field tests of C3003 in Camelina, canola and potentially soybean expected in 2018
- Progress on oil enhancing traits using CRISPR genome editing technology

**Numerous opportunities for value capture**

**Has an organization structured to achieve upcoming milestones**



# Yield10

B I O S C I E N C E

Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)

Ladenburg Thalmann 2018 Conference Investor Presentation

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

**October 2, 2018**