Filed pursuant to Rule 433
Registration Statement No. 333-221283
December 11, 2017

Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)
Investor Presentation

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

December 2017

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, 2016 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**

Free Writing Prospectus

This presentation highlights basic information about us and the offering. Because it is a summary that has been prepared solely for informational purposes, it does not contain all of the information that you should consider before investing in our company. Except as otherwise indicated, this presentation speaks only as of the date hereof.

This presentation does not constitute an offer to sell, nor a solicitation of an offer to buy, any securities by any person in any jurisdiction in which it is unlawful for such person to make such an offering or solicitation.

Neither the Securities and Exchange Commission (the "SEC") nor any other regulatory body has approved or disapproved of our securities or passed upon the accuracy or adequacy of this presentation. Any representation to the contrary is a criminal offense.

This presentation includes industry and market data that we obtained from industry publications and journals, third-party studies and surveys, internal company studies and surveys, and other publicly available information. Industry publications and surveys generally state that the information contained therein has been obtained from sources believed to be reliable. Although we believe the industry and market data to be reliable as of the date of this presentation, this information could prove to be inaccurate. Industry and market data could be wrong because of the method by which sources obtained their data and because information cannot always be verified with complete certainty due to the limits on the availability and reliability of raw data, the voluntary nature of the data gathering process and other limitations and uncertainties. In addition, we do not know all of the assumptions that were used in preparing the forecasts from the sources relied upon or cited herein.

We have filed a Registration Statement on Form S-1 with the SEC, including a preliminary prospectus dated November 2, 2017 (the "Preliminary Prospectus") and an amended Form S-1/A dated November 22, 2017, with respect to the offering of our securities to which this communication relates. Before you invest, you should read the Preliminary Prospectus (including the risk factors described therein) and, when available, the final prospectus relating to the offering, and the other documents filed with the SEC and incorporated by reference into the Preliminary Prospectus, for more complete information about us and the offering. You may obtain these documents, including the Preliminary Prospectus, for free by visiting EDGAR on the SEC website at http://sec.gov.

Alternatively, we or any underwriter participating in the offering will arrange to send you the prospectus if you request it by contacting Ladenburg Thalmann & Co. Inc., 277 Park Avenue, 26th Floor, New York, NY 10172 or by email at prospectus@ladenburg.com.

Investment Considerations

"Yield10 designs precise alterations to gene activity in 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

- 15 recent patent applications for increased crop yield

Applying a technology approach/knowledge base that has been historically productive at a time when a critical new tool, genome editing, is available

Has significant, near-term milestones in major row crops

- Data from field tests of C3003 in Camelina, canola and soybean expected in 2018

Has numerous opportunities for value capture

Has an organization structured to achieve upcoming milestones

COMPANY OVERVIEW

Company Overview

Yield10 Bioscience (Nasdaq:YTEN) is developing technologies to enhance global food security

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

Yield10 is bringing extensive expertise and track record in optimizing the flow of carbon in living systems to the agriculture sector to increase yield in key row crops

- Yield10 is targeting step-change, or 10-20% increases, in seed yield
- Our technology is based on 15 plus years of cutting edge crop metabolic engineering research
- 15 recent patent applications for increased crop yield
- Focus on major North American crops: canola, soybean and corn

Yield10 will focus on its core strengths of advanced bioscience and innovation

- Discover and develop proprietary crop yield technologies and de-risk them by developing proof points in canola, soybean and corn to optimize value capture from licensing or acquisition

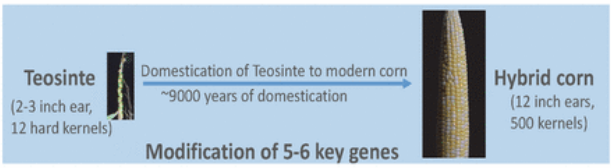
Leadership Team

Oliver Peoples, Ph.D. CEO	• Founder and CSO of Metabolix, an MIT spinout and predecessor to Yield10. Dr. Peoples is an experienced entrepreneur and biotechnology executive with over 30 years of experience in science and technology innovation and commercialization • He initiated the crop science program over a decade ago and more recently spearheaded 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

Crop Yield: Yield10 Technology Platform

Increasing Crop Yield is Valuable but Technically Very Challenging

- First generation Ag biotech is based on using microbial genes in crops (early 90's)
- Over the last 20 years transgenic screening of thousands of single plant genes has failed
- Development of modern corn from ancient teosinte provides insights into the path forward



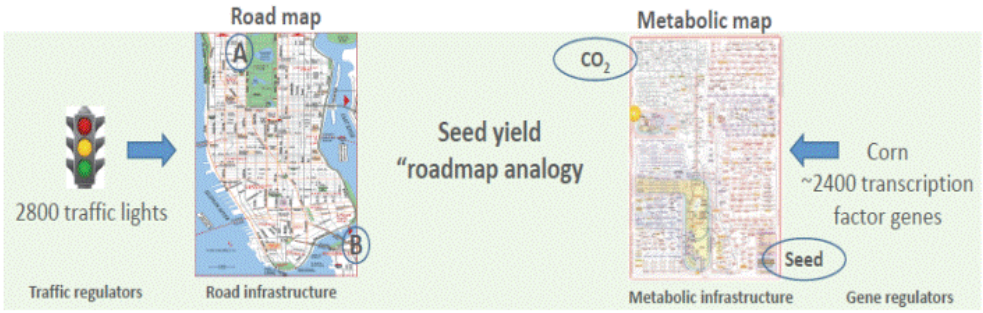
- Genome editing enables precise modification of gene combinations in crops

$50 billion[1] question: what combination of corn genes can be modified to double modern corn yield?

- Yield10 applies a powerful platform for identifying gene combinations to increase crop yield

[1] 2 x value of 2016 corn harvest, see slide 16

Increasing Crop Yield is a Multi-Gene Problem



- Yield10: Two discovery platforms
  - "Smart Carbon Grid" optimizes crop metabolism or infrastructure
  - "T3 Platform" identifies key transcription factor genes
  - Yield10 is progressing a number of Performance Traits from these platforms in key crops
- Unmet need: Smart technology for identifying key crop gene combinations
  - 3.3 million experiments would be required to test all two gene combinations of transcription factors in corn
- Yield10 is integrating its two platforms to create a "Google Earth" or "Waze"-like map of carbon flow (traffic) in crops

Yield10 | BIOSCIENCE

Rich Pipeline of Trait Genes in Development

SUMMARY OF OUR CROP YIELD TRAITS IN DEVELOPMENT	
Business Area	**Current Status**
Seed Yield Traits-Regulated	
C3003	Camelina 1st and 2nd generation at field testing stage Canola 1st generation at field testing stage Soybean and rice in development
Seed/Oil Enhancing Traits-Non-Regulated	
C3004	Camelina testing underway
C3007	Camelina, canola editing underway
C3008a	Camelina non-regulated[1] status achieved
C3008a, C3008b and C3009 combinations	Camelina, editing of all 3 gene targets underway
Additional oil trait combinations	Research in progress
Yield Improvement Discovery Platform	
C4001	Wheat program underway Rice transformation underway Corn transformation next step
C4002	Corn transformation next step
C4003	Wheat program underway Rice transformation underway Corn transformation next step
C4004	Editing in rice underway
C4004 plus 24 additional crop gene targets	Research with rice and wheat next step

Many opportunities exist for licensing and/or partnerships

[1] not regulated by USDA-APHIS, could be regulated by EPA and/or FDA

Yield10 | BIOSCIENCE

MARKET OPPORTUNITY

Yield10: A Compelling Market Opportunity

Yield10 is…….Aligned with compelling megatrends

UNITED NATIONS
9 October 2009; Revised June, 2015
GA/EF/3242
Food Production Must Double by 2050

Global Food Security…… increasing overall demand and increased protein consumption

Health and Wellness…..improved nutrition profile

Food Safety and Sustainability…..growing interest in a "seed to plate value chain"

Innovation…..new technology approaches, "big data/metabolic modeling" and genome editing

Genome Editing in Agriculture

Next Phase of High-Tech Crops, Editing Their Genes (May 7, 2017 By Jacob Bunge) WSJ

- Genome editing completes the toolbox for enhancing crop yield and value
- Genome editing enables **Precision Molecular Breeding** of gene combinations for enhancing crop yield
- Genome edited plants may be **non-regulated** reducing product development timelines and costs[1]
  - Regulated traits: Average 13 years and $130 M to develop
  - Non-regulated traits: Potential for 3-6 years, less than $10 M to develop
- Licenses to CRISPR/Cas9 for crops may be readily available[2]
- **The race is on to identify novel gene combinations for editing to improve crop performance**

[1] https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/sa_brs_vpm/340-peis
2 https://broadinstitute.org/news/dupont-pioneer-and-broad-institute-join-forces-enabling

Granted Research License to Monsanto

Research license to C3003 and C3004 to improve yield in soybean

- Market leader in GM soybean seed in the United States and North America
- Non-exclusive term of approx. 3.5 years, preserves YTEN downstream rights
- Develop and test C3003 in proprietary soybean lines
- Develop and test C3003 combined with C3004 in proprietary soybean lines
- Test traits in world class Monsanto soybean development program
- Contributes significant resources and expertise in soybean research and breeding to YTEN C3003/C3004 yield trait program

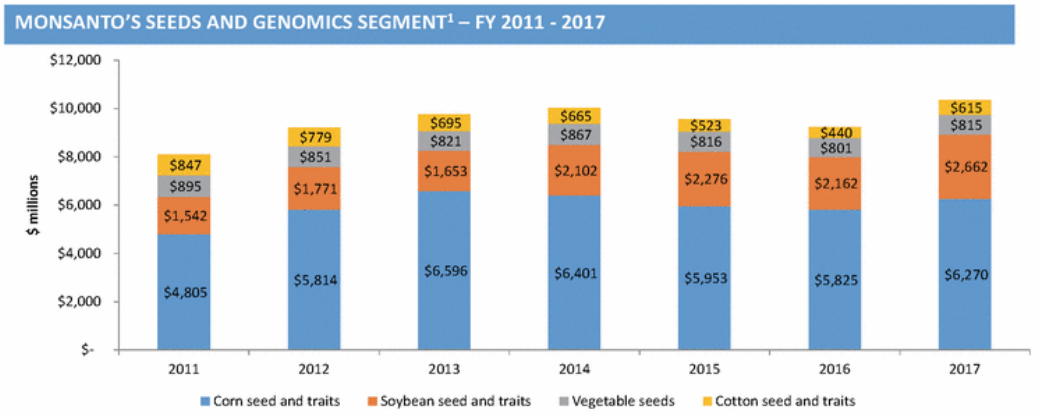
"The early development work with C3003 in oilseed plants and its mechanism is very interesting, and we are excited to have the opportunity to explore the potential of this unique yield trait gene in soybean. We are also impressed by Yield10's metabolic engineering and advanced carbon flux modeling capabilities, as Monsanto is committed to developing solutions that meet farmers' important needs, while positively affecting modern agriculture's carbon footprint and overall sustainability." *Janice Edwards, Ph.D., Director, Yield Traits and Disease.*

MONSANTO

Monsanto's Net Sales – Seeds and Genomics Segment

Monsanto's net sales for the seeds and genomics segment was $10.9 billion in FY 2017.

- The seeds and genomics segment produces seed brands and develops biotechnology traits.



[1] Monsanto Company 2017 Form 10-K, page 25

MONSANTO

Yield10 | BIOSCIENCE

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.

Canola[(1)] (Can)	Soybean[(2)] (US)	Corn[(2)] (US)
2016 Harvest $18.4 M tons $9.6 B value	2016 Harvest $4.36 B bu $40.1 B value	2016 Harvest $15.2 B bu $50.2 B value
20% Target Yield Increase	20% Target Yield Increase	10% Target Yield Increase
+$1.92 B value	+$8.01 B value	+$5.16 B value
40-50% Value - Seed Co/Yield 10	40-50% Value - Seed Co/Yield 10	40-50% Value - Seed Co/Yield 10
$0.77 - $0.96 B value	$3.2 - $4.0 B value	$2.0 - $2.6 B value
Yield10 Target[3]	Yield10 Target[3]	Yield10 Target[3]
$65 - $82 M potential revenue	$272 - $340 M potential revenue	$170 - $221 M potential revenue

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; 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 | BIOSCIENCE

Market Opportunities

Yield10 Traits: Market Doubleplay

	Crop	Value Proposition	Competitive Advantage
Commodity	• Corn • Soybean • Canola	• Reduce grower cost • Increase production • Lower food costs • Food security • Sustainability	• Novel yield traits • Powerful trait gene combination discovery platform
	High performance traits		
Specialty	• Oilseed focus • Identity preserved	• Health and wellness • Sustainability • Alternative crops • Industrial feedstocks	• Novel yield traits • Increased oil content • Lower production costs

Commercial Strategy

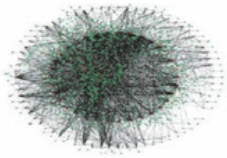
Yield10 Technologies Enable Multiple Paths to Value Creation Driven by Yield Traits and Unique Capabilities


Major North American Commodity Crops

- Accelerate deployment with Ag majors
- Provide low hurdle to deploy and test yield traits in elite germplasm
- License agreements with milestones and participation in downstream economics


Specialty and Niche Crops including Nutritional Oils

- Form collaborations based on combining technologies to improve yield and/or improve nutritional value
- Focus on development of new products in food and animal feed
- Utilize technologies enabling a non-regulated path to market
- JV-type agreements with significant share of downstream economics



Yield10 Technology Platforms

- Accelerate innovation based on unique approach to identifying gene combinations for editing
- Access government grants and relationships with leading plant scientists
- R&D support for partner funded programs

MILESTONES

Upcoming Milestones

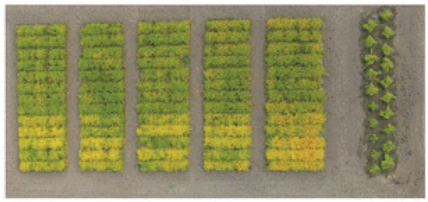
Yield10 is working to progress our yield enhancement technologies and build collaborations

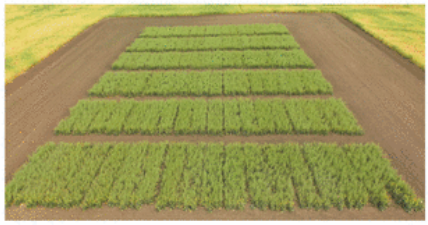
- Continue progress on C3003 with additional constructs and crops
  - Begin planning and logistics for 2018 field testing of C3003 in Camelina and canola in Canada
  - Work with Monsanto to set up testing program in soybean for 2018
  - Report greenhouse data on C3003 trait in rice in 2018 and continue evaluating soybean
- Progress oil enhancing targets using CRISPR genome editing
  - C3004, C3007, C3008 and C3009 for increased seed yield and seed oil content
- Progress C4000 series traits into rice and corn
  - Report greenhouse data for C4003 in rice in 2018
  - Begin work on C4000 series traits in corn
  - 24 downstream transcription factors and combinations from the T3 Platform - genome editing target focus
- Secure Ag industry collaborations and non-dilutive sources of funding
- Build our intellectual property portfolio
- Communicate our scientific innovations in technical presentations and papers

C3003 Yield Trait Development Timeline

Indicative Proof Point Timelines for C3003

Crop/Trait	Year		
	2017	2018	2019
Camelina/Gen 1 C3003	✓ Field test data (Q1)		
Camelina/Gen 2 C3003	✓ Greenhouse data (Q1) ✓ Field test data (Q4)	Field test data (Q4)	
Canola/Gen 1 C3003	✓ Field test data (Q4)	Field test data (Q4)	Field trial
Canola/Gen 2 C3003		Field test data (Q4)*	Field trial
Soybean/Gen 1 C3003	✓ Preliminary Greenhouse data	Field test TBD [1]	Field test
Soybean /Gen 2 C3003	✓ Preliminary Greenhouse data	Field test TBD [1]	Field test
Rice/Gen 1 C3003		Greenhouse data	TBD *,[1]
Rice/Gen 2 C3003		Greenhouse data	TBD *,[1]





* Progress depends on results achieved in greenhouse studies
[1] Progress depends on seed bulk up in greenhouse

Path Forward for C3003

Plans for 2018 Field Tests and Related Discovery & Early Development Activities

Goal: Identify best constructs/events to move into larger scale field studies

Camelina

- Field tests with best lines with Gen 2.0 and Gen 2.1 constructs using field grown seed
- Continue research on Gen 3 C3003 constructs

Canola

- Results from Camelina translate into canola for Gen C3003, repeat field tests with Gen1 canola using field grown seed
- Scale up Gen 2.0 lines with intention to do field trials in 2019 at latest and in 2018 if technically possible
- Develop Gen 2.1 lines of canola

Soybean

- Gen 1 and Gen 2 C3003
  - Preliminary greenhouse indications: effects of C3003 translate into soybean
    - E.g. lower individual seed weight with soybean Gen 1, typical individual seed weight with Gen 2
  - Preliminary results suggest an increase in branching for some events
  - Plan to conduct pilot scale field test with seed from greenhouse study (2018 or 2019)
  - Progress additional events for Gen 1, Gen 2.0 and develop Gen 2.1 lines of soybean
  - Support Monsanto soybean activity with C3003 and C3004

TRAIT GENE DEVELOPMENT

Novel Yield Trait Gene: C3003

C3003 is a component of an algal system for increasing photosynthesis in low CO_2 conditions

- A scientific discovery from University of Massachusetts with a unique biological mechanism
- C3003 improves the metabolic infrastructure of the plants
- Potential to be useful in a wide range of C3 crops: Camelina, canola, soybean, corn, wheat, rice etc.

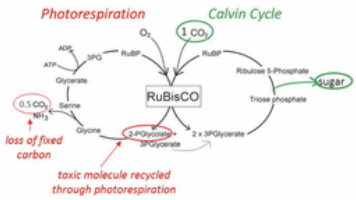
Scientific progress provides new insights on mechanism

- Two additional patent applications filed
- Recent DOE grant sub-awardee

2017 research program for C3003

- Leverage the development speed of Camelina to optimize the impact of C3003 in major crops
- Determine if Camelina results with C3003 translate into canola, soybean and rice

C3 photosynthesis reactions



A 5% reduction of photorespiration in soybean and wheat would add ~$500 million/year of economic value in the US
(Walker et al., 2016, Ann. Rev. Plant Biol. 67:17.1 – 17.23)

Gen 2 C3003 Camelina Field Test 2017 Results

First Field Test with Gen 2.0 C3003 Shows Promising Results in Camelina

Objectives

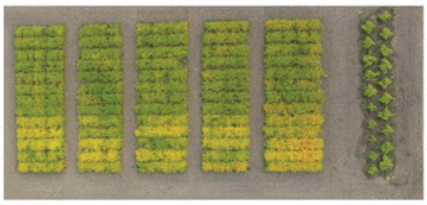
- Generate technical data and determine the best way to deploy C3003 in canola and soybean

Results

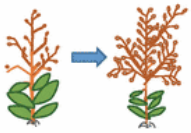
- Solid agronomic profile: seed germination, seedling vigor
- Overall seed yield results positive but varied between the two sites; the range was 2 to 7% (factors: weather conditions, site location, soil differences, nitrogen application)
- Harvest index at maturity increased versus control plants in majority of events
- Average individual seed weight[1] increased above control plants in majority of events
- Seed oil content and fatty acid profile unchanged

Next Steps

- Generate additional data on Gen 2.0 and 2.1 constructs and optimize seed specific promoter activity



C3003 Camelina field test 2017



Harvest index (HI) is a ratio of seed to plant biomass

[1] determined by measuring mass of 1000 seeds

Yield10 | BIOSCIENCE

Gen 2 C3003 Camelina Mini Cage/Seed Bulk Up Results

Mini Cage Results Provide Insight into Optimizing Expression of C3003 in Oilseed Crops

Objectives and Growth Conditions

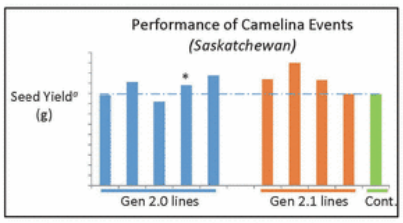
- Produce pure field grown seed for 2018 field testing program
- Compare 2 different seed specific promoters (Gen 2.0 and 2.1 constructs)

Observations

- Solid agronomic performance
- Cage trials produced higher yields than control plants for most lines
  - Note: cage trials provide only an indication of performance
- 6 out of 9 lines produced increase in seed yield versus control plants with range of seed yield
- Gen 2.1 construct looks particularly promising

Results strongly support deployment of Gen 2.0 and Gen 2.1 versions of C3003 in canola and soybean

C3003 Camelina Mini Cages 2017



*[a]Seed yield harvested per cage plot. Values are the average of 2 cages for all data points except * where only one cage was harvested*

Yield10 | BIOSCIENCE

Gen 1 C3003 Canola Field Test 2017 Results

First Field Test with Gen 1 C3003 Shows Translation of Yield Trait into Canola

Objectives

- Determine if seed yield improvement and agronomic attributes observed for C3003 in Camelina translate to canola
- Test several events and select best ones for further study

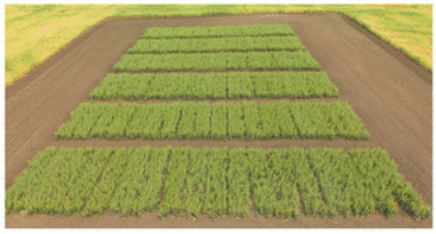
Results

- Observed seed yield improvements of up to 13% in the best line versus control plants
  - Note: low rainfall conditions at site
- Observed decrease in individual seed weight as seen with Gen 1 C3003 in Camelina

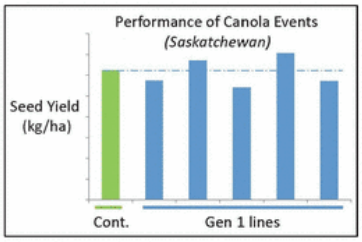
Next Steps

- Complete data analysis: seed oil content and fatty acid profile
- Optimize seed specific promoter activity based on findings from work on Gen 2.0 and Gen 2.1 versions of C3003 in Camelina

Key Finding: Gen 1 C3003 results in Camelina translate into canola



C3003 canola field test Aug. 2017



Yield of harvested seed converted to kg/ha based on size of plot. Cont. = control wild-type plants

Yield10: Traits for Boosting Seed Oil Content

USDA-APHIS confirmed nonregulated status for our genome-edited C3008a Camelina line

- First nonregulated trait (C3008a) submission to USDA-APHIS by Yield10
- Developing multi-gene edited oilseed lines (C3008a, b, C3009) for future submission
- C3007 and C3010 also accessible through genome editing to increase oil content

C3007 a promising target for boosting oil content in oilseed crops

- A scientific discovery from University of Missouri
- A unique regulatory mechanism controlling oil biosynthesis
- Potentially accessible through genome editing (reduce time to market?)
- Combine C3007 with other genome edited traits to re-engineer oil biosynthesis

Progressing C4000 Traits in Rice and Wheat

- C4001 boosts a key parameter of photosynthesis (~75%) and improves plant biomass yield (~75-100%) in switchgrass
- Transformed rice with C4001 gene from switchgrass and rice
  - 1st generation plants are growing in greenhouse
  - Produce 3rd generation plants and measure seed yield
- Signed two-year collaboration with The National Research Council (NRC) of Canada to improve yield and drought tolerance in North American wheat
  - Focus on C4000 series of traits
  - NRC contributes financial resources and expertise in wheat research and breeding
  - Yield10 retains rights to IP
- Corn transformation in planning stage

C4001 in rice

wheat

KEY ACCOMPLISHMENTS & CAPITALIZATION TABLE

2017 Key Accomplishments

- ✓ Achieved all major objectives for 2017 while managing cash usage
  - ✓ Kicked off 2017 with renaming and rebranding as Yield10 Bioscience, Inc.
  - ✓ Added 2 key scientists and board member with agricultural business experience
  - ✓ Conducted Field Tests for C3003 in Camelina and canola
  - ✓ Reported encouraging results for C3003 in Camelina, canola and soybean
  - ✓ Signed a research agreement with Monsanto for testing of C3003 and C3004 in soybean
  - ✓ Reported results showing that trait C4001 produces significant increases in plant yield
  - ✓ Signed a research collaboration with NRC to improve yield and drought tolerance in wheat
  - ✓ Secured option from University of Missouri for C3007 technology to boost oil content
  - ✓ Received confirmation of nonregulated status from USDA-APHIS for genome-edited Camelina
  - ✓ Filed 5 patent applications
  - ✓ Raised $2.0M, net in offering of common stock and warrants

Capitalization Table

OWNERSHIP TABLE as of November 15, 2017		
Holder	# of Common Shares	% of Common Shares
5% Holders		
Jack W. Schuler	1,383,421	40.0%
William P Scully	293,333	8.4%
Matt Strobeck/Birchview Capital	228,493	6.6%
Total Ownership >5%	1,905,247	55.0%
All Directors and Officers as a group	117,564	3.4%

CAPITALIZATION TABLE as of November 15, 2017	
Description	Common Equivalent
Common Shares Outstanding	3,461,714
Options (weighted average price $17.93)	626,185
Restricted Stock Units	14,367
Warrants* (weighted average price $18.72)	994,084
Total Fully Diluted Shares	5,096,350

**Strike price for 393,300, 570,784, and 30,000 warrants is $39.80, $5.04, and $2.90, respectively.*

Filed pursuant to Rule 433
Registration Statement No. 333-221283
December 11, 2017

Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)

Investor Presentation

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

December 2017