



Yield10

B I O S C I E N C E

Yield10 Bioscience, Inc.

(NASDAQCM:YTEN)

First Quarter 2018 Investor Presentation

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

May 10, 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**

First Quarter Financial Results

- **Balance Sheet**

- \$11.6 M in cash, cash equivalents and short term investments at end of Q1
- Net operating cash usage of \$3.0 M for first quarter
- No debt on balance sheet
- All preferred shares issued in Dec. 2017 offering converted to common shares in Q1
- Estimate total net cash usage of approx. \$9.0 to \$9.5 M for full year 2018, including payments of \$0.5 million made in 1H18 for final restructuring costs

- **Operating Results**

- Reported net loss for Q1 2018 of \$2.3 M or \$0.24 per share
- Reported \$0.1 M in grant revenue, \$1.1 M in R&D, and \$1.3 M in G&A spend

Recent Accomplishments

- ✓ Completed Planning and Permitting for 2018 Field Tests
 - Field test versions of C3003 in Camelina and canola to evaluate seed yield
 - Perform seed bulk up of C3003 in soybean
 - Field test genome-edited C3008 in Camelina
- ✓ Completed Genome-edit of 3 Gene Targets Involved in Oil Biosynthesis
 - Combined C3008a, C3008b and C3009 edits in Camelina
 - Plan to seek “non-regulated” status from USDA-APHIS to enable field testing
- ✓ Two Recent Publications Highlight Yield10 Technology and Targets for Genome-editing
 - Metabolic Engineering to Increase Crop Yield: From Concept to Execution
 - The return on investment over the last 20 years for mass screening of individual plant genes to improve crops has been low
 - Yield10 is taking a differentiated approach to address crop yield using predictive models
 - Novel Transcription Factors PvBMY1 and PvBMY3 Increase Biomass Yield in Switchgrass
 - Report for the first time data obtained with C4003 in switchgrass
- ✓ Filed patent application on using GTFs in corn to boost seed yield

Yield10 is Well Positioned for 2018

- Rich pipeline of yield traits in development addresses compelling market opportunity
- Deploying R&D resources to generate proof points in key crops
 - Field tests
 - Greenhouse studies
 - USDA-APHIS submissions
- Opportunities for licenses and collaborations

Rich Pipeline of Trait Genes in Development

SUMMARY OF OUR CROP TRAITS IN DEVELOPMENT	
Business Area	Current Status
Seed Yield Traits-Regulated	
C3003	Camelina 1 st and 2 nd generation at field testing stage Canola 1 st and 2 nd 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; at field testing stage
C3008a, C3008b and C3009 combinations	Camelina, editing of all 3 gene targets completed
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

Novel Yield Trait Gene: C3003

C3003 is a component of an algal system for increasing photosynthesis in low CO₂ 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, wheat, rice and others

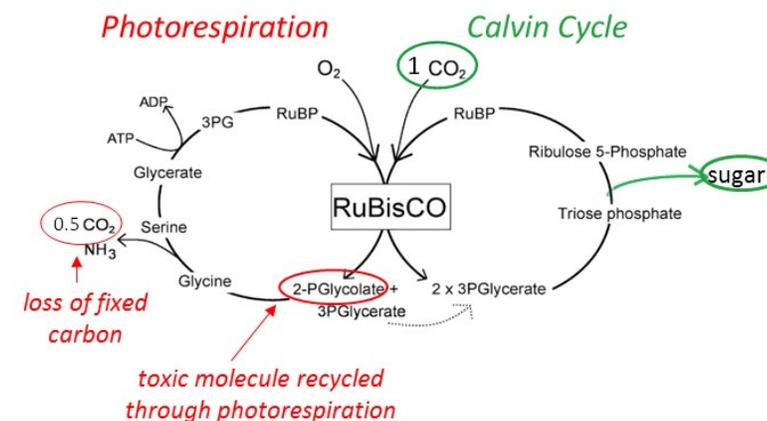
Scientific progress provides new insights on mechanism

- Four additional patent applications filed in 2017
- DOE grant sub-awardee
- Modeling suggests testing in combination with C3004

Research program for C3003

- Leverage the development speed of Camelina to optimize the impact of C3003 in major crops
- Demonstrate Camelina results with C3003 translate into canola, soybean and rice
- Execute 2018 Field Tests in oilseed crops to optimize constructs
- Monsanto license provides a path to test C3003 in elite soybean germplasm and in combination with C3004

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)

We have engineered Camelina and canola to express C3003 from constitutive (Gen 1) or seed specific (Gen2) promoters

Crop/Trait	Year		
	2017	2018	2019
Camelina Gen 1 C3003	<ul style="list-style-type: none"> 2016 field test data reported (<i>up to 23% seed yield increase</i>) 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
Camelina Gen 2 C3003	<ul style="list-style-type: none"> Greenhouse (<i>up to 24% seed yield increase</i>) 2017 field test (<i>up to 7% seed yield increase</i>) 	<ul style="list-style-type: none"> Field tests (data Q4) 	<ul style="list-style-type: none"> Field tests Gen 2.0, 2.1
Canola Gen 1 C3003	<ul style="list-style-type: none"> 2017 field test (<i>up to 13% seed yield increase</i>) 	<ul style="list-style-type: none"> Field tests (data Q4) 	<ul style="list-style-type: none"> TBD
Canola Gen 2 C3003		<ul style="list-style-type: none"> Greenhouse data Field tests (data Q4) 	<ul style="list-style-type: none"> Field tests Gen 2.0, 2.1
Soybean Gen 1 & Gen 2	<ul style="list-style-type: none"> Greenhouse data from early generations 	<ul style="list-style-type: none"> Small scale field plots 	<ul style="list-style-type: none"> Field tests
Rice Gen 1 & Gen 2		<ul style="list-style-type: none"> Greenhouse studies 	<ul style="list-style-type: none"> Greenhouse studies

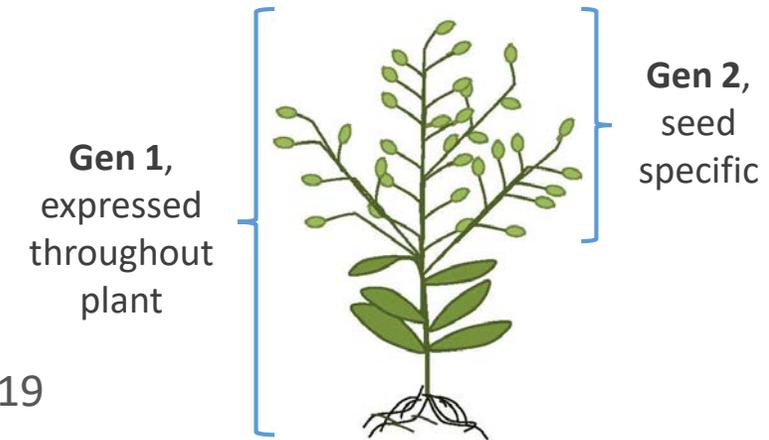
Conduct Field Tests of C3003 in Camelina, canola; Bulk-up soybean seed

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

Conduct Field Test of Genome-edited C3008 in Camelina

- Begin to generate data on component traits to be used in multi-trait stack
- C3008a may be a useful target in trait stack intended to increase oil yield and improve lipid quality
- First field test of this trait in 2018; Conduct test at two U.S. sites
- Obtained non-regulated status in 2017



Generated Preliminary Greenhouse Results for Soybean in 2017 Informing Plans for 2018

Current Status and Recent Results

- Developed Gen 1 and Gen 2 C3003 constructs/events with academic collaborator in Canada
- Preliminary observations from greenhouse grown plants indicate that effects of C3003 translate into soybean
 - Observed 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
- Monsanto researchers working to deploy C3003 into elite soybean germplasm

Path Forward in 2018

- Plant small-scale field plots at sites in Canada with greenhouse grown seed
- Conduct seed bulk-up for 2019 field tests, monitor agronomic parameters
- Planting anticipated in 2Q 2018
- Progress additional events for Gen 1, Gen 2.0
- Support Monsanto soybean activity with C3003

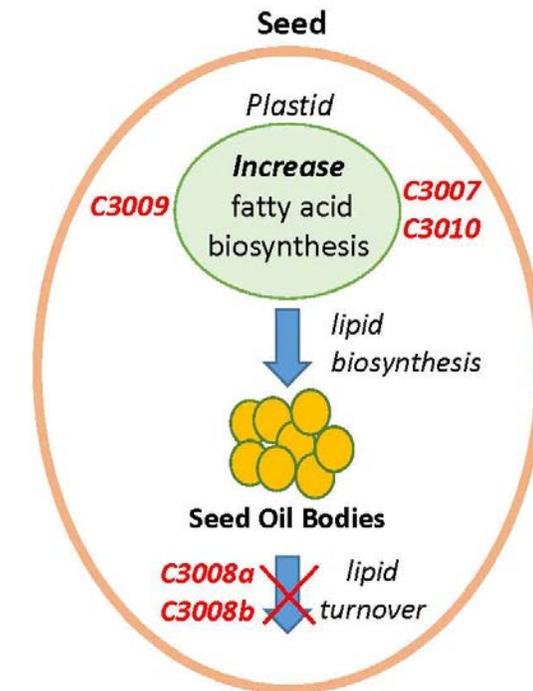
Yield10 is uniquely positioned to re-engineer the oil biosynthesis pathway in oilseed crops

Current Status

- Boosting oil yield per acre significantly increases the value of the crop to the grower
- Identified 5 targets involved in oil biosynthesis pathway
- Generating IP
- Traits accessible through genome-editing (non-GMO), reducing development cost and time associated with commercialization
- Potential to stack with composition traits (e.g. high oleic, omega fatty acids)
- Obtained first non-regulated¹ trait (C3008a) via a submission to USDA-APHIS in 2017
- Completed stacking of multiple edited traits in one line (eg. C3008a, C3008b, C3009)

Next Steps

- Edit additional genes including C3007 and/or C3010 to boost oil content
- Make submissions of traits/plants to USDA-APHIS to enable non-regulated US field tests
- Conduct field tests to generate data in oilseed crops
- Identify opportunities for licenses and collaborations for specialty oil seed crops





Plant Science

Available online 14 March 2018

In Press, Corrected Proof



Metabolic engineering to increase crop yield: From concept to execution ☆

Frank A. Skraly, Madana M.R. Ambavaram, Oliver Peoples, Kristi D. Snell

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<https://doi.org/10.1016/j.plantsci.2018.03.011>

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Plant Science

Available online 7 April 2018

In Press, Corrected Proof



Novel transcription factors *PvBMY1* and *PvBMY3* increase biomass yield in greenhouse-grown switchgrass (*Panicum virgatum* L.) ☆

Madana M.R. Ambavaram, Aminat Ali, Kieran P. Ryan, Oliver Peoples, Kristi D. Snell , Maria N. Somleva

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<https://doi.org/10.1016/j.plantsci.2018.04.003>

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Global Regulatory Genes in Switchgrass

- Produced transgenic plants
- Significant increases in photosynthesis as well as aboveground and root biomass
- Accessible to genome-edit
- Potential application to biomass crops such as sorghum, silage corn and alfalfa
- May be applicable to seed crops since similar genes in corn are expressed in seed tissues
- Related work underway in rice, wheat, and planned for corn

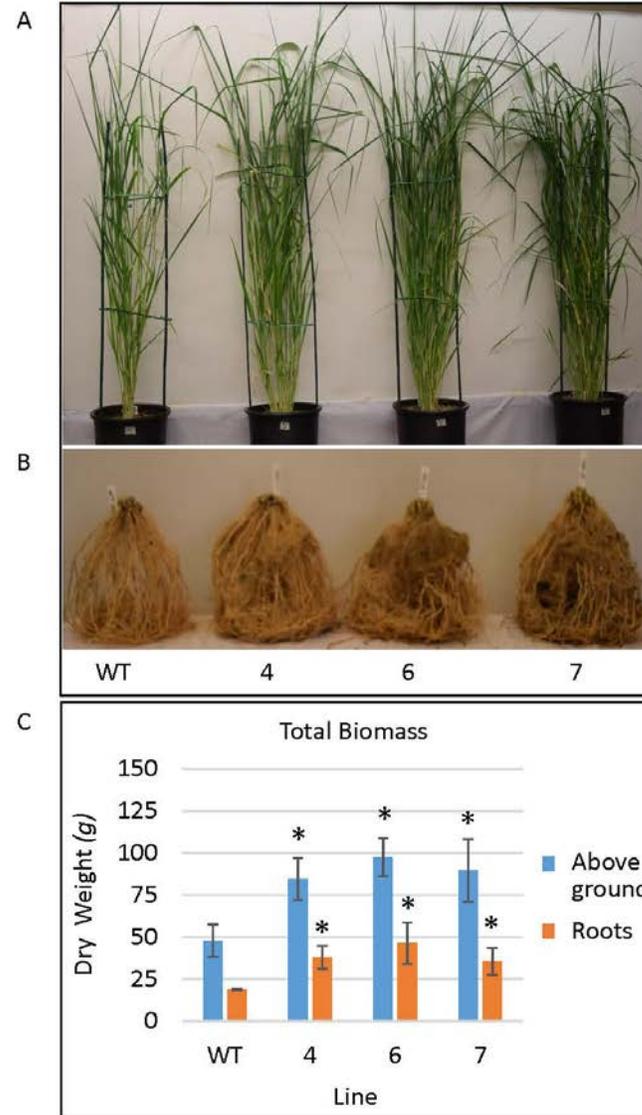
Work funded by DOE-EERE

For more data, see: Ambavaram et al., Novel transcription factors PvBMY1 and PvBMY3 increase biomass yield in greenhouse-grown switchgrass (*Panicum virgatum* L.), 2018, Plant Science, in press

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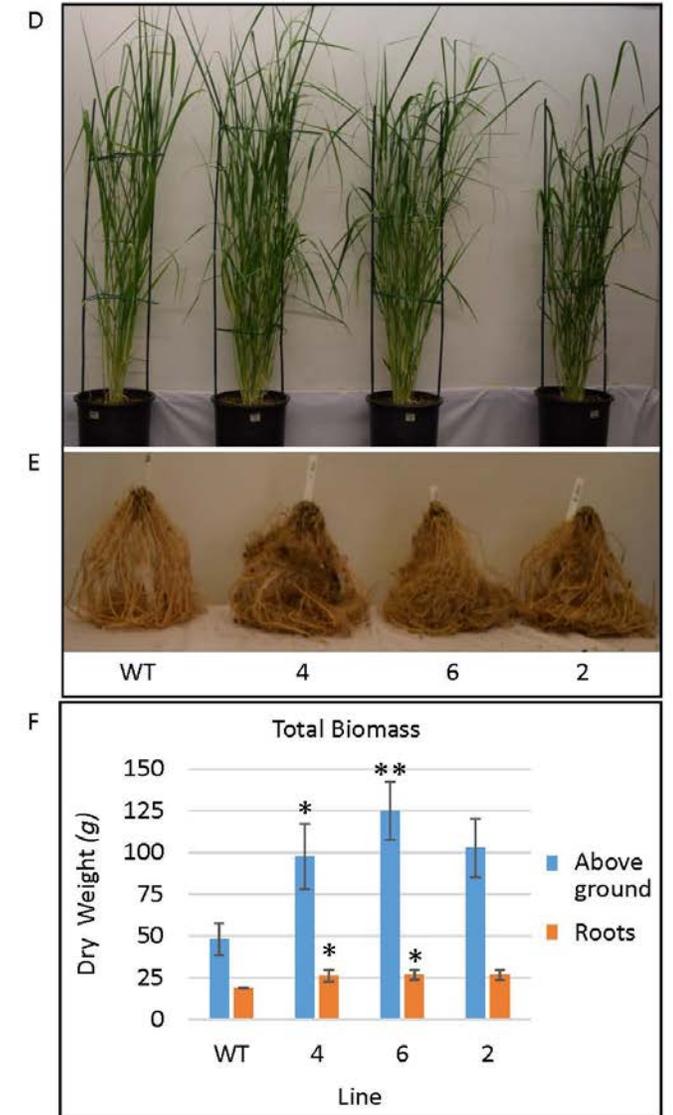
n=4 plants, asterisks indicate levels of significance;
* $P \leq 0.01$, ** $P \leq 0.05$)

C4001 (*PvBMY1*)



Leaves & stems, 75%-100% increase
Roots, 85-140% increase

C4003 (*PvBMY3*)



Leaves & stems, 100-160% increase
Roots, ~40% increase

Yield10 is uniquely positioned to identify valuable targets based on global transcription factors

Current Status

- Published data showing that C4001 and C4003 significantly boost key parameter of photosynthesis and improve plant biomass in switchgrass
- Conducting studies of C4001 and C4003 in rice
- Working through collaboration with NRC to improve yield and drought tolerance in wheat using C4001 and C4003
- Foundational IP filed and generating additional IP on C4004 plus series traits

Next Steps

- Generate data in rice and wheat for C4001 and C4003 traits
- Begin corn transformations to enable greenhouse and field tests
- Increase focus on non-regulated route to increased seed yield and biomass production
- Identify new targets from engineered lines accessible with genome-editing and explore combinations



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**



A Breeding Revolution

As Gene Editing Nears the Field, Regulators and Consumers Lag Behind

4/27/2018 | 7:55 AM CDT



By *Emily Unglesbee*, DTN Staff Reporter

Connect with Emily:

[@Emily_Unglesbee](#)



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GENETICS

The USDA Just Gave the Green Light to CRISPR'd Food



Kristen V. Brown

3/30/18 2:34pm • Filed to: CRISPR

GIZMODO

- Obtaining non-regulated status reduces development costs and timelines¹
- “GRAIN” trait gene discovery platform identifies “Smart Editing Targets”

¹ https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/sa_brs_vpm/340-peis

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

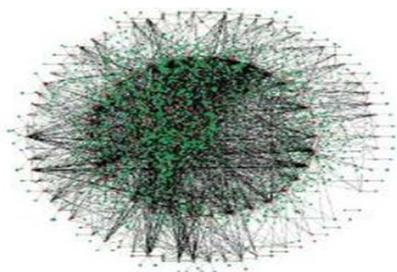


Specialty and Niche Crops including Nutritional Oils

- 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



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

- Continue progress on C3003 with additional constructs and crops
 - Execute 2018 field testing of C3003 in Camelina and canola in Canada
 - Expect planting in 2Q 2018 and first results in 4Q 2018
 - Monsanto is developing the C3003 trait in soybean
 - Continue independent evaluation of C3003 in soybean and rice
- Advance oil boosting traits
 - Progress oil enhancing traits using CRISPR genome-editing including C3004, C3007, C3008a/b, C3009 and C3010 for increased seed yield and seed oil content
- Progress C4000 series traits into key crops
 - Continue work with C4000 series traits in rice, begin work on C4000 series traits in corn
 - Progress genome-editing of select C4000 series traits in rice
- Secure Ag industry collaborations and non-dilutive sources of funding
- Build our intellectual property portfolio
- Communicate our scientific innovations in technical presentations and papers

- Positioned to generate proof points and achieve milestones in 2018
- Executing focused program with C3003 yield trait in oilseed crops and rice
- Leveraging biotech expertise to build value around genome-editing targets for key crops including oilseeds, as well as rice, wheat and corn
- We have a clear vision for our business – defining the commercial opportunity in 3 areas: commodity crops, specialty oils and R&D Platform



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