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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2018;
or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission File Number 001-33133

YIELD10 BIOSCIENCE, INC.
(Exact name of registrant as specified in its charter)

Delaware	**04-3158289**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
19 Presidential Way, Woburn, MA	**01801**
(Address of principal executive offices)	(Zip Code)

(Registrant's telephone number, including area code): **(617) 583-1700**

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	**Name of exchange on which registered**
Common Stock, par value $.01 per share	The Nasdaq Stock Market LLC (Nasdaq Capital Market)

Securities registered pursuant to Section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (Section 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act:

Large accelerated filer ☐	Accelerated filer ☐
Non-accelerated filer ☒	Smaller reporting company ☒
Emerging growth company ☐	

If an emerging growth company, indicate by check mark if the registrant elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold on the Nasdaq Capital Market on June 29, 2018 was $9,065,921.

The number of shares outstanding of the registrant's common stock as of March 25, 2019 was 12,468,219.

DOCUMENTS INCORPORATED BY REFERENCE

Pursuant to General Instruction G to Form 10-K, the information required by Part III, Items 10, 11, 12, 13 and 14 is incorporated herein by reference from the Company's proxy statement for the Annual Meeting of Stockholders to be held on May 22, 2019, which is expected to be filed not later than 120 days after the fiscal year end covered by this Form 10-K.

YIELD10 BIOSCIENCE, INC.
ANNUAL REPORT ON FORM 10-K
For the Year Ended December 31, 2018
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Forward Looking Statements

This annual report on Form 10-K contains "forward-looking statements" within the meaning of 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These statements relate to our future plans, objectives, expectations and intentions and may be identified by words such as "may," "will," "should," "expects," "plans," "anticipate," "intends," "target," "projects," "contemplates," "believe," "estimates," "predicts," "potential," and "continue," or similar words.

Although we believe that our expectations are based on reasonable assumptions within the limits of our knowledge of our business and operations, the forward-looking statements contained in this document are neither promises nor guarantees. Our business is subject to significant risks and uncertainties and there can be no assurance that our actual results will not differ materially from our expectations. These forward looking statements include, but are not limited to, statements concerning our business plans and strategies; the expected results of our strategic restructuring to focus on Yield10 Bioscience as our core business; expected future financial results and cash requirements; plans for obtaining additional funding; plans and expectations that depend on our ability to continue as a going concern; and plans for development and commercialization of our crop yield traits, technologies and intellectual property. Such forward-looking statements are subject to a number of risks and uncertainties that could cause actual results to differ materially from those anticipated including, without limitation, risks related to our limited cash resources, uncertainty about our ability to secure additional funding, risks and uncertainties associated with our restructuring plans, risks related to the execution of our business plans and strategies, risks associated with the protection and enforcement of our intellectual property rights, as well as other risks and uncertainties set forth below under the caption "Risk Factors" in Part I, Item 1A, of this report.

The forward-looking statements and risk factors presented in this document are made only as of the date hereof and we do not intend to update any of these risk factors or to publicly announce the results of any revisions to any of our forward-looking statements other than as required under the federal securities laws.

Unless the context otherwise requires, all references in this Annual Report on Form 10-K to "Yield10 Bioscience," "we," "our," "us," "our company" or "the company" refer to Yield10 Bioscience, Inc., a Delaware corporation and its subsidiaries.

PART I

ITEM 1. BUSINESS

Overview

Yield10 Bioscience, Inc. is an agricultural bioscience company which uses its "Trait Factory" to develop high value seed traits for the agriculture and food industries. Specifically, Yield10 plans to efficiently develop superior gene traits for the major grain crops, which are corn, soybean, canola, wheat and rice. We consider 10-20 percent increases in crop yield to be step-change increases. We are currently progressing several novel yield gene traits in our pipeline in canola, soybean and corn, the major North American row crops, among others. Over the last three years, we have evaluated certain of our traits in greenhouse studies and field tests conducted in the United States and Canada. We currently have non-exclusive research license agreements in place with the Monsanto division of Bayer Crop Science, a division of Bayer AG, for the evaluation of our C3003 and C3004 traits in soybean and with Forage Genetics International, LLC, a division of Land O'Lakes, Inc. for the evaluation of five yield traits in forage sorghum. Our business strategy is to progress our traits into field tests to generate validating yield data. Over the last three years, we have progressed our evaluation of C3003 in field tests with Camelina and canola. We are planning to expand our field tests with additional traits and more events in 2019 and 2020. We plan to leverage data that we generate to support the performance of our traits in key crops to establish collaborations or sign licenses to the traits with major agricultural companies in order to generate revenue. Yield10 Bioscience is headquartered in Woburn, Massachusetts and has an oilseed development Center of Excellence in Saskatoon, Saskatchewan, Canada.

According to a United Nations report, crop production must be increased by over 70 percent in the next 35 years to feed the growing global population, which is expected to increase from 7 billion to more than 9.6 billion by 2050. During that time period, there will be a reduction in available arable land as a result of infrastructure growth and increased pressure on scarce water resources. Consumption of meat, fish, and dairy products is also expected to increase based on dietary changes associated with increasing wealth and living standards. Harvestable food production per acre and per growing season must be increased to meet this demand. At the same time, with the increasing focus on health and wellness, food safety and sustainability in developed countries, we anticipate a rise in demand for new varieties of food and food ingredients with improved nutritional properties. With crop intensification (less land available and more production needed), we expect that

improved crop genetics based on new gene traits will be a key driver of increased productivity, potentially resulting in the best performing yield traits commanding disproportionate value and disrupting the seed sector. We expect farmers and growers to be the major beneficiaries of these drivers, which represent potential opportunities for increased revenue and crop diversification. Today the global food market has an estimated value of $5 trillion.

Crop yield is determined by the efficiency by which crops fix carbon dioxide from the air through photosynthesis and convert that fixed carbon through carbon metabolism during the growing season into harvestable grain or biomass. Yield10 brings unique capabilities and experience in advanced metabolic engineering and systems biology to optimize photosynthesis and carbon efficiency in crops to increase grain or biomass yield. These capabilities were developed based on sustained investment over many years when the Company was named Metabolix. As Metabolix, the Company solved complex biological problems in the industrial/synthetic biology space to produce bioplastics. By 2012, the Company had begun work to increase photosynthesis in crops as part of those activities, which led to the creation in 2015 of the current Yield10 business focused on crop yield. In mid-2016 we sold our bioplastics assets to focus on our agricultural innovations and the Company was rebranded as Yield10 Bioscience in January 2017.

One of the critical unmet needs in the agricultural sector is to increase the fundamental yield potential of crops to address global food security. This challenge is well suited to Yield10's unique background and expertise in metabolic modeling, genetic engineering, genome editing and next generation microbial gene systems which collectively form the foundation of Yield10's trait development process. We refer to this trait development process as the "Trait Factory." The Trait Factory encompasses discovery of gene targets using our GRAIN platform (which stands for **G**ene **R**anking **A**rtificial **I**ntelligence **N**etwork), genetic engineering of crops using traditional approaches or genome editing to modify those targets and generation of field data with the engineered crops. Performance and molecular data from the engineered crops are then fed back into the GRAIN system to enable refinement of specific gene targets and the identification of new trait gene targets. Modified crops with improved performance then enter the development pipeline and progress on the regulated or non-regulated path to market depending on how the plants are genetically engineered.

Exciting new genetic engineering technologies like the CRISPR technology and other approaches to genome editing hold promise to accelerate the deployment of novel traits into commercial crops. This method of making insertions or deletions of DNA into plants without the use of foreign DNA has been described as "precision breeding." We signed a research license, with rights to convert to a commercial license, to CRISPR/Cas-9 technology in 2018 to support our genome editing program. We have taken two genome edited traits designed to boost oil content in oilseed crops through the U.S. Department of Agriculture (USDA)—Animal and Plant Health Inspection Service (APHIS) "Am I Regulated?" petitioning process and confirmed non-regulated status with the agency, clearing the way to conduct field tests in the United States. Genome editing technology as well as the streamlined regulatory process supported by USDA-APHIS for certain types of plant traits may enable agricultural innovators such as Yield10 to deploy and field test new traits more quickly, potentially resulting in a shorter path to market and reduced costs as compared to the more highly regulated path required for traditional biotechnology-derived traits.

SUMMARY OF OUR CROP YIELD TRAITS IN DEVELOPMENT	
R&D Area	**Crops Under Evaluation**
Seed Yield Traits-Likely Regulated[1]	
C3003	Canola, soybean, sorghum and corn
C3011	Corn, Camelina and canola
Seed Yield Traits-Likely Non-Regulated[2]	
C3004	Camelina and canola
Oil Enhancing Traits-Likely Non-Regulated[2]	
C3007	Camelina and canola
C3008a	Camelina (non-regulated status granted to Yield10[4])
Oil trait combinations - C3008a, C3008b and C3009	Camelina (non-regulated status granted to Yield10[4])
Additional oil trait combinations	Research in progress (target crops to be determined)
Yield Improvement Trait Discovery Platform (Traits Potentially Non-Regulated)[3]	
C4001	Wheat, rice, sorghum and corn
C4002	Sorghum and corn
C4003	Wheat, rice, sorghum and corn
C4004	Wheat and rice
C4029	Sorghum

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(1) C3003 and C3011 consist of microbial genes and are likely to be subject to regulation by USDA-APHIS.

(2) These traits are accessible using genome editing or other methods that do not result in the insertion of non-plant DNA. These approaches may be deemed non-regulated by USDA-APHIS based on recent filings by us and other groups.

(3) Traits in this area were developed in our T3 platform and all are potentially deployable through approaches which may be non-regulated by USDA-APHIS.

(4) Non-regulated status granted by USDA-APHIS. Commercial plant or plant products may be regulated by FDA or EPA.

As we continue to develop the GRAIN platform, key elements of this system have proven effective and have enabled Yield10 to produce several promising crop yield traits in our development pipeline. Yield10 has achieved and published in peer reviewed journals scientific data from growth chamber and greenhouse studies showing that significant improvements to crop yield are possible. We have achieved these results by improving fundamental crop yield through enhanced photosynthetic carbon capture and increased carbon utilization efficiency to increase seed yield. Examples of these traits and their impact on crop yield are shown below. The C3005 trait results required a complex combination of microbial genes to enhance carbon fixation during seed development and serves to highlight the power of our advanced metabolic engineering/systems biology approach. Results we have obtained based on preliminary testing of our C3003 and C3004 traits as well as our C4000 series traits support our plans to test and develop these traits in major row crops.

Examples of our traits and their impact on crop yield in growth chamber and greenhouse studies
C3003/C3004 traits: 23% - 65% increase in seed yield in oilseed crops (Camelina)
C3005 advanced synthetic biology trait: 128% increase in oilseed yield (Camelina)
C4001, C4003 traits: 70% increase in photosynthesis, 150% increase in biomass (switchgrass)

Yield10 has a pipeline of more than 10 novel yield traits in research and development and we expect to generate several proof points for our traits in various crops over the next two years. We are developing our lead yield trait C3003 in canola and recently completed its second year of field tests in Canada. We anticipate that field tests will continue in 2019 as we advance the trait towards commercial development by developing additional commercial canola lines with the trait and expanding field testing. We plan to undertake our first field testing of C3004 in our Camelina platform in 2019 and are working to deploy and test this promising trait in canola, soybean and corn in the future. We have proven capabilities with genome editing using the CRISPR/Cas9 system and have been granted "non-regulated" status from USDA-APHIS for single and multiple genome edited lines of Camelina designed to increase oil content. We plan to field test these plant lines and use the data to optimize the deployment of these traits to boost oil content in canola and potentially soybean. We recently successfully edited C3007, a novel target gene for increasing oil content, in canola and these plants are now progressing through our development pipeline. We plan to continue to progress initial development and testing of multiple traits in wheat and rice. Our approach is to engineer rice and wheat plants with our gene regulator traits to increase photosynthesis and grain yield and use those plants as a source of data to generate new gene targets for genome editing. Yield10 has no plans to field test or develop wheat or rice using traditional genetic engineering technologies. We anticipate that data generated on our traits will enable us to establish revenue generating collaborations in the future for the development and commercialization of our novel yield traits in commercial crops.

We are building a portfolio of intellectual property around our crop yield technology and traits. As of December 31, 2018, we owned or held exclusive rights to 17 pending patent applications worldwide related to advanced technologies for increasing yield in crops. Our portfolio of patent applications includes plant science technologies we have in-licensed globally and exclusively from the University of Massachusetts and North Carolina State University related to the yield trait gene C3003 and other advanced technologies based on advanced metabolic engineering methods to improve carbon capture and selectively control carbon partitioning in plants. Our portfolio of patent applications also includes advanced technologies for increasing oil content in oilseed crops that we in-licensed globally and exclusively from the University of Missouri in 2018 related to the yield trait genes C3007 and C3010.

The Unmet Need: Global Population Growth Outpacing Anticipated Global Food Supply

Yield10 is targeting a critical unmet need in agriculture based on the future disconnect between agricultural supply and the growing global population. According to a United Nations study, the global population is expected to exceed 9.6 billion people by 2050 and therefore there is a need to increase global food production including in grains, protein, dairy and edible oils to meet this demand. This will need to be achieved in the face of increased pressure on land and water resources in addition to increasingly variable weather patterns. Solving this problem is a major global challenge requiring new crop innovation and technologies to fundamentally enhance crop productivity.

The Yield Gap

According to several studies described in an article published in the Public Library of Science in 2013, crop yields may no longer be increasing in different regions of the globe, and current rates of crop yield increase based on traditional plant breeding approaches are expected to fall significantly behind the levels needed to meet the demand for global food production. The researchers found that the top four global crops—maize (corn), rice, wheat and soybean—are currently witnessing average yield improvements of only between 0.9 to 1.6 percent per year, far slower than the required rates to double their production by 2050 solely from incremental yield gains. At these rates, global production of maize, rice, wheat and soybean crops may be required to increase by about 67 percent, 42 percent, 38 percent and 55 percent, respectively, by 2050, in order to meet the anticipated increase in demand for food production caused by population growth. For corn and soybean, the benefits of currently available biotechnology traits were already factored into the data cited in the studies referenced above. The yield increases needed to meet the demands of the growing global population show that a significant "yield gap" exists for each of the crops evaluated in the study.

Yield10 is focused on addressing the yield gap for major crops by utilizing modern biotechnology strategies, including metabolic engineering (synthetic biology approaches) to "build better plants," by using our Trait Factory to optimize photosynthesis and carbon efficiency in crops to increase grain or biomass yield. Enhancement of the photosynthetic capacity of major crops is fundamentally important to crop science and an essential first step to increase the seed and/or biomass yield of plants and, therefore, food production. We have been working in the area of increasing photosynthetic carbon capture and crop yield technologies since 2012 and we have identified several potentially promising genes for increasing yield or improving crop performance.

Health and Wellness, Food Safety and Sustainability

At the same time, with the increasing focus on health and wellness, food safety and sustainability in developed countries, we anticipate a rise in demand for new varieties of food and food ingredients with improved nutritional properties. Further, concerns about food safety have led to the concept of "seed to plate," with a focus on stringent quality control along the entire value chain. If this concept takes hold with consumers, it is likely to require identity preservation from seed to harvest and involve contract farming. This concept is currently being implemented in agricultural biotechnology, in both canola and soybean which have been modified to alter the composition of the oil produced. High oleic canola and soybean oils are being marketed as "healthier" where the value driver is the ability to make marketing claims directly to the consumer. Consumer demand to preserve the identity of specialty ingredients is expected to rise, and we believe that Yield10's crop yield technologies and crop gene editing targets could be useful in this emerging field. Yield10 believes that these types of small acreage specialty crops have the potential for a broader range of future partnering opportunities along the entire value chain.

Business Strategy

Our goal is to build a successful agricultural biotechnology company centered on demonstrating and capturing the value of our yield traits in major food and feed crops. We have identified and are evaluating novel yield trait genes in our Trait Factory to help address the growing global yield gap in food and feed crops. As the primary driver of financial returns each season, crop yield is the key decision variable for farmers in making seed buying decisions, and as a result is critical to the seed industry. Improvements in yield to the levels targeted by Yield10, for example 10-20 percent increases, would be expected to generate significant value to the seed and crop industry. For example, Yield10 is targeting an approximately 10-20 percent increase in canola and soybean yields, which, if successfully deployed across North American acreage, could result in annual incremental crop value of up to $10 billion. By ultimately increasing the output of major food and feed crops and potentially reducing strains on scarce natural resources, we believe that Yield10’s technologies will also contribute to addressing global food security.

Recognizing the highly concentrated nature of the seed business, the prevalence of cross-licensing of traits, and the need to stack multiple crop traits in elite seed germplasm to provide the best options for farmers for large acreage commodity crops, Yield10 does not expect to become an integrated seed company. The current major seed companies dominate the biotech crop space based largely on the early technology innovations that resulted in herbicide and pest resistance traits and have a very successful operating track record in the sector. Yield10 plans to develop yield traits that enable farmers to increase their revenue and secure a share of that added value. To do this Yield10 plans to license our trait innovations to the major agricultural companies so that they can be deployed in elite seed varieties. The incremental value sharing model is well established in the seed sector. Therefore, rather than replicating the downstream elements of these operations and developing our own regulatory, crop breeding or seed production capabilities, we intend to seek industry collaborations and partnerships to leverage these existing core competencies of the current seed industry. Yield10 will focus on its core competency, which is breakthrough science and technology innovation applied to the seed sector.

The type of collaborations and partnerships we seek will depend on the specific anticipated path to market for the crop. For large acreage biotech crops including canola, soybean and corn, we plan to develop proof points for our yield traits as a basis for licensing to major agricultural companies with a focus on capturing downstream value. By developing gene traits that enable the farmer to increase revenue. Yield10 believes that it can secure a share of that increased revenue in much the same way Uber generates revenue by enabling private car owners to operate in the taxi business. According to industry estimates, the timeline from discovery to full commercialization of a biotech trait in a commodity crop can be up to 13 years at a cost of up to $130 million. Our C3003 yield trait is an algal gene, and we believe that it will be regulated as a biotech trait. As we are in the construct optimization/event selection stage, we believe that we are approximately half way along the anticipated development timeline for C3003. Our strategy is to make it attractive for major agricultural companies to invest financial and technical resources to introduce our traits into their elite germplasm for event selection and evaluation. In 2017, we signed a non-exclusive research license with the Monsanto division of Bayer Crop Science (formerly Monsanto Company), a division of Bayer AG ("Bayer"), to test C3003 and C3004 in soybean. Similarly, in 2018 we signed a non-exclusive research license with Forage Genetics International LLC, a division of Land O'Lakes, Inc. ("Forage Genetics"), to test a series of traits in forage sorghum. We may sign additional non-exclusive research licenses on a crop by crop basis in the future, allowing the licensees to invest their resources in progressing the trait. Our focus is on securing a share of the upside value of our traits when we finalize the economic terms of license agreements at the point where the value of the trait is well understood.

For small acreage specialty oil crops, we believe we can leverage our unique skill set to add value to the development of specialty oils focused on nutrition and aquaculture feed. These crops can cost more to produce because of the unique supply chain needed when identity preservation from seed planting to final product is desired. In this area, there may be opportunities for establishing partnerships and license agreements with consumer facing companies in the food and feed sector. Our high oil content traits developed through genome editing may have shorter timelines to commercialization (3-6 years) if deployed in specialty oil crops. We are at an early stage of developing our strategy in this area but believe it may have considerable potential for Yield10.

Yield10 plans to build on its core strengths bringing new technology approaches to exploit an innovation gap in the agricultural biotechnology space that exists due to reduced investment in basic research and development resulting from the ongoing consolidation and restructuring in the agricultural sector. Yield10's mission is to translate and optimize our step-change yield trait innovations in six major food and feed crops and demonstrate their economic value to farmers and seed companies. We intend to create high-value assets in the form of proprietary yield trait gene technologies and to de-risk these assets by progressing them along the path to commercial development with increasingly larger scale field tests and multi-site field trials in major crops. We are currently deploying our yield trait genes into canola, soybean, rice, wheat and corn, by designing and progressing genetically engineered events that we believe to be suitable for the applicable regulatory approval processes and which can be readily bred into the industry's elite crop lines by plant breeding. We expect the customers for Yield10's innovations to be the large and mid-size agricultural companies that would either license or acquire rights to Yield10's yield trait genes and incorporate them into their proprietary commercial crop lines for subsequent commercialization.

We are focused on identifying and developing technologies that will enable us to produce step-change improvements to crop yield.

Yield10 is targeting a critical unmet need in agriculture based on the anticipated disconnect between agricultural supply and the growing global population. Food production must be increased by over 70 percent in the next 35 years to feed the growing global population, which is expected to increase from 7 billion to more than 9.6 billion by 2050. Global climate change is also resulting in regional shifts to historical growing conditions. Given the projection for population growth, recent studies show a "yield gap" for major food and feed crops that cannot be addressed by incremental improvements to yield brought about by traditional plant breeding and existing biotech traits. Current biotech traits deployed in crops by the seed industry are based primarily on using microbial-sourced genes to impart yield protection through herbicide, pest, disease and even drought resistance, whereas Yield10 is focused on increasing fundamental crop yield through enhanced carbon capture and utilization.

Yield10 is focused on "building better plants" using the Trait Factory to optimize photosynthesis and carbon efficiency in crops to increase grain or biomass yield targeting step-change increases in the range of 10-20 percent in crop yield.

Our History

We have a significant track record and expertise in the metabolic engineering of microbes and have made significant progress translating this capability to plants.

As part of the legacy biopolymers and biobased chemicals business of our predecessor company Metabolix, our research team developed an advanced metabolic engineering capability to alter key biochemical pathways and redirect the flow of carbon metabolic intermediates in microbes resulting in the production of the biomaterial polyhydroxyalkanoate, or PHA, at a level of more than 80 to 90 percent by weight of microbial cells that normally did not produce any PHA. In 1997, Metabolix initiated a crop science research program to produce renewable bioplastics and chemicals from agricultural crops. Historically, these efforts were focused on producing PHB, a microbial carbon storage biopolymer, in high concentration in the seeds of oilseed crops or in the leaves of biomass crops such as switchgrass.

As we made progress on producing PHB in plants, we learned that basic carbon supply from photosynthesis was a bottleneck. To address this carbon shortfall, in 2012 we began developing new metabolic engineering and bioinformatics approaches to enhancing basic crop photosynthetic carbon capture. Discoveries from these two approaches became the foundation of our GRAIN crop trait discovery platform. We also began building intellectual property on novel yield trait gene technologies discovered in these programs and realized that our experience in re-engineering the flow of carbon in microorganisms could be applied to building better plants. Photosynthesis is the most important biological process responsible for global food production. Improving the photosynthetic capacity of plants is an essential first step to increase

seed and/or biomass yield and, therefore, food production. We must develop plants which on a per acre basis during the growing season fix more carbon and ultimately target that additional fixed carbon to seed or biomass.

Our Approach

We have assembled a pipeline of crop yield traits for development that are applicable to major commercial crops.

Our unique approach to crop yield trait discovery utilizing our GRAIN platform, which integrates advanced metabolic engineering concepts to address critical bottlenecks in carbon metabolism, has enabled us to discover a series of yield genes with potential use for producing step-change improvements in crop yield. Through our research and early development efforts we have identified and begun characterizing our C3000 and C4000 series of traits. To initially characterize the potential yield trait genes, we test many of our yield trait candidates using our Camelina or switchgrass platforms. As a yield trait innovator, our objective is to identify novel yield traits that act at a fundamental level in crop metabolism to provide the potential for broad deployment of our traits across multiple crop types. Following our early work with these trait genes, we focus on deploying the traits for evaluation across a range of crops including canola, soybean, corn, rice, wheat, each of which are crops of high commercial interest in North America. For crops where Yield10 is not directly conducting research and development activities, we are open to licensing arrangements like the agreement we have in place with Forage Genetics for evaluation of five of our traits in forage sorghum. Our goal is to generate greenhouse and field test data that will support commercial development of the trait and enable us to form collaborations or enter into license agreements with major agricultural companies in order to incorporate our novel yield traits into their seed products. We believe that successfully launching new, high yielding seed to the market would result in higher economic benefit to growers, seed companies, and Yield10.

We believe our business model will allow us to capture value for our discoveries and provide a path to commercialization for important new yield traits for major crops.

Yield10 is working to advance our own developments as well as form business alliances to progress our traits through development, launch and commercialization. Our goal is to capture an attractive share of the added economic value resulting from the deployment of our trait genes and technologies in key crops. We are currently working on the development and deployment of our trait genes into several crops, an approach facilitated by the expiration of much of the early foundation patents in the agricultural biotechnology sector, and one of our key objectives in that regard is to demonstrate commercial proof points through field tests and multi-site field trials. Yield10 opportunities and business models for value capture including partnering or licensing with established agricultural industry companies. Key to our strategy is to retain, where practical, control of timelines and maximize, where possible, the opportunity for value creation and optionality around future value realization strategies. In 2019, we are focused on identifying and signing additional research and development collaborations to accelerate commercial development of our promising yield traits.

We have signed non-exclusive research licenses for our novel yield traits with agriculture industry leaders.

In 2017 we granted a non-exclusive global research license to the Monsanto division of Bayer Crop Science to evaluate our novel yield traits C3003 and C3004 in soybean. Monsanto is a leader in the development and commercialization of biotech-derived soybean seed. In 2018, we granted a research license with a similar structure to Forage Genetics, a leader in forage crops used for animal feed, to evaluate five traits in forage sorghum.

These licenses are intended to provide market leaders in their respective crops with an attractive opportunity to test our traits and develop data at their own expense. At any time during the term, they have the option to negotiate a broader agreement with us. At the same time, we have the right to sign licenses with other companies for these traits. This structure allows us the flexibility to expand the testing of our traits with investment by other companies and to potentially enter negotiations for development and commercial licenses when the value of our traits is better understood. In 2019, we plan to explore additional opportunities to expand the testing of our traits through similar arrangements with other companies.

We are focused on developing yield traits for use in canola, soybean and corn, major North American commercial crops.

Canola, soybean and corn represent the largest North American commercial crops with approximately 195 million combined acres. The majority of the crop acreage incorporates biotechnology traits for herbicide or pesticide resistance that are deployed in elite germplasm controlled by seed companies. Recent advances in crop yield have been based primarily on the use of biotechnology traits to protect yield by managing and/or allowing the plants to outcompete weeds. We are developing our traits to complement the biotechnology traits currently utilized in these major crops by focusing on our traits

to increase the inherent seed yield of the plant. In 2018, we obtained promising field test results for second generation C3003 in canola and advanced work with the trait into the early commercial development phase where we will make and test additional elite events of the C3003 trait. Our development work with C3003 and other traits in the C3000 and C4000 series, some of which may be accessible using genome editing, is progressing in canola, soybean and corn. Canola is important as an edible oil for human consumption, while soybean and corn are grown in North America mainly as animal feed.

We are testing our yield traits in wheat and rice, important staple crops for human consumption.

Wheat and rice are important staple crops used primarily for human consumption. It is estimated that more than 900 million acres of rice and wheat are grown annually worldwide. Advances in seed yield for rice and wheat have occurred primarily through plant breeding for rice and hybridization and breeding for wheat. Genetically modified, or GM, traits based on biotechnology have not been broadly introduced into these crops. Seed sales to growers for these crops typically rely on regional, local organizations to distribute and sell seed and the market is extremely fragmented. To enable production of wheat and rice to meet future global demand, increases in yields will be required. The application of genome editing to precisely incorporate yield traits into these crops may represent a way to increase yield and establish consumer acceptance of the technology and seed product. We recently published promising results with members of our C4000 series of traits showing that deployment of these traits in switchgrass as a model crop resulted in significant increases in photosynthesis and biomass yield. We are testing C4000 series traits that may be accessible through genome editing as a strategy to produce increases in seed yield in wheat and rice.

Our GRAIN platform provides us with a unique approach for discovering novel yield trait genes.

We have integrated advanced metabolic flux modeling capabilities with transcriptome network analysis to form the foundation of our "GRAIN" (Gene Ranking Artificial Intelligence Network) bioinformatics gene discovery platform. This discovery platform is the core of our Trait Factory. GRAIN takes both a bottom up approach based on the flow of electrons and carbon through essential metabolic processes and a top down approach based on transcriptome network analysis. In the case of crops, the levers to increase seed yield are the metabolic infrastructure through which carbon flows from photosynthesis to seed production and the gene regulators or transcription factors which control the various pathways. Over the last 20 years, the agricultural sector has generated vast numbers of data points. During this same period, there have been very few new crop traits produced. The purpose of GRAIN is to develop a system which can convert data sets into actionable gene targets to improve crop productivity. We have employed this approach to discover a range of potential yield trait genes.

We have identified promising potential yield targets which can be modified using genome editing. We believe that such targets may be subject to less regulatory complexity in the U.S. during development and along the path to commercialization and may provide opportunities for licensing.

Genome editing techniques, including CRISPR, which involve making small targeted changes to the DNA of a target organism, have been of interest to the agricultural biotechnology industry because this approach is believed to have the potential to significantly reduce development costs and regulatory timelines for crop trait development and market introduction. In 2018, we signed a non-exclusive research license for CRISPR/Cas-9 technology with the Broad Institute of MIT and Harvard and Pioneer, part of the Corteva Agriscience Agriculture Division of DowDuPont Inc.

Announcements from USDA-APHIS, including those made in 2018, indicate that the regulatory path for genome edited plants lines that do not contain any remaining foreign DNA (i.e. DNA sequences not from the plant being engineered) from the procedure used to edit the plant may not be subject to certain USDA-APHIS crop regulations in the U.S. See "Regulatory Requirements" section below. One of the potential implications of this regulatory approach in which edited plants are subject to fewer regulatory controls than traditional genetically modified plants may be to significantly decrease the timeline and cost of developing and bringing new traits to commercialization in the U.S. The challenge now for the agricultural biotechnology sector will be to identify gene targets for genome editing that can generate economic value. This has opened the potential for Yield10 to exploit a second tier of novel traits addressable with genome editing.

Yield10 has identified, from its internal discovery platforms and in-licensed through academic collaborations, gene targets suitable for deployment in crops through genome editing. In the course of our work, we have introduced genes coding for new metabolic pathway enzymes or global transcription factors producing high yield lines with higher rates of photosynthetic carbon fixation. Analysis of these high yielding plants has allowed identification of novel genome editing targets.

We have deployed genome editing technology based on our C3008a trait in Camelina as well as our triple edited-line based on our C3008a, C3008b and C3009 traits in Camelina, which were deemed non-regulated by USDA-APHIS in 2017 and 2018, respectively. Plants that are not regulated by USDA-APHIS may still be subject to regulation by the U.S. Food and Drug Administration (FDA) or the U.S. Environmental Protection Agency (EPA) depending on certain characteristics and the plant's intended uses. We expect to increase our level of effort in this area in other crops, particularly canola, over the course of 2019 and are implementing a plan to deploy our genome edited traits into soybean, rice and corn. We have successfully edited the C4004 gene in rice and are currently developing performance data on the edited rice lines. We believe our genome editing targets as well as the improved crops we could develop using this approach may enable us to form collaborations or enter into license arrangements with a broader set of potential commercial partners in order to bring these genome edited traits forward into development in the near-term.

We plan to use any revenues we generate from license agreements around our genome editing targets to support our ongoing research and development efforts to enable step-changes in crop yield.

We developed the Camelina Fast Field Test model system to characterize, evaluate and de-risk novel yield trait genes.

One of the challenges the agricultural industry has faced over the years is translating early crop science discovery into value generating traits. In part this is because results from greenhouse studies in model plants have not translated well into field results in major crops. This is also in part because the plants used for discovery research have not been suitable for studies in the field and are not representative of the advanced seed or crop varieties (germplasm) used in commercial production, which have been subject to decades of intensive breeding to improve yield. Translating success when introducing non-plant genes into major crops has been very successful and the current biotechnology seed sector, which accounted for 457 million acres of crops worldwide in 2016, is based on using microbial genes in plants. The long timelines to progress early discoveries successfully into major crops and generate field data adds to the challenge.

For these reasons, Yield10 has put in place a process we call "Fast Field Testing" based on our Camelina oilseed platform. We believe that over time this will become a valuable tool in the trait discovery to translation effort. Camelina is an industrial oilseed well-suited to field trials, and we believe it is a good model for identifying promising new yield traits for canola and soybean. It is also very fast to modify and develop genetically stable seed for field planting. Ideally, we hope to be able to progress from trait identification to field planting in about 12 months. Our process is to identify trait genes of interest in Camelina and immediately begin putting them into canola and soybean, where the timelines to transform plants and generate field data are much longer. We can then progress the Fast Field Testing in Camelina and generate field data and a complete molecular analysis of plant material from the field. These results and data can then be used to inform how we progress the previously transformed canola and soybean.

We believe that this will provide the opportunity for go-no-go decisions in some cases and in other cases allow us to update our approach based on the results of our Fast Field Testing in Camelina. For example, with the longer development timelines needed to get canola and soybean ready for field testing, we expect to initiate additional modifications earlier in these crops, having identified the potential to further improve the outcome based on the results of our Fast Field Testing in Camelina.

In our 2017 and 2018 field test programs, we tested both first and second generation versions of C3003 in Camelina and in canola, an important North American oilseed crop. Overall, our findings in canola for first generation and second generation C3003 mirror closely our observations of the effect of the trait in Camelina, underscoring the value of Camelina as a predictive system for understanding the performance of our novel yield traits in development.

We are using our Camelina Field Test model system to de-risk and accelerate the demonstration of the trait gene value in major crops. As a particular trait is de-risked there is the potential for inflection points in value. If we can establish a strong correlation between the results from the Camelina system with future field data first from canola and then with soybean, then we may be able to leverage this to enter partnership and licensing discussions earlier while preserving the opportunity to capture a meaningful share of the upside value.

Our Oilseed Operation based in Canada provides us with unique capabilities in the development of oilseed crops.

We established our oilseeds subsidiary in Canada in 2010 to produce robust oilseed germplasm with engineered value-added traits for commercial crop production in western North America. Our oilseeds team is based in Saskatoon, Saskatchewan, with laboratories in the National Research Council (NRC) - Saskatoon facility and commercial greenhouse and laboratory facilities at nearby Innovation Place. Our team has developed and implemented technology to improve and accelerate engineering and trait evaluation of Camelina and canola. The team also plays a key role in designing and conducting greenhouse and field tests required to effectively evaluate novel yield traits.

We are establishing a network of commercial and science advisors to provide us with insight and opportunities to advance our industry alliances, crop research and development, and key intellectual property.

Yield10 named Sherri Brown, Ph.D., a former Monsanto Company executive, as a special commercial and technical advisor to the Company in 2018. Dr. Brown, who is currently a Managing Director at The Yield Lab, served from 1999-2017 in leadership positions at Monsanto, most involving the development and commercialization of new traits for corn and oilseed crops including soybean and canola.

Yield10 has pursued academic collaborations that have led to the discovery of novel yield trait genes. Researcher Danny Schnell, Ph.D. discovered the C3003 trait in an ARPA-e (a division of the DOE) funded collaborative project at the University of Massachusetts in which Yield10 was a partner. In 2015, Prof. Schnell moved to Michigan State University where he is Chairperson, Department of Plant Biology and remains a collaborator on C3003. Heike Sederoff, Ph.D., Professor, Department of Plant and Microbial Biology at North Carolina State University, developed the C3004 and C3005 traits with ARPA-e funding which Yield10 is now progressing under a license agreement. In 2018, Yield10 announced signing a global license agreement with the University of Missouri for advanced technology to boost oil content in oilseed crops, including C3007 and C3010, which are based on the discovery of a key regulatory mechanism controlling oil production in oilseed crops which can be used to increase oil content. Jay J. Thelen, Ph.D., Professor of Biochemistry at the University of Missouri, who discovered this mechanism, joined Dr. Schnell and Dr. Sederoff as a member of our Scientific Advisory Board in 2018.

We plan to seek U.S. and Canadian government grants to support our research and development goals.

Yield10 has been awarded grants over the last several years supporting research on strategies to improve the efficiency of photosynthesis, increase seed oil content, identify novel yield traits and test these novel traits in Camelina. This work is valuable because traits developed in Camelina have the potential to be developed and deployed in other oilseed crops. For example, in 2017, we were selected as a sub-awardee on a new U.S. Department of Energy (DOE) grant led by Michigan State University that commenced during the first quarter of 2018 to conduct research aimed at boosting oilseed yield in Camelina. We plan to continue to pursue government grants to defray research costs associated with our research and development activities.

We are operating with a lean organizational footprint which is evaluating our novel yield traits in greenhouse and field tests while maintaining efficient use of cash resources.

As of December 31, 2018, we had 22 full-time employees, with the majority directly involved with our research and development activities. We believe that our organizational capabilities are aligned with our research priorities and are complemented by our use of third-party infrastructure and certain service providers. With this approach we can leverage third-party infrastructure and capability without having to spend the time and capital needed to recreate them in-house. This is allowing us to focus our limited resources on deploying our core strengths against our key development goals. We expect to grow our research and development operations over time commensurate with building value in our business and advancing our traits through development while at the same time tightly managing overhead costs.

Our "GRAIN" Technology Platform

In the last decade there has been a dramatic expansion of new genetic engineering and systems biology tools: genomics data, metabolic engineering, high-throughput analytical tools, including whole organism gene expression analysis and metabolomics, and powerful genome editing technologies. At Yield10 we plan to build value by leveraging genome editing targets for revenue generation in the near-term while we independently work to demonstrate the economic value of our transformative genetic engineering-based yield breakthroughs in the longer term. The recent expiration of blocking patents on early inventions in the plant genetic engineering space means that we can now be more effective in research and

development, leverage third-party service providers and independently drive key proof points in major commercial crops such as canola, soybean and corn while focusing our resources on our core strengths. Yield10 is focused on increasing the inherent yield of major food and feed crops. Our goal is to "build better plants" which requires new approaches and innovation and, in our view, will most likely involve gene combinations and/or multi-gene systems.

At a fundamental level, increasing crop yield is a complex two-step carbon optimization problem. Harvested seed is mostly carbon fixed from carbon dioxide in the air by photosynthesis with oxygen coming from water in the soil and smaller amounts of nitrogen and phosphate both of which are applied as fertilizer. To achieve increased yield, the rate at which crops can fix carbon has to be increased. Based on our experience optimizing carbon flow in living systems, we know that increasing seed yield will likely require multiple trait genes to increase carbon fixation by photosynthesis at the front-end and direct the increased fixed carbon to the seed.

We have integrated advanced metabolic flux modeling capabilities with transcriptome network analysis to form the foundation of the "GRAIN" (Gene Ranking Artificial Intelligence Network) bioinformatics gene discovery platform. This discovery platform is the core of our Trait Factory. GRAIN takes a bottom up approach based on the flow of electrons and carbon through essential metabolic processes and a top down approach based on transcriptome network analysis. Plant growth at its core is a series of chemical reactions and these can be modeled to determine the best ways to optimize the yield of the targeted product. Advanced metabolic modeling based on flux-balance analysis and enzyme reaction thermodynamics and kinetics enables us to make predictions about which reaction modifications are most likely to achieve targeted performance improvements. However, as with all modeling approaches, the tool is only useful alongside the means and the data to test it in real plants. Here, Yield10 makes use of metabolic and transcriptome data generated from its high-photosynthesis, high-yield engineered plants as well as from academic publications and other public data to project optimal gene targets for modifications. By integrating the transcriptome network capabilities of our technology platform, we expect to be able to identify transcription factor genes whose activity profiles can be altered to optimize multiple steps in metabolic pathways or the flow of carbon in plant tissues of interest. In a crop like modern hybrid corn, which already produces vastly more seed than it needs to reproduce, our initial objective is to reduce or even eliminate the activity of the transcription factors that restrict further seed production.

We are excited about the prospects of C3003 in reducing the well-known yield losses that occur through photorespiration in C3 crops. C3 photosynthesis, the simplest type of plant photosynthetic system, exists in most agricultural crops used for human consumption, including canola, soybean, rice wheat and potato. We know C3003 has increased the rate of photosynthetic carbon fixation in our Camelina plants and we have been able to study these plants at the molecular level. Consistent with our initial hypothesis that downstream bottlenecks can be identified, we have found that in high yielding plants expressing C3003, the expression of other genes, including our C3004 trait gene is changed. We have carried out experiments to increase the activity of the C3004 trait gene in Camelina and have shown in growth chamber studies that this results in increased plant vigor, branching and up to a 65% increase in seed yield. We believe the C3004 gene, which may be engineered into crops using genome editing, has the potential to be used alone or be combined with the C3003 trait gene to further increase yield beyond what can be achieved with C3003 alone. We have work ongoing to evaluate the Camelina C3004 gene in canola, soybean and corn.

In crops having the evolutionarily advanced, more efficient C4 photosynthetic system, including corn, sugarcane and sorghum, the yield is already several-fold higher than in C3 crops. In this case, the hurdle to accomplish step-change increases in seed yield is higher as these crops are already more metabolically efficient. We validated our approach by verifying with experimental results the positive yield impact of three gene targets we identified computationally, which we believe to be an exceptional hit rate. These three yield genes, C4001, C4002 and C4003, significantly increased photosynthetic carbon capture and biomass production in switchgrass, an already high biomass yielding C4 crop. In this case our early experiments have been successful in demonstrating the potential to increase the rate of carbon fixation even in a high yielding C4 crop.

Plant scientists now have powerful genome editing tools, such as the CRISPR/Cas9 system, that enable single and multi-gene changes to be made in major crops; the challenge is knowing what combinations of genes to edit. We believe Yield10 is in a unique position to expand our learning and discover additional gene targets, or genes that need to be modulated, to optimize the flow of carbon to seed in these plants, and we have made considerable progress on this front.

Molecular analysis of high yielding plants expressing the global transcription factors has allowed the identification of 71 downstream transcription factors that are differentially expressed in the high yielding lines and are themselves targets for genetic manipulation. The expression of some of these genes is down regulated in the high yielding plants making them potentially promising targets for genome editing through well-known approaches such as CRISPR. We began by validating

the predictive impact of three of these trait gene targets in switchgrass and confirmed their function and recently completed the genome editing of the first of these, C4004 in rice. We know the industry has struggled to deploy transcription factors using traditional biotech approaches to improve crops particularly in hybrid corn. However, we are optimistic that we will be more successful introducing our global regulator genes using genome editing and believe that simple gene deletions to eliminate their function, will be significantly easier to implement and translate across crop varieties.

We believe our integrated GRAIN platform can be used to successfully identify new targets for improving crop yield and are working to leverage the platform in the near-term to secure research and development funding from industry partners.

Fast Field Testing System in Camelina

One of the challenges the agricultural industry has faced over the years is translating early crop science discoveries into value generating traits. This is in part because most of the plants used for discovery research have not been suitable for studies in the field. In addition, the plant systems used for discovery are not representative of the advanced seed or germplasm used in commercial production which have been subject to decades of intensive breeding to improve yield. The long timelines to progress early discoveries successfully into major crops and generate field data adds to the challenge.

In 2010, we established a research and development operation in Saskatoon, Canada staffed with leading oilseed researchers. Our team established a model for testing novel trait genes called the “Fast Field Testing” system based on our Camelina oilseed platform. We believe that this system has become a valuable tool for our yield trait discovery and translation effort. Camelina is an industrial oilseed with reasonable field performance providing a robust model for canola and soybean and it is well suited to multi-site field tests and larger scale trials. Camelina is a plant that can be readily genetically modified and bred through the efforts of our skilled staff to deliver genetically stable seed sufficient for planting in field tests. We have shown that we can go from the identification of a potential yield trait gene or combinations of genes to field planting in about 12 months. In our Fast Field Tests, we typically collect and analyze a broad set of data on our transgenic or genome edited plants including parameters such as stand establishment, flowering, maturity, seed weight, seed size, oil content and oil composition. We also perform molecular analysis on plants of interest. We are using our Camelina Fast Field Test system to identify and screen trait genes of interest while deploying them in parallel into crops of commercial interest including canola, soybean, rice, corn and wheat where the timelines to obtain stable plant lines and field data are longer.

Traits in Development

Yield10 Bioscience has ownership or licensed rights to several crop trait genes and our lead yield trait gene C3003 is currently well-positioned in terms of translation and demonstration in key crops. Yield10 has exclusive rights through ownership or licensing of patent applications, or is preparing patent applications, covering the trait genes listed in the accompanying table.

We identified the C3000 series of novel yield traits based on establishing new metabolic pathways in crops. We have tested our lead yield trait gene C3003 in Camelina in both greenhouse and field tests and have previously reported results from these studies. We are moving this promising trait forward in additional crops including canola, soybean, corn, sorghum and rice. Our other C3000 series traits may be accessible through genome editing and are being tested in various target crops as well.

We have also identified the C4000 series of novel yield traits and gene editing targets addressing increases in seed yield and biomass. We have shown that our C4000 series traits, which comprise global regulatory genes discovered through our GRAIN technology platform, may have the potential to significantly enhance photosynthesis and carbon capture in key crops. We are moving members of the C4000 series of traits forward in several crops including wheat, rice, corn and forage sorghum. We are also progressing the C4001 trait gene in rice using our internal resources and we expect to report initial rice data once greenhouse tests have been completed and analyzed.

Novel Yield Trait Gene C3003

C3003 represents the lead novel yield trait gene in our trait pipeline. C3003 is a scientific discovery made in one of our academic collaborations funded by ARPA-e, a division of the Department of Energy. Our academic collaborator is continuing work to characterize C3003 and some of this work is funded by a DOE grant under which Yield10 is a sub-awardee conducting research supported by the grant.

C3003 appears to be a unique gene that impacts photorespiration, a biochemical pathway in C3 plants that is responsible for significant losses in yield. Yield10 is progressing the introduction of the C3003 trait gene as well as improvements to the C3003 trait in Camelina, canola, soybean, corn and rice. During 2019 we plan to conduct additional greenhouse and field testing to continue generating yield and agronomic data on C3003 in a variety of important crops.

Camelina

We have extensively utilized our Camelina Fast Field Testing Platform to evaluate the mechanism and effect of C3003 in crops. Over the past three growing seasons, 2016-2018, we have produced field-grown seed and field tested numerous stable Camelina seed lines containing first generation C3003, second generation C3003 and certain prototypes of traits related to C3003. Through this work, we have collected important molecular, agronomic and seed yield data that has enabled us to characterize these traits as well as understand important differences in the effects they produce in field-grown plants.

Our greenhouse and field work with C3003 in Camelina have allowed us to capture data on the performance of the trait. The results from our field tests show that first generation C3003 produces significant improvements in seed yield although the individual seed weight in these lines is decreased as compared to controls, likely due to a change in carbon partitioning in the plant. Field test results for second generation C3003 (seed specific expression of the trait), show improvements in seed yield, harvest index and overall agronomic performance, while also maintaining typical seed size as compared to control plants. There were no significant changes to oil content or oil composition with either version of the trait as compared to control plants. In our 2019 field tests, we saw some indications of drought resistance with C3003, an observation we plan to follow up on in subsequent field tests of this trait.

Underscoring the value of our Camelina Platform in the evaluation of C3003, our observations around the increases in seed yield along with differences in seed weight have been observed in some of our recent studies with canola and soybean lines. Based on encouraging data obtained in Camelina with first and second generation C3003, we are continuing to progress the evaluation of the C3003 yield trait gene in parallel in various commercial crops including canola, soybean, corn and rice, where we believe step-change increases in seed yield could improve the prospects for global food security and create considerable economic value.

Canola

Canola is an important North American oilseed crop harvested for its oil. We are targeting step-changes of 10-20% in the evaluation and development of novel traits to increase seed yield in canola. In our field tests of canola in 2018, we achieved seed yield improvements in some events at the low end of this range (11%), and based on these results, we will progress C3003 into the preliminary commercial development phase in canola in 2019. The key activities to be completed during this phase include development of commercial quality events in elite canola germplasm, execution of multi-site, multi-year field studies and development of regulatory data as appropriate.

In 2018, we evaluated our second generation C3003 yield trait in canola. In these field tests, we monitored key agronomic and growth parameters of the plants throughout the field test and collected yield data including total weight of harvested seed, individual seed weight and oil content in our transformed plants as compared to control plants. The best second generation C3003 canola lines showed an increase in seed yield of 11 percent as compared to control plants, a statistically significant outcome. In second generation C3003 canola plants, the weight of an individual seed (measured using 1,000 seeds) was similar to control plants, an expected outcome using the second generation version of the C3003 trait.

In 2019, we plan to conduct additional field tests in Canada with second generation C3003 in canola, pending permitting and other related logistical activities.

The results we obtained in canola were similar to results obtained in prior studies with Camelina, illustrating that our Fast Field Testing system in Camelina is a valuable tool for effectively screening novel yield trait genes and dynamically adapting our approach to trait development as we work to translate these improvements into commercially important crops.

Soybean

Yield10 has limited capabilities related to engineering soybean. However, because soybean is the leading North American oilseed crop, we initiated deployment of both first and second generation C3003 into soybean in 2016 through an academic collaborator. We recognize that the scale of this program is limited and that it will serve mainly to generate research data. Yield10 is currently exploring additional third-party options for conducting soybean transformations to increase the scope of our internal program. In 2017 we generated early greenhouse data and in 2018 we grew C3003 soybean plants at sites in Canada to produce field-grown seed. We expect that additional development work including the generation of more C3003 lines will continue in soybean with our academic collaborator in 2019.

Preliminary observations based on a small number of events from our greenhouse studies suggest that results for C3003 obtained in Camelina and canola are translating into soybean. First generation C3003 produced seeds with lower individual seed weight while typical individual seed weight was observed with second generation C3003 in soybean. Further, our greenhouse results show that there is an increase in branching in the plants for some of the events tested. This is significant because more branching provides more sites on the soybean plant for seed pods to develop which can be associated with obtaining higher yielding plants.

In December 2017, we granted a non-exclusive research license to the Monsanto division of Bayer Crop Science to evaluate our novel C3003 and C3004 yield traits in soybean. Under the license, Monsanto is working with C3003 in its soybean program as a strategy to improve seed yield. We anticipate that Monsanto will generate field test data with C3003 pursuant to the research license.

Corn

Corn is the highest value commercial row crop grown in the United States. We initiated an early development program in corn in late 2018 with the objective of evaluating novel seed yield and drought tolerance traits in this crop. Under this program, novel traits discovered by Yield10 are being deployed in corn by a third-party agriculture company with proven expertise introducing new traits into corn. The yield traits included in the corn development program are C3003, C3004, and C3011, as well as the transcription factors C4001, C4002, and C4003. This aspect of the development activity is expected to be completed in early 2020. We plan to engage an additional third party to conduct field testing of the novel traits in corn to evaluate the impact on seed yield.

Novel Yield Trait Gene C3004

We studied the expression of C3003 using information from our Camelina and GRAIN Platforms and, among the discoveries we made, we found that the plant gene C3004 is overexpressed in Camelina plants engineered to express C3003. While the role of C3004 is currently not well understood and we continue to investigate the role of the gene in plant metabolism, we believe that it may have an effect on carbon partitioning in plants. We also believe that, under certain conditions, this effect may potentially be additive with the activity of C3003. Our ongoing research will continue to investigate the activity of C3004 alone and in combination with C3003 to produce increases in seed yield in crops.

We began our investigation of C3004 in Camelina. We constructed C3004 to increase expression of the gene in Camelina. Stable plant lines were developed and we performed yield studies in a controlled environment growth chamber. In these studies, increased expression of C3004 in Camelina results in a significant increase in plant growth and vigor, increased seed yield, and in some cases increased individual seed weight. In six Camelina plant lines containing C3004, average seed yield (grams/plant) increased by 26 to 65 percent over control plants. We also measured tertiary branching in a subset of plants and found that the increase in seed yield seen in the plants was also accompanied by an increase in tertiary branching. While early stage and based on a small sample of events, the data suggest that C3004 may hold significant promise as a novel yield trait.

During 2019 we plan to conduct greenhouse and field tests to continue to generate additional seed yield and agronomic data on C3004 in important crops. Based on the initial results obtained using our Camelina platform we plan to expand testing of C3004 in 2019. We also plan to test C3004 in combination with C3003 in Camelina to investigate whether the traits could be additive or synergistic. We have also fast-tracked the deployment of C3004 into canola and corn where we will engineer lines and begin testing to determine if this trait produces improvements in seed yield in other crops. The version of the C3004 trait we tested in our Camelina studies was genetically engineered using recombinant DNA; however, we believe that it may be possible to develop versions of the trait that are genome edited, potentially enabling a path to non-regulated status for C3004 plants under current USDA-APHIS rules.

Oil Enhancing Traits

With increasing focus on health and wellness, food safety and sustainability in developed countries, we anticipate a rise in demand for new varieties of food and food ingredients with improved nutritional properties. This concept is currently being implemented in agricultural biotechnology, in both canola and soybean that have been modified to alter the composition of the oil produced. High oleic canola and soybean oils are being marketed as "healthier" than other oils; we believe the ability to make similar marketing claims directly to the consumer will be a feature of newly developed products in this space. We expect consumer demand for identity preserved specialty ingredients will rise, and we believe that Yield10's crop yield technologies and crop gene editing targets could be useful in this emerging field.

Based on our study of metabolic pathways in oilseed crops, we believe there is an opportunity to apply genome editing to significantly increase oil content in oilseed crops including canola, soybean, sunflower and safflower. In cases where the edible oil is the primary economic value driver for the crop or in cases such as high oleic soybean where the crop has been modified to improve the fatty acid profile, increasing oil content is a valuable trait. This potential also extends to Camelina where recent clinical studies have shown that Camelina sativa oil, but not fatty fish or lean fish, improved serum lipid profile in subjects with impaired glucose metabolism. This randomized, controlled study was recently published in the journal Molecular Nutrition and Food Research, U. Schwab, et. al. (2018). Improving the oil content and yield of Camelina seed could make this an attractive crop for producing nutritional oils. In 2017 and 2018, we received confirmation from USDA-APHIS's Biotechnology Regulatory Services (BRS) that two types of our genome-edited Camelina plant lines developed using CRISPR/Cas-9 genome editing technology for increased oil content would be exempt from 7 CFR Part 340 regulations, clearing the way for field testing in the U.S. We developed these genome edited Camelina lines together with our wholly owned Canadian subsidiary, Metabolix Oilseeds, Inc. The first type is based on the inactivation of an enzyme expected to increase seed oil content in Camelina, a trait we have designated as C3008a. The other type is based on the inactivation of three enzymes to enhance the production of oil and is designated as our triple edit, or C3008a, C3008b and C3009 trait containing line. We are currently evaluating combinations of the genome editing targets to optimize oil content in Camelina and canola, and plan to do so in soybean with the objective of having our plant lines designated as non-regulated by USDA-APHIS.

In 2018 we signed an exclusive global license agreement with the University of Missouri for advanced oilseed technology including C3007 and C3010, which are promising targets involved in oil biosynthesis. We are working to deploy C3007 in oilseed crops with the objective of increasing oil content through methods that could result in a plant line with non-regulated status with USDA-APHIS. We have produced a genome edited version of C3007 in canola and further development and evaluation of the trait is underway.

C4000 Series Traits

We have used our GRAIN platform to study global transcription factors and identify novel yield traits in the C4000 series. These traits may be powerful regulators of plant growth and represent a potentially valuable resource for identifying genome editing traits for crops. We have recently shown that traits from the C4000 series can significantly increase photosynthetic efficiency as well as aboveground and below ground biomass production in our switchgrass plants.

In 2018 in the journal *Plant Science*, we reported that our novel C4001 and C4003 traits have been shown to significantly increase plant biomass yield in switchgrass. Switchgrass plants expressing C4001 resulted in a total increase in biomass of 75-100 percent in leaves and stems as compared to controls. Expression of C4003 in switchgrass resulted in a total increase in biomass of 100-160 percent in leaves and stems as compared to control plants. Increasing biomass yield is important for forage crops such as sorghum, silage corn, and alfalfa.

We are testing certain of our C4000 series of traits to increase seed yield in wheat, rice, and corn, as well as to increase biomass in forage sorghum. Using internal resources, we have been able to progress the C4001 trait gene in rice and we expect to evaluate initial rice data as soon as it is available. In a collaboration with the National Research Council of Canada we have introduced the C4001 and C4003 traits into wheat and expect to generate performance data from wheat lines in the coming year. With rice and wheat, we do not plan to evaluate traditional biotechnology traits in the field or develop them as products but to use them as a source of new genome editing trait leads. We have completed the editing of the first of the C4004 trait in rice and are currently growing these plants in the greenhouse. Forage Genetics began work with certain of our C4000 series traits through a research license signed in 2018 to assess the potential of our traits to increase biomass in forage sorghum. We also began early development work in late 2018 to assess certain C3000 and C4000 series traits in corn through a third-party agricultural company. We expect the first phase of this work to be completed by early 2020.

We expect evaluation of C4000 series traits in these target crops will continue to advance in 2019. Traits in this series and the proof points we expect to generate may provide us with an opportunity to selectively partner with others for the development of these traits in major commercial food, feed, and forage crops.

Target Crops

Our research and early development work in our C3000 and C4000 series traits suggests that our technology may be applicable to a wide range of crops harvested for food and animal feed uses. We believe that if novel yield traits could be successfully developed and commercialized in any of these crops, farmers would be able to improve the productivity of their land to meet rising demand for food and feed, thereby creating significant economic value.

In considering our strategy to develop our technologies we segregate our trait genes into two classes: trait genes based on using non-plant genes to add new functionality to crops which are by definition GM due to the insertion of foreign recombinant DNA; and trait genes that we may be able to deploy under non-regulated status from USDA-APHIS, which encompass our trait genes that are based exclusively on plant genes. We see the opportunity to deploy our trait technology in a broader set of food and feed crops many of which are not currently GM. We plan to pursue our GM trait genes in crops which are currently GM and where the economics can sustain the cost and timelines for deregulation. We are aware of the current USDA-APHIS GM crop regulation review and the reality that GM likely will remain an issue for some NGO groups regardless of the science. For our GM yield trait genes, we are targeting seed yield increases on the order of 10 to 20 percent over the current elite seed lines, increases which reflect the order of magnitude step-changes necessary to address global food security.

The crops we are targeting for development are described below.

Camelina or *Camelina sativa* is an oilseed crop in limited cultivation in North America and Europe. Camelina has received recent attention as an industrial oilseed for the production of biofuels, novel industrial lipids, and oleochemicals. In addition, its meal has been identified for development as an animal feed supplement and its oil as a fish feed supplement. Recent clinical studies have shown that Camelina sativa oil, but not fatty fish or lean fish improved serum lipid profile in subjects with impaired glucose metabolism-a randomized controlled study published in the journal *Molecular Nutrition and Food Research*, U. Schwab, et. al. (2018). Improving the oil content and yield of Camelina seed could make this an attractive crop for producing nutritional oils. While it is not currently a commercially significant crop, research suggests that efforts to improve seed yield, oil content and fatty acid composition, and tolerance to heat stress may expand the commercial adoption and cultivation of Camelina.

Canola or *Brassica napus* is a cultivar of rapeseed which produces a higher value edible oil favored by consumers because it has a healthier fatty acid profile than corn or soybean oil. The canola crop was developed in Canada where it is primarily grown today with additional acreage grown in the U.S. Currently the vast majority of the canola grown in North America contains two seed enhancement technologies, herbicide tolerance and hybrid seed. Both Roundup Ready (Monsanto, now Bayer) and Liberty-Link (Bayer) varieties of canola are grown and were introduced to the market in 1990s. Approximately 24.7 million acres were planted in Canada and the U.S. in the 2018 growing season. The Canola Council of Canada has set yield goals of 52 bushels/acre for 26 million metric tons of production to meet global market demand for canola by 2025. Yield10 is targeting a 10-20 percent or greater increase in canola seed yield. With a 2017 harvest of 939 million bushels of canola (Statistics Canada) and assuming an average farm gate price of $10.00 per bushel, a 20 percent yield increase in canola represents a total potential added annual value of $1.9 billion that could be shared among the companies in the canola value chain.

Soybean or *Glycine max* is an oilseed crop used for food, food ingredients, food additives and animal feed. The soybean can be harvested for oil used in food and industrial applications, and soybean meal is a significant source of protein for use mostly in animal feed but also for direct human consumption. Fermented soy foods include soy sauce and tempeh, and non-fermented food uses include soy milk and tofu. Soybeans are widely cultivated in North and South America, where a majority of the seed planted is genetically modified. An estimated 94.4 million acres of soybean will be planted in the U.S. and Canada in the 2018/2019 growing season. According to the USDA, the U.S., Brazil and Argentina together represent approximately 80 percent of global soybean production. Yield10 is targeting a 20 percent or greater increase in soybean seed yield. Assuming a 2018/2019 U.S. harvest of 4.5 billion bushels (USDA) and an average farm gate price of $10.00 per bushel, a 20 percent yield increase in soybean represents a total potential added annual value of $8.8 billion that could be shared among the companies in the soybean value chain.

Corn is a crop grown globally and used for animal feed and for producing starch which can be used as a raw material for producing food ingredients and food additives, as well as for use in the production of paper, packaging materials

and other items. GM maize was grown for the first time in the U.S. and Canada in 1997. Currently, about 80 percent of maize/corn production in the U.S. is genetically modified. It was estimated that more than 83 million acres of corn were planted in North America in the 2018 growing season. The traits commonly used in today's corn cultivars provide insect resistance and herbicide tolerance. In many GM seeds sold today, these traits are stacked ("stacked" refers to the practice of adding multiple traits to an elite plant line). Europe has limited production of GM corn, where Spain is a leading producer. In this case, the most widely used GM trait (Bt) protects against the corn borer insect. Special protocols must be followed in Europe to avoid mixing of GM corn with conventional corn. Corn has the more efficient C4 photosynthesis system and Yield10 is targeting a 10 percent yield increase in corn. With a projected 2018/2019 U.S. harvest of 14.4 billion bushels and an average per bushel price of $3.50, a 10 percent yield increase in corn represents a total potential added annual value of $5.1 billion that could be shared among the companies in the corn value chain.

Rice is the staple food for over 50 percent of the global population. World crop production of rice for 2018/2019 is estimated at approximately 495 million metric tons. Rice is grown in tropical and subtropical regions around the world. Rice cultivation takes place primarily in China, India and Southeast Asia. Typically, improvements to rice yield have been achieved through traditional plant breeding approaches. Genetic engineering approaches are being investigated to develop rice hybrids and to protect rice from weeds and insect pests. Additional biotechnology approaches are being taken to improve the nutritional value of rice. While Yield10 has not established a target for yield improvement in rice, early work is underway to evaluate the potential of our technologies in this globally important food crop.

Wheat is a species of grass cultivated broadly worldwide as a staple cereal crop. Wheat requires processing to be used as food, mainly in the form of flour for bread, baked goods and pasta. Wheat may also be used as an industrial starch, as a food additive or as a production component in the textile and paper industries. Improvements to wheat yield have typically been achieved through plant breeding approaches. Wheat production ranks third among U.S. field crops in planted acreage, production and gross farm receipts behind corn and soybeans. The planted area for wheat (winter and spring varieties) in the U.S. and Canada combined for 2018 was estimated at 72 million acres.

Forage crops are grown expressly for biomass used for feeding livestock. Typical forage crops include both annual and perennial crops such as various grasses, silage corn, alfalfa and sorghum. Biotechnology traits have been previously introduced into silage corn and alfalfa. Other forage crops could be amenable to gene editing strategies to increase biomass yield per acre. We believe that our technology and traits that increase biomass may have application to forage crops.

Regulatory Requirements

Since the first successful commercialization of a biotechnology-derived agricultural crop in the 1990s, many new crop varieties have been developed and made available to farmers in the U.S. and worldwide. U.S. farmers have rapidly adopted many of these new biotechnology-derived varieties, so that in 2016, 92 percent of the corn, 93 percent of the cotton and 94 percent of the soybeans planted in the U.S. were varieties produced through traditional forms of genetic engineering. A significant percentage of the production of other crops planted and harvested in the U.S., such as alfalfa, papaya and sugar beet, are also biotechnology-derived.

Biotechnology-derived or genetically engineered crops are subject to a significant amount of regulation in the U.S. and around the world. Field tests and field trials of such crops need to ensure that traits in development do not escape or mix with native plants, and crops that may be used as human food or animal feed must meet certain safety standards, but government regulations, regulatory systems and the politics that influence them vary significantly among jurisdictions.

For purposes of this discussion, the term "GE" includes both biotechnology-derived or genetically engineered plants that are modified by the insertion of recombinant DNA ("Traditional Genome Modification") and biotechnology-derived or genetically engineered plants that are modified through the application of more modern techniques of genome editing. We have seed traits that fall within each of these two generalized categories of GE plants, as summarized above under the subheading "*Traits in Development*."

United States Regulation

The U.S. Government agencies primarily responsible for overseeing the products of modern agricultural biotechnology are the U.S. Department of Agriculture (USDA), the U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA). Depending on its characteristics, a product may be subject to the jurisdiction of one or more of these agencies under the federal government's 1986 Coordinated Framework for the Regulation of Biotechnology, as updated. Regulatory officials from the three agencies regularly communicate and exchange information to ensure that any safety or regulatory issues that may arise are appropriately resolved within the scope of authority afforded to each agency

under their respective statutes. Other environmental laws or regulations also may be implicated, depending on the specific product and its potential applications or intended uses. EPA's principal oversight role is for biotechnology-derived products that are intended for use as pesticides or herbicides, under the authorities granted to the agency under the Federal Insecticide, Fungicide, and Rodenticide Act and the Toxic Substances Control Act. Our business strategy is focused on crop yield traits and we have no current plans for the development of pesticide or herbicide GE traits that would be subject to the procedures and requirements of the EPA under these statutes.

Our seed traits and any future products that are successfully developed containing our seed traits, however, are or will be subject to USDA and FDA regulatory requirements. Those requirements will vary depending on the particular seed trait and the intended use of any product that will be commercialized.

First, within USDA, the Animal and Plant Health Inspection Service (APHIS) is responsible for protecting agricultural plants from pests, diseases and noxious weeds. Under the Plant Protection Act (PPA), USDA-APHIS has regulatory oversight over products of modern biotechnology that could pose such a risk to domestic agriculture and native plants. Accordingly, USDA-APHIS regulates organisms and products that are known or are suspected to be plant pests or to pose a plant pest risk, including those that have been altered or produced through various genetic engineering techniques. These GE plants are called "regulated articles" in the relevant USDA-APHIS regulations, which are codified at 7 C.F.R. Part 340 ("Part 340"). The PPA and the implementing regulations in Part 340 empower USDA-APHIS to regulate the import, handling, interstate movement and release into the environment of regulated articles, including certain GE organisms undergoing confined experimental use or field trials. Regulated articles are reviewed to ensure that, under the proposed conditions of use, they do not present a plant pest risk by ensuring appropriate handling, confinement and disposal.

Seed traits developed using Traditional Genome Modification, such as our C3003 yield trait that leverages the biological functions of an algal gene, are regulated under Part 340. Regulated articles are subject to extensive USDA-APHIS oversight, including but not limited to permitting requirements for import, handling, interstate movement and release into the environment.

If, however, USDA-APHIS determines that a GE plant is unlikely to present a greater plant pest risk than its unmodified counterpart, the newly developed crop will no longer be subject to the permitting and other regulatory processes that are overseen by the agency (*i.e.*, it will no longer be treated as a potential plant pest). Such a determination by the USDA-APHIS is called "non-regulated status" under the Part 340 regulatory framework. The regulations establish detailed procedures for how a developer of a new GE plant may petition USDA-APHIS for a determination of non-regulated status, which is an official agency finding that the particular article is unlikely to pose a plant pest risk and therefore no longer needs to be regulated under Part 340 and the PPA.

USDA-APHIS conducts a comprehensive science-based review of the petition to assess, among other things, plant pest risk, environmental considerations pursuant to the National Environmental Policy Act, and any potential impacts on endangered species. The duration of the petition process varies based on a number of factors, including the agency's familiarity with similar GE products, the type and scope of the environmental review conducted, and the number and types of public comments received. If, upon the completion of the review, USDA-APHIS approves the petition and the product is no longer deemed a "regulated article," the developer may commercialize the product, subject to any conditions set forth in the USDA-APHIS written decision issued in response to the petition for determination of non-regulated status.

As previously described, our seed traits developed using Traditional Genome Modification are regulated under Part 340 and are subject to USDA-APHIS permitting requirements. In recent years, however, we and others have submitted various petitions to USDA-APHIS to determine whether particular GE plants developed through the use of different genome editing techniques may be granted non-regulated status under the regulated/non-regulated framework administered by the agency. In general, genome editing approaches to GE trait development have been deemed non-regulated by USDA-APHIS. The USDA also announced in March 2018 that it would not require an assessment on products that used modern forms of mutagenesis if it was clear these outcomes could occur in nature. The USDA stated at that time that it did not "have any plans to regulate plants that could otherwise have been developed through traditional breeding techniques as long as they are developed without the use of a plant pest as the donor or vector and they are not themselves plant pests." This USDA policy statement applies to genetic deletions of any size, which would include genome editing through CRISPR-Cas9 and other emerging technologies, although it remains to be seen how this policy announcement will be implemented by USDA-APHIS and what practical effect that may have on seed trait developers like us and our competitors.

Historically, changes to the U.S. regulatory paradigm for agricultural biotechnology have been infrequent, are typically preceded by notice, and are most often subject to public comment, but there can be no guarantee that the USDA-APHIS governing regulations and policies will not change.

We have submitted two petitions under Part 340 for a determination of non-regulated status (also known as the "Am I Regulated?" letter) to USDA-APHIS's Biotechnology Regulatory Services (BRS) in order to confirm that the following two traits designed to increase oil content are not going to be regulated by the agency: (i) the single trait C3008 Camelina plant line, developed using CRISPR genome editing technology for increased oil content; and (ii) the triple-edited Camelina line that combines three gene traits, C3008a, C3008b and C3009, to increase oil production. In both cases, BRS approved our petitions and confirmed that each of these novel plant lines would not be treated as a regulated article.

To our knowledge, our triple-edited Camelina line, which received non-regulated status from BRS in September 2018, is the first CRISPR-edited triple-trait plant determined by the agency to be non-regulated. Given our business strategy to develop certain multi-trait genome edited plant lines, this achievement should facilitate our ability to put more of our novel yield traits through the petitioning process and the agency's scientifically driven decision-making process, with the expected end result of having more of our traits treated as non-regulated articles under Part 340 (as compared to our seed traits developed using Traditional Genome Modification, which are regulated articles). We expect to continue to make appropriate use of the "Am I Regulated" letter procedures to clarify the regulatory status of our new GE seed traits as they are developed.

Also, during 2018, we tested the C3008 single-trait Camelina line in a field evaluation that took place in the United States following our receipt of a non-regulated determination for C3008 from BRS the preceding year.

Separate from the plant breeding and planting issues and USDA-APHIS regulation under Part 340, a GE plant also will be regulated by FDA if it is intended to be used as human food or animal feed. FDA regulates the safety of food for humans and animals, and foods derived from GE plants must meet the same food safety requirements as foods derived from traditionally bred plants (also called conventional foods).

Since 1992, FDA has had in place a voluntary consultation process for developers of bioengineered food ("Biotechnology Consultations"). Final agency decisions and other information from these Biotechnology Consultations are made publicly available by FDA. Biotechnology Consultations are data-intensive and examine the new food product's safety and nutritional profile, among other issues. Generally, FDA has found that such food products do not pose unique health risks to humans or animals, but if a novel allergen or other distinction from the conventional food is present in the new plant variety, the agency may require specific label statements on the product to ensure that consumers are made aware of material differences between GE and conventional versions. FDA primarily derives its regulatory power from the Federal Food, Drug, and Cosmetic Act, which has been amended over time by several subsequent laws. Among other oversight and inspection responsibilities, FDA regulates ingredients, packaging, and labeling of foods, including nutrition and health claims and the nutrition facts panel. Foods are typically not subject to premarket review and approval requirements, with limited exceptions.

As part of a broader effort to modernize its regulatory approach to all biotechnology-derived products, FDA is currently re-evaluating its regulatory approach in light of the increasing prevalence of certain genome edited plants. In January 2017, FDA asked for public input to help inform its thinking about human and animal foods derived from new plant varieties produced using genome editing techniques. Among other things, the FDA's request for comments asked for data and information in response to questions about the safety of foods from genome edited plants, such as whether certain categories of genome edited plants present food safety risks different from other plants produced through traditional plant breeding.

In October 2018, FDA leadership issued a document entitled the "Plant and Animal Biotechnology Innovation Action Plan" ("Action Plan") that identified three key priorities for the agency in this area: 1) advancing human and animal health by promoting product innovation and applying modern, efficient and risk-based regulatory pathways; 2) strengthening public outreach and communication regarding the FDA's approach to innovative plant and animal biotechnology; and 3) increasing engagement with domestic and international partners on biotechnology issues. The Action Plan also stated that FDA has reviewed the comments and other information it received in response to the January 2017 request for comments, and that it intends to develop guidance for the industry explaining how the FDA's existing regulatory policy for foods derived from new plant varieties applies to foods produced using genome editing. The forthcoming draft guidance is expected to be released for public comment in early 2019. FDA also stated in the Action Plan that it intends to begin updating the existing procedures for voluntary Biotechnology Consultations to reflect the agency's 25 years of experience with foods derived from biotechnology plants and to incorporate any additional issues related to genome editing of food crops. Such procedural updates are expected to be developed and implemented over the next two years.

Canadian Regulation

In Canada, GE crops and the food products into which they are incorporated are regulated by multiple government agencies under a federal framework for the regulation of biotechnology products that is similar to the U.S. system. First, the Canadian Food Inspection Agency (CFIA) is the lead agency for ensuring that a new agricultural biotechnology crop will not

pose new risks to Canadian plants, animals and other agricultural commodities. The CFIA's Plant Biosafety Office (PBO) is responsible for conducting environmental assessments of biotechnology-derived plants, referred to as "plants with novel traits" or PNTs. Authority for the PBO includes both approving confined field trials with the PNT through permits and authorizing their "unconfined release" as a first step towards commercialization. PNTs are defined in the Canadian Seeds Regulations as (i) plants into which a trait or traits have been intentionally introduced, and (ii) where the trait is new in Canada and has the potential to impact the environment. The CFIA also has in place a remutation policy, whereby plants containing the same mutation as a previously authorized plant of the same species are included in the authorization of the original PNT and are therefore subject to the same conditions.

Second, under the Food and Drugs Act and related regulations, Health Canada is responsible for reviewing a pre-market safety assessment that must be submitted by the manufacturer or importer of a "novel food," a term of art that includes any PNT or other or biotechnology-derived foods. The safety assessment should provide assurances that the novel food is safe when prepared or consumed according to its intended use before it enters the Canadian market and food system. A multi-disciplinary team of experts from Health Canada will evaluate the data and information about the novel food and make a determination regarding whether it is safe and nutritious before it can be sold in Canada, as well as whether any restrictions are warranted under applicable law or the product's safety profile. Health Canada's final decision documents regarding the safety of these novel foods are made available to the public by the government. As in the United States, approval of a PNT or a novel food product does not take into account the method with which such product was produced. Rather, Health Canada employs a product-based (as opposed to a process-based) approach to its regulatory oversight of such emerging foods and food ingredients.

As the lead agency for public health and safety, Health Canada also works in conjunction with the CFIA on food labeling oversight when it has identified a potential health or safety issues with a food that could be mitigated through labeling or other disclosures. For example, if the biotechnology-derived food contains a new allergen that is otherwise not present in the conventional version of the food, then specific label statements will be required to alert consumers to that important health information. However, the CFIA has primary oversight over non-health issues related to food labeling, packaging, and advertising. Accordingly, the CFIA is the lead agency for ensuring that food labeling, and advertising meet the legal requirements of the Food and Drugs Act, and that labeling representations do not create a potential risk of fraud or consumer confusion and are compliant with Canada's voluntary disclosure standard for GE food ingredients.

Environment Canada is also available to serve as a regulatory "safety net" if a novel product does not naturally fall within the jurisdiction of the CFIA, Health Canada, or the Pest Management Regulatory Agency that oversees pesticide products.

Our work involving the development, greenhouse testing and field testing of novel yield trait genes in crop plants requires certain government and municipal permits and we must ensure compliance with all applicable regulations including regulations relating to GE crops. With laboratories and greenhouses in both the U.S. and Canada, we are also subject to regulations governing the shipment of seeds and other plant material (including GE seeds and GE plant material) between our facilities in the U.S. and Canada, including USDA-APHIS permits for the import and export of plant materials that could pose a risk to domestic agriculture.

Having deployed our own research and development operations in Saskatoon, Canada in 2010, we have been conducting field studies of various yield traits in that country since 2016 under PNT permits issued by Canadian regulators. During 2018, we conducted field studies of C3003 in canola, Camelina and soybean at field sites in Canada.

Finally, as one of Canada's major field crops, canola in particular is subject to variety registration, which is a regulatory requirement of the Seeds Act and is also administered by the CFIA. Any future sales of our seed traits or products in Canada would be done by a third-party collaborator or other partner, and that third party would be responsible for complying with registration requirements for the canola varieties, if applicable.

Regulation in Other Jurisdictions

Other jurisdictions and governmental authorities, including in South America and Asia, are increasingly taking an interest in regulating agricultural products of biotechnology. Regulatory approaches vary by jurisdiction, the existing public health framework and phytosanitary laws in the country, and other less tangible factors such as cultural and religious norms that may have an impact on individual country risk assessments and decision-making. We cannot predict future changes in the global regulatory landscape regarding GE plants subjected to Traditional Genome Modification or GE plants subjected to genome editing.

Further, although U.S. and Canadian regulatory authorities have taken similar approaches to overseeing both traditional biotechnology-derived plants and genome edited plants under their national plant health and biosafety laws, regulation of all GE plants in the European Union (EU) is significantly more stringent than in North America. U.S. and Canadian regulators have also determined that genome edited GE plants pose fewer risks that those subjected to Traditional Genome Modification, while a recent EU legal ruling indicates that the existing European regulations for GE plants modified by the insertion of recombinant DNA should be strictly applied to genome edited plants at well. There is thus a sharp distinction between how European and North American regulatory agencies oversee novel seed traits, including those that are generated using the more modern techniques of genome editing. It is possible that emerging oversight regimes for GE products in other jurisdictions could follow the EU approach and impose similar strict requirements for the release of such products into the environment and their incorporation into human food or other consumer products.

Regulation of biotechnology-derived products in the EU is primarily based on Directive 2001/18/EC (the “2001 EC Directive”). The 2001 EC Directive defines “genetically modified organisms” (GMOs) broadly as “organism[s], with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.” In July 2018, the Court of Justice of the European Union (CJEU) issued an important ruling clarifying that the 2001 EC Directive and its pre-market authorization and associated risk assessment requirements required for such “GMOs” should also apply in full to organisms developed using more modern “directed” mutagenesis techniques.

This July 2018 CJEU decision is being interpreted to cover all modern genome editing tools such as CRISPR-Cas9, TALEN and oligonucleotide-directed mutagenesis. This recent clarification by the CJEU regarding the scope of EU regulations suggests that novel seed trait developers who are seeking to bring genome edited seed traits to commercial markets in the EU will face hurdles comparable to what has historically been required in Europe for introducing and commercializing Traditional Genome Modification traits.

Although we are not currently targeting European markets for the development or commercialization of our products, the EU approach to regulating GE plants without regard to the scientific distinctions between Traditional Genome Modification and directed genome editing could be adopted by emerging oversight regimes for GE products in other jurisdictions. There is no guarantee that countries for which we may have or may develop future marketing plans would not take a stricter legal and regulatory approach to controlling GE plants similar to that of the EU.

License Agreement with the University of Massachusetts

Pursuant to a license agreement with the University of Massachusetts ("UMASS") dated as of June 30, 2015, we have an exclusive, worldwide license under certain patents and patent applications, including issued patents covering our yield trait gene C3003, relating to the manufacture of plants with enhanced photosynthesis. The agreement provides an exclusive, worldwide license to make, have made, use, offer for sale, sell, have sold and import any transgenic plant seed or plant grown therefrom or transgenic plant material developed for sale to a farmer or grower for planting in the field, which transgenic plant seed or plant grown therefrom or transgenic plant material is covered by, embodies or is derived from (in whole or in part) one or more issued or pending claims of the licensed patents or patent applications.

We are required to use diligent efforts to develop licensed products throughout the field of use and to introduce licensed products into the commercial market. In that regard, we are obligated to fulfill certain development and regulatory milestones relating to C3003, including completion of multi-site field demonstrations of a crop species in which C3003 has been introduced, and filing for regulatory approval of a crop species in which C3003 has been introduced within a specified period. Our failure to achieve any milestone provided for under the agreement would, if we are unable to reach agreement with UMASS as to a potential adjustment of the applicable milestone, give UMASS the right to terminate the agreement, following a notice period.

We are obligated to pay UMASS milestone payments relating to any regulatory filings and approvals covered by the agreement, royalties on any sales of licensed products following regulatory approval, as well as a percentage of any sublicense income related to the licensed products.

We may terminate the agreement at any time upon 90 days prior written notice to UMASS. Either party may terminate for material breach immediately upon written notice for a breach that is not cured within 60 days after receiving written notice of the breach. In addition, UMASS may terminate this agreement with respect to certain patent rights immediately upon written notice in the event we contest the validity or enforceability of such patent rights.

License Agreement with the University of Missouri

Pursuant to a license agreement with the University of Missouri ("UM") dated as of May 17, 2018, we have an exclusive, worldwide license to two novel gene technologies to boost oil content in crops. Both technologies are based on significant new discoveries around the function and regulation of Acetyl-CoA carboxylase ("ACCase"), a key rate-limiting enzyme involved in oil production. The first technology, named C3007, is a gene for a negative controller that inhibits the enzyme activity of ACCase. The second technology, named C3010, is a gene which, if over-expressed, results in increased activity of ACCase.

We are required to use reasonable efforts to develop licensed products throughout the licensed field and to introduce licensed products into the commercial market. In that regard, we are obligated to fulfill certain research, development and regulatory milestones relating to C3007 and C3010, including completion of multi-site field demonstrations of a crop species in which C3007 and C3010 have been introduced, and filing for regulatory approval of a crop species in which C3007 and C3010 have been introduced within a specified period. Our failure to achieve any milestone provided for under the license agreement would, if we are unable to reach agreement with UM as to a potential adjustment of the applicable milestone, give UM the right to terminate the license agreement or render it nonexclusive.

We are obligated to pay UM a license execution payment, milestone payments relating to any regulatory filings and approvals covered by the license agreement, royalties on any sales of licensed products following regulatory approval, as well as a percentage of any sublicense royalties related to the licensed products.

We may terminate the license agreement at any time upon 90 days' prior written notice to UM. Either party may terminate the license agreement upon written notice for a breach that is not cured within 30 days after receiving written notice of the breach. In addition, UM may terminate the license agreement with respect to certain patent rights immediately upon written notice in the event we contest the validity or enforceability of such patent rights.

Agricultural Industry Landscape

Following advances in biotechnology in the 1970s through early 1990s, the first genetically modified ("GM") crops were commercially introduced in the U.S. in the years 1994 and 1995. Today, the U.S. leads the world in the adoption of GM crops in terms of crop value and acreage planted. GM crops have had both their supporters and their detractors over the years. Consumer sentiment including concerns about the safety of GM crops have limited the introduction and adoption of GM crops in Europe. However, recent studies by the National Academy of Science continue to support the 20 year history of safe use of GM crops.

The International Service for the Acquisition of Agri-Biotech Applications (ISAAA), an industry research group, reported that 457 million acres worldwide were planted with GM crops in 2016, the most recent year where data is available. The planting of GM crops is centered in the Americas with North America at approximately 45 percent of the acres and South America at approximately 43 percent. China and India follow with approximately 8 percent and the balance of the total worldwide GM crop acreage in 2016 was planted in European Union and the rest of world. The primary GM crops in the U.S. are corn, soybean, cotton and sugar beet. In Canada, the oilseed crop canola is the primary GM crop. Cotton is the primary GM crop grown in India and China.

In contrast to the Americas, the European Union has been resistant to the adoption of GM crops and has relied heavily on plant breeding programs for capturing crop yield improvements over the last 20 years. In 2016, Spain was the largest producer of GM crops in Europe, based on cultivation of GM corn representing approximately 20 percent of the country's crop that year. Certain GM crops have been approved for cultivation in some European countries, while other countries have imposed outright bans on cultivation of GM crops.

According to the market research firm, Research and Markets, the total global seed business was estimated at $68 billion in 2017 and is projected to grow to more than $100 billion by 2022. According to an ISAAA report, the global GM seed business represented a $17.2 billion market in 2017 and biotech crops were grown on approximately 469 million acres that year. The traits being commercialized today by the agricultural industry mainly address crop protection, which involves preventing crop damage by weeds, insects and other pests that lower expected crop yield. As technology has advanced, "trait stacking," or the practice of adding multiple traits to an elite plant line, has become commonplace as a strategy to protect yield. As the industry has developed, the practice of inter-licensing traits between research and development driven seed companies has led to a proliferation of branded seed products on the market today.

The GM seed business is dominated by large multinational companies and their subsidiaries including BASF, Bayer Crop Science, DowDuPont, Syngenta and AgReliant. These companies have significant resources, experience and track records of successfully developing, testing and commercializing high performing seed lines as well as new traits for GM crops. They offer farmers conventional and biotechnology seeds as well as crop protection chemicals, biologicals, fertilizers and other products and technologies aimed at supporting the on-farm efficiency of managing crops in the field as well as managing the overall cost of crop production to successful harvest. Many of these companies were recently involved in consolidation of the sector with the DowDuPont merger, the acquisition of Syngenta by ChemChina, and the acquisition of Monsanto by Bayer in 2018.

Privately owned, U.S. retail seed companies play a key role in the industry by developing, marketing and selling high performing seed to U.S. farmers. These companies include Beck's Hybrids and Stine Seed. These companies have capabilities in both biotechnology and plant breeding. They source traits from the multinational companies and input these traits into elite plant germplasm to produce seeds optimized for a variety of soil, climate and field conditions. Both companies offer a broad arrange of GM corn and soybean products to their customers.

Recent advances in biotechnology including gene editing have led to the formation of companies focusing on yield trait discovery, biologicals for pest control, agbiome strategies and precision agriculture. There are startups, privately held and publicly traded companies involved in this space. Such companies include AgBiome, Arcadia Biosciences, Benson Hill Biosystems, BioCeres, Calyxt, Cibus, Evogene, Inari, Indigo, Kaiima, and Marrone Bio Innovation, many of which have greater resources and experience than we have.

Intellectual Property

Our continued success depends in large part on our proprietary technology. As of December 31, 2018, we owned or held exclusive rights to 17 pending patent applications worldwide related to advanced technologies for increasing yield in crops. Our portfolio of patent applications includes plant science technologies we have in-licensed globally and exclusively from the University of Massachusetts and North Carolina State University related to the yield trait gene C3003 and other advanced technologies based on advanced metabolic engineering methods to improve carbon capture and selectively control carbon partitioning in plants. Our portfolio of patent applications also includes advanced technologies for oilseed crops we in-licensed globally and exclusively from the University of Missouri in 2018 related to the yield trait genes C3007 and C3010.

We continue to seek, develop and evaluate new technologies and related intellectual property that might enhance our Company's business strategy, industry position or deployment options.

Employees

As of December 31, 2018, we had 22 full-time employees. Of those employees, 18 were in research and development. Among our staff, 9 hold Ph.D.'s and 10 hold masters' or bachelors' degrees in their respective disciplines. Our technical staff has expertise in the following areas: plant genetics, plant biology, microbial genetics, bioinformatics, metabolic engineering and systems biology. Our headquarters are located in Massachusetts, and we maintain a research and development facility, including greenhouse facilities, in Saskatoon, Canada. None of our employees are subject to a collective bargaining agreement. We consider our relationship with our employees to be good.

Corporate History and Investor Information

We changed our name to Yield10 Bioscience, Inc. in January 2017 to reflect our change in mission around innovations in agricultural biotechnology focused on developing disruptive technologies for step-change improvements in crop yield. In 1992, our Company was incorporated in Massachusetts under the name Metabolix, Inc. In September 1998, we reincorporated in Delaware. Financial and other information about our Company is available on our website at www.yield10bio.com.

The information on our website is not incorporated by reference into this annual report on Form 10-K and should not be considered to be part of this annual report on Form 10-K. We make available on our website, free of charge, copies of our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act") as soon as reasonably practicable after filing such material electronically or otherwise furnishing it to the Securities and Exchange Commission (the "SEC").

Investors should note that we announce material information to our investors using our website, SEC filings, press releases, public conference calls and webcasts. We use these channels, as well as social media, to communicate with our shareholders and the public about our Company, our products and other matters. It is possible that the information we post on social media could be deemed to be material information. Therefore, we encourage investors, the media, and others interested in our Company to review the information we post on the social media channels listed at the top of our website.

In addition, the SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. Our filings with the SEC may be accessed through the SEC's website at http://www.sec.gov.

ITEM 1A. RISK FACTORS

Our business is subject to numerous risks. We caution you that the following important factors, among others, could cause our actual results to differ materially from those expressed in forward-looking statements made by us or on our behalf in filings with the SEC, press releases, communications with investors and oral statements. Any or all of our forward-looking statements in this Annual Report on Form 10-K and in any other public statements we make may turn out to be wrong. They can be affected by inaccurate assumptions we might make or by known or unknown risks and uncertainties. Many factors mentioned in the discussion below will be important in determining future results. Consequently, no forward-looking statement can be guaranteed. Actual future results may differ materially from those anticipated in forward-looking statements. We undertake no obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosure we make in our reports filed with the SEC.

Risks Relating to our Financial Position

We have a history of net losses and our future profitability is uncertain.

We have recorded losses in every year since our inception, with the exception of 2012. As of December 31, 2018, our accumulated deficit was $351.9 million. Since 1992, we have been engaged primarily in research and development and early-stage commercial activities. Because our crop science technology is at an early stage of development, we cannot be certain that the Yield10 Bioscience business will generate sufficient revenue to become profitable. We expect to continue to have significant losses and negative cash flow for at least the next several years, as we incur additional costs and expenses for the continued development of our technology, including the ongoing expenses of research, development, commercialization and administration. The amount we spend will impact our need for capital resources as well as our ability to become profitable and this will depend, in part, on the number of new technologies that we attempt to develop. We may not achieve any or all of these goals and, thus, we cannot provide assurances that we will ever be profitable or achieve significant, or any, product revenues.

We will need to secure additional funding to finance our operations and may not be able to do so when necessary, and/or the terms of any financings may not be advantageous to us.

As of December 31, 2018, we held unrestricted cash, cash equivalents and short-term investments of $5.8 million. In March 2019 we closed on a registered direct offering of our common stock, raising $2.6 million, net of offering costs. We believe that these resources and the cash generated from existing grants will be sufficient to meet our projected operating requirements into the fourth quarter of 2019. We follow the guidance of Accounting Standards Codification ("ASC") Topic 205-40, *Presentation of Financial Statements-Going Concern,* in order to determine whether there is substantial doubt about the Company's ability to continue as a going concern for one year after the date its financial statements are issued. We have concluded, and our independent auditors have agreed, that substantial doubt does exist as to our ability to continue as a going concern under this standard, and as a result, our auditors have included an explanatory paragraph in their audit opinion for our fiscal year ended December 31, 2018. We will need to secure additional funds in the near term to continue operations.

We continue to face significant challenges and uncertainties and, as a result, our available capital resources may be consumed more rapidly than currently expected due to any or all of the following:

- lower than expected revenues from grants and licenses related to our technologies;
- changes we may make to the business that affect ongoing operating expenses;
- further changes we may make to our business strategy;

- changes in our research and development spending plans; and
- other items affecting our forecasted level of expenditures and use of cash resources.

We will require additional capital resources to support the implementation of our business strategy and we may pursue one or more of a variety of financing options, including public or private equity financing, secured or unsecured debt financing, equity or debt bridge financing, as well as licensing or other collaborative arrangements. There can be no assurance that our financing efforts will be successful. If we are not able to secure such additional capital resources or otherwise fund our operations, we may be forced to explore strategic alternatives and/or wind down our operations and pursue options for liquidating our remaining assets, including intellectual property and equipment.

If we issue equity or debt securities to raise additional funds in the future, we may incur fees associated with such issuances, our existing stockholders may experience dilution from the issuance of new equity securities, we may incur ongoing interest expense and be required to grant a security interest in our assets in connection with any debt issuance, and the new equity or debt securities may have rights, preferences and privileges senior to those of our existing stockholders. In addition, utilization of our net operating loss and research and development credit carryforwards may be subject to significant annual limitations under Section 382 of the Internal Revenue Code of 1986 due to ownership changes resulting from equity financing transactions. If we raise additional funds through collaboration, licensing or other similar arrangements, it may be necessary to relinquish valuable rights to our potential products or proprietary technologies or grant licenses on terms that are not favorable to us.

Inadequate funding for the SEC could hinder our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations.

Government funding of the SEC is subject to the political process, which is inherently fluid and unpredictable. Over the last several years, including a period from late December 2018 through January 2019, the U.S. government has shut down several times and regulatory agencies such as the SEC have had to furlough employees and stop activities. Future government shutdowns could affect our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations, to the extent we need or elect to pursue a financing for which a registration statement must be declared effective by the SEC Staff.

We have changed our corporate strategy to focus on the crop science industry, and our technologies in this area are at a very early stage of development. We may never commercialize a technology or product that will generate meaningful, or any, revenues.

In July 2016, our Board of Directors approved a plan to implement a strategic restructuring under which Yield10 Bioscience has become our core business. As part of the restructuring, we discontinued our biopolymer operations, eliminated positions in our biopolymer operations and corporate organization, and sold certain of our biopolymer business assets.

The crop science products and technologies we are currently developing as a result of our strategic repositioning are at a very early stage of development, and the process of developing them is lengthy and uncertain. In addition, our current management has limited experience in developing technologies for the crop science industry and has never commercialized a product or technology in this industry. We may never reach a point at which our efforts result in products that allow us to achieve revenue from their license or sale.

There can be no assurance that we will be able to comply with the continued listing standards of The Nasdaq Capital Market.

We cannot assure you that we will be able to comply with the standards that we are required to meet in order to maintain a listing of our common stock on The Nasdaq Capital Market. Nasdaq listing rules require us to maintain certain closing bid price, stockholders' equity and other financial metric criteria in order for our common stock to continue trading on The Nasdaq Capital Market. Nasdaq Listing Rule 5550(a)(2) requires listed securities to maintain a minimum bid price of $1.00 per share, and Listing Rule 5810(c)(3)(A) provides that a failure to meet the minimum bid price requirement exists if the deficiency continues for a period of 30 consecutive business days. Our common stock has recently traded below $1.00 per share at times, including closing bid prices below $1.00 per share in the fourth quarter of 2018 and the first quarter of 2019.

If we fail to continue to meet all applicable Nasdaq Capital Market requirements in the future and Nasdaq determines to delist our common stock, the delisting could substantially decrease trading in our common stock and adversely affect the

market liquidity of our common stock; adversely affect our ability to obtain financing on acceptable terms, if at all, for the continuation of our operations; and harm our business. Additionally, the market price of our common stock may decline further, and stockholders may lose some or all of their investment.

Currently, the sole source of our revenue is government grants; continued availability of government grant funding is uncertain and contingent on compliance with the requirements of the grant.

Historically, a portion of our revenue has been generated from payments to us from government entities in the form of government grants, whereby we are reimbursed for certain expenses incurred in connection with our research and development activities, subject to our compliance with the specific requirements of the applicable grant, including rigorous documentation requirements. To the extent that we do not comply with these requirements, the expenses that we incur may not be reimbursed. Any of our existing grants or new grants that we may obtain in the future may be terminated or modified.

Our ability to obtain grants or incentives from government entities in the future is subject to the availability of funds under applicable government programs and approval of our applications to participate in such programs. The application process for these grants and other incentives is highly competitive. We may not be successful in obtaining any additional grants, loans or other incentives. Recent political focus on reducing spending at the U.S. federal and state levels may continue to reduce the scope and amount of funds dedicated to crop science products, if such funds will continue to be available at all. To the extent that we are unsuccessful in being awarded any additional government grants in the future, we would lose a potential source of revenue.

Our government grants may subject us to government audits, which could expose us to penalties if we have failed to comply with the terms of the grants.

We may be subject to audits by government agencies as part of routine audits of our activities funded by our government grants. As part of an audit, these agencies may review our performance, cost structures and compliance with applicable laws, regulations and standards and the terms and conditions of the grant. If any of our costs are found to be allocated improperly, the costs may not be reimbursed, and any costs already reimbursed for such contract may have to be refunded. Accordingly, an audit could result in a material adjustment to our results of operations and financial condition. Moreover, if an audit uncovers improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions.

Risks Relating to our Yield10 Bioscience Crop Science Program

The crop science product development cycle is lengthy and uncertain, and our progress will depend heavily on our ability to attract third-party investment in research under license agreements and on our ability to establish future collaborative partnerships to develop and commercialize our innovations.

The technology and processes used in our crop science program and the application of our technology to enhance photosynthetic efficiency of crops are at an early stage of development. Research and development in the seed, agricultural biotechnology, and larger agriculture industries is expensive and prolonged and entails considerable uncertainty. Completion of development work with respect to our products will require a significant investment of both time and money, if it can be completed at all. We expect that collaborations with established agricultural industry companies will be required to successfully develop and commercialize our innovations. Our initial development strategy is to make it attractive for established agricultural industry companies to invest financial and technical resources to introduce our traits into their elite germplasm for event selection and evaluation under research licenses. For example, in 2017 we entered into a non-exclusive research license with Monsanto, which was subsequently acquired by Bayer AG ("Bayer"), pursuant to which we granted Monsanto a non-exclusive research license to evaluate our novel C3003 and C3004 yield traits in soybean. In September 2018, we granted a non-exclusive research license to Forage Genetics, a subsidiary of Land O'Lakes, Inc., to evaluate five of our novel yield traits in forage sorghum. The traits included in the research license include C3003 as well as four traits from our GRAIN platform, C4001, C4002, C4003 and C4029. We may not be successful in establishing or maintaining suitable relationships with established agricultural industry companies for research licenses in the future, and there can be no assurance that any such relationships will result in future collaboration agreements to develop and commercialize our innovations, with terms that are satisfactory to us or at all. In addition, industry collaborators have significant resources and development capabilities and may develop products and technologies that compete with or negatively impact the development and commercialization of our technologies.

Any potential collaborative partnerships that we may enter into in the future may not be successful, which could adversely affect our ability to develop and commercialize our innovations.

We expect that collaborations with established agricultural industry companies will be required for us to successfully develop and commercialize our innovations. The agriculture industry is highly concentrated and dominated by a small number of large companies, which could impact efforts to form the collaborations that we will need in order to complete the development of our products. To the extent that we pursue such arrangements, we will face significant competition in seeking appropriate partners. Moreover, such arrangements are complex and time-consuming to negotiate, document, implement and maintain. We may not be successful in establishing or implementing such arrangements. The terms of any partnerships, joint ventures or other collaborative arrangements that we may establish may not be favorable to us.

The success of any future collaborative partnerships is uncertain and will depend heavily on the efforts and activities of our potential partners. Such arrangements are subject to numerous risks, including the risks that:

- our partners may have significant discretion in determining the efforts and resources that they will apply to the arrangement;
- our partners may not pursue the development and commercialization of our product candidates based on trial results, changes in their strategic focus, competing priorities, availability of funding, or other external factors;
- our partners may delay or abandon field trials, fail to conduct field trials that produce sufficient conclusory data, provide insufficient funding for field trials, or repeat or conduct new field trials;
- partners who have marketing, manufacturing and distribution rights with respect to a product may not commit sufficient resources to, or otherwise not perform satisfactorily in carrying out, these activities;
- to the extent that such arrangements provide for exclusive rights, we may be precluded from collaborating with others;
- our partners may not properly maintain or defend our intellectual property rights, or may use our intellectual property or proprietary information in a way that gives rise to actual or threatened litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential liability;
- disputes may arise between us and a partner that causes the delay or termination of the research, development or commercialization of our current or future products, or that results in costly litigation or arbitration that diverts management attention and resources;
- such arrangements may be terminated, and, if terminated, may result in a need for additional capital for our independent pursuit of matters previously covered by such arrangement;
- our partners may own or co-own intellectual property that results from our arrangement; and
- a partner's sales and marketing activities or other operations may not be in compliance with applicable laws resulting in civil or criminal proceedings.

Our crop science program may not be successful in developing commercial products.

We and our potential future collaborators may spend many years and dedicate significant financial and other resources developing traits that will never be commercialized. Seeds containing the traits that we develop may never become commercialized for any of the following reasons:

- our traits may not be successfully validated in the target crops;
- our traits may not achieve our targeted yield improvements;
- we may not be able to secure sufficient funding to progress our traits through development and commercial validation;
- our traits may not have the desired effects sought by future collaborators for the relevant crops;
- development and validation of traits, particularly during field trials, may be adversely affected by environmental or other circumstances beyond our control;
- we or our future collaborators may be unable to obtain the requisite regulatory approvals for the seeds containing our traits, to the extent regulatory approvals are required;
- competitors may launch competing or more effective seed traits or seeds;
- a market may not exist for seeds containing our traits or such seeds may not be commercially successful;
- future collaborators may be unable to fully develop and commercialize products containing our seed traits or may decide, for whatever reason, not to commercialize such products; and

- we may be unable to patent our traits in the necessary jurisdictions.

If any of these things were to occur, it could have a material adverse effect on our business and our results of operations. Research and development in the crop science industry is expensive and prolonged and entails considerable uncertainty. Because of the stringent product performance and safety criteria applied in development of crop science products, products currently under development may neither survive the development process nor ultimately receive any requisite regulatory approvals that may be needed to market such products. Even when such approvals are obtained, there can be no assurance that a new product will be commercially successful. In addition, research undertaken by competitors may lead to the launch of competing or improved products, which may affect sales of any products that we are able to develop.

Even if we or our future collaborators are successful in developing commercial products that incorporate our traits, such products may not achieve commercial success.

Our strategy depends upon our or our future collaborators' ability to incorporate our traits into a wide range of crops in significant markets and geographies. Even if we or our future collaborators are able to develop commercial products that incorporate our traits, any such products may not achieve commercial success for one or more of the following reasons, among others:

- products may fail to be effective in particular crops, geographies, or circumstances, limiting their commercialization potential;
- our competitors, or competitors of our collaborators, may launch competing or more effective traits or products;
- significant fluctuations in market prices for agricultural inputs and crops could have an adverse effect on the value of our traits;
- farmers are generally cautious in their adoption of new products and technologies, with conservative initial purchases and proof of product required prior to widespread deployment, and accordingly, it may take several growing seasons for farmers to adopt our or our collaborators' products on a large scale;
- we may not be able to produce high-quality seeds in sufficient amounts to meet demand; and
- we may not be able to secure the financial or other resources needed to achieve commercial success.

Our financial condition and results of operations could be materially and adversely affected if any of the above were to occur.

Our estimates of market opportunity and forecasts of market growth may prove to be inaccurate, and even if the markets in which we may compete in the future achieve growth, our business could fail to achieve the same growth rates as others in the industry.

Market opportunity estimates and market growth forecasts are subject to significant uncertainty and are based on assumptions and estimates that may not prove to be accurate. Our estimates and forecasts relating to the size and expected growth of the global seed industry and the biotechnology seeds market, and the estimated ranges of incremental value increase that a novel, newly developed crop trait may produce, may prove to be inaccurate. Even if the markets in which we may compete in the future achieve these opportunity estimates and market growth forecasts, our business could fail to grow at similar rates, if at all.

If ongoing or future field trials conducted by us or our future collaborators are unsuccessful, we may be unable to complete the regulatory process for, or commercialize, our products in development on a timely basis.

The successful completion of multi-year, multi-site field trials is critical to the success of product development and marketing efforts for products containing our traits. If our ongoing or future field trials, or those of our future collaborators, are unsuccessful or produce inconsistent results or unanticipated adverse effects on crops, or if we or our collaborators are unable to collect reliable data, regulatory review of products in development containing our traits could be delayed or commercialization of products in development containing our traits may not be possible. In addition, more than one growing season may be required to collect sufficient data to develop or market a product containing our traits, and it may be necessary to collect data from different geographies to prove performance for customer adoption. Even in cases where field trials are successful, we cannot be certain that additional field trials conducted on a greater number of acres, or in different crops or geographies, will be successful. Generally, we or our research licensees conduct these field trials, or we pay third parties, such as farmers, consultants, contractors, and universities, to conduct field trials on our

behalf. Poor trial execution or data collection, failure to follow required agronomic practices, regulatory requirements, or mishandling of products in development by our collaborators or these third parties could impair the success of these field trials.

Many factors that may adversely affect the success of our field trials are beyond our control, including weather and climatic variations, such as drought or floods, severe heat or frost, hail, tornadoes and hurricanes, uncommon or unanticipated pests and diseases, or acts of protest or vandalism. For example, if there were a prolonged or permanent disruption to the electricity, climate control, or water supply operating systems in our greenhouses or laboratories, the crops in which we or our collaborators are testing our traits and the samples we or our collaborators store in freezers, both of which are essential to our research and development activities including field tests, could be severely damaged or destroyed, adversely affecting these activities and thereby our business and results of operations. Unfavorable weather conditions including drought or excessive rain, or fluctuations in temperature, which we have experienced from time to time in our field trials, can also reduce both acreages planted and incidence, or timing of, certain crop diseases or pest infestations, each of which may halt or delay our field trials. Any field test failure we may experience may not be covered by insurance and, therefore, could result in increased cost for the field trials and development of our traits, which may negatively impact our business, results of operations, and ability to secure financing. Such factors outside of our control can create substantial volatility relating to our business and results of operations.

Competition in the market for traits and seeds is intense and requires continuous technological development, and, if we are unable to compete effectively, our financial results will suffer.

We face significant competition in the markets in which we operate. The markets for traits and agricultural biotechnology products are intensely competitive and rapidly changing. In most segments of the seed and agricultural biotechnology market, the number of products available to consumers is steadily increasing as new products are introduced. At the same time, the expiration of patents covering existing products reduces the barriers to entry for competitors. We may be unable to compete successfully against our current and future competitors, which may result in price reductions, reduced margins and the inability to achieve market acceptance for any products that we or our future collaborators commercialize containing our traits. In addition, most of our competitors have substantially greater financial, marketing, sales, distribution, research and development, and technical resources than we have, and some of our potential future collaborators have more experience in research and development, regulatory matters, manufacturing, and marketing. We anticipate increased competition in the future as new companies enter the market and new technologies become available. Our technologies may be rendered obsolete or uneconomical by technological advances or entirely different approaches developed by one or more of our competitors, which will prevent or limit our ability to generate revenues from the commercialization of our traits being developed.

Our business is subject to various government regulations in the United States and Canada, the regulatory requirements for our future products in development are evolving and are subject to change, and if there are adverse changes to the current regulatory framework, our or our future collaborators' ability to market our traits could be delayed, prevented or limited.

In the United States and Canada, where our seed traits and biotechnology-derived plant lines are developed and field tested, changes in regulatory requirements applicable to our seed traits or future products in development containing our traits could result in a substantial increase in the time and costs associated with developing and commercializing future products containing our traits, and could materially affect our ability to meet our desired development timelines or to develop and commercialize a future product containing our traits at all.

In the United States, our seed traits and any future products that are successfully developed containing our seed traits are or will be subject to U.S. Department of Agriculture (USDA) and U.S. Food and Drug Administration (FDA) regulatory requirements. The USDA and FDA requirements will vary depending on the particular seed trait and the intended use of any product that will be commercialized. Our business strategy is focused on crop yield traits and we have no current plans for the development of pesticide or herbicide traits, which would be subject to regulation by the U.S. Environmental Protection Agency (EPA).

Within USDA, the Animal and Plant Health Inspection Service (APHIS) is responsible for protecting agricultural plants under the Plant Protection Act. USDA-APHIS regulates organisms and products that are known or are suspected to be plant pests or to pose a plant pest risk, including those that have been altered or produced through various genetic engineering techniques. These genetically engineered plants are called "regulated articles" in the relevant USDA-APHIS regulations, which control the import, handling, interstate movement and release into the environment of regulated articles, including

certain genetically engineered organisms undergoing confined experimental use or field trials. Seed traits developed using the insertion of recombinant DNA, such as our C3003 yield trait that leverages the biological functions of an algal gene, are regulated articles and are therefore subject to extensive USDA-APHIS oversight, including but not limited to permitting requirements for import, handling, interstate movement and release into the environment.

If, however, USDA-APHIS determines that a genetically engineered plant is unlikely to present a greater plant pest risk than its unmodified counterpart, the newly developed crop will no longer be subject to the permitting and other regulatory processes that are overseen by the agency (*i.e.*, it will no longer be treated as a potential plant pest). Such a determination by the USDA-APHIS is called "non-regulated status" under the regulatory framework. The regulations establish detailed procedures for how a developer of a new plant variety may petition USDA-APHIS for a determination of non-regulated status, which is an official agency finding that the particular article is unlikely to pose a plant pest risk and therefore no longer needs to be regulated.

In recent years, we and others have submitted various petitions to USDA-APHIS to determine whether particular biotechnology-derived plants developed through the use of different genome editing techniques may be granted non-regulated status under the regulated/non-regulated framework administered by the agency. In general, genome editing approaches to novel plant trait development have been deemed non-regulated by USDA-APHIS. In particular, we have submitted two petitions for a determination of non-regulated status (also known as the "Am I Regulated?" letter) to USDA-APHIS's Biotechnology Regulatory Services (BRS) in order to confirm that the following two yield traits are not going to be regulated by the agency: (i) the single trait C3008 Camelina plant line, developed using CRISPR genome editing technology for increased oil content; and (ii) the triple-edited Camelina line that combines three gene traits, C3008a, C3008b and C3009, to increase oil production. In both cases, BRS approved our petitions and confirmed in writing that each of these novel plant lines would not be treated as a regulated article.

The USDA also announced in March 2018 that it would not require an assessment on products that used modern forms of mutagenesis if it was clear these outcomes could occur in nature. The USDA stated at that time that it did not "have any plans to regulate plants that could otherwise have been developed through traditional breeding techniques as long as they are developed without the use of a plant pest as the donor or vector and they are not themselves plant pests." This USDA policy statement applies to genetic deletions of any size, which would include genome editing through CRISPR-Cas9 and other emerging technologies, although it remains to be seen how this policy announcement will be implemented by USDA-APHIS and what practical effect that may have on seed trait developers like us and our competitors.

There can be no guarantee that the USDA-APHIS governing regulations and policies will not change. We cannot predict whether advocacy groups will challenge existing regulations and USDA determinations, whether the USDA will alter its interpretations of existing regulations, modify existing regulations or promulgate new regulations, or whether additional laws will come into effect. If these or other developments resulted in adverse changes to the current regulatory framework, our seed traits or future products in development containing our traits could be subjected to more burdensome regulatory standards, thereby substantially increasing the time and costs associated with developing and commercializing any future products. Moreover, we cannot assure you that USDA-APHIS will analyze any of our future yield traits or products in development containing our traits in a manner consistent with its analysis of our genome edited yield traits to date. Complying with the USDA's plant pest regulations for traits that are classified as "regulated articles," including the permitting requirements for field testing and environmental release, is a costly, time-consuming process and could substantially delay or prevent the commercialization of any future products containing traits that we expected to be deemed non-regulated by USDA-APHIS.

In addition to USDA-APHIS regulation of plant breeding and planting, a biotechnology-derived plant also will be regulated by FDA if it is intended to be used as human food or animal feed. FDA regulates the safety of food for humans and animals, and foods derived from novel plant varieties must meet the same food safety requirements as foods derived from traditionally bred plants (also called conventional foods). Since 1992, FDA has had in place a voluntary consultation process for developers of bioengineered food ("Biotechnology Consultations"). Biotechnology Consultations are data-intensive and examine the new food product's safety and nutritional profile, among other issues. Generally, FDA has found that such food products do not pose unique health risks to humans or animals, but if a novel allergen or other distinction from the conventional food is present in the new plant variety, the agency may require specific label statements on the product to ensure that consumers are made aware of material differences between genetically engineered and conventional versions. When such a determination cannot be made, the novel plant variety may become subject to FDA premarket review and approval as a food additive.

As part of a broader effort to modernize its regulatory approach to all biotechnology-derived products, FDA is currently re-evaluating its regulatory approach in light of the increasing prevalence of certain genome edited plants. In January 2017, FDA asked for public input to help inform its thinking about human and animal foods derived from new plant varieties produced using genome editing techniques. Among other things, the FDA's request for comments asked for data and information in response to questions about the safety of foods from genome edited plants, such as whether certain categories of genome edited plants present food safety risks different from other plants produced through traditional plant breeding. Subsequently, in October 2018, FDA leadership issued a document entitled the "Plant and Animal Biotechnology Innovation Action Plan" ("Action Plan") that identified three key priorities for the agency in this area and stated that FDA has reviewed the comments and other information it received in response to the January 2017 request for comments. FDA also stated that it intends to develop guidance for industry explaining how the FDA's existing regulatory policy for foods derived from new plant varieties applies to foods produced using genome editing. The forthcoming draft guidance is expected to be released for public comment in early 2019. FDA also stated in the Action Plan that it intends to begin updating the existing procedures for voluntary Biotechnology Consultations to reflect the agency's 25 years of experience with foods derived from biotechnology plants and to incorporate any additional issues related to genome editing of food crops. Such procedural updates are expected to be developed and implemented over the next two years.

We have not participated in any Biotechnology Consultations or engaged in any informal discussions with FDA about our novel yield traits, whether those traits have been developed using genome editing or traditional genome modification using the insertion of recombinant DNA. Any delay in the regulatory consultation process, or a determination by FDA that future product candidates containing our traits raise different safety issues than the relevant conventional crop and therefore must be approved by the agency as a new food additive through an intensive premarket safety review process, could increase the costs associated with or delay or prevent the commercialization of the future product candidate. Such delays may lead to reduced acceptance by farmers, food manufacturers or the public and an increase in competitor products that may directly compete with ours. Further, if the FDA enacts new regulations or policies with respect to genome edited plants in particular, such policies could result in additional compliance costs or delay or prevent the commercialization of any potential commercial products containing our seed traits, which could adversely affect our ability to generate revenues and to achieve profitability.

In Canada, genetically engineered crops and the food products into which they are incorporated are regulated by multiple government agencies under a federal framework for the regulation of biotechnology products that is similar to the U.S. system. First, the Canadian Food Inspection Agency (CFIA) is the lead agency for ensuring that a new agricultural biotechnology crop will not pose new risks to Canadian plants, animals and other agricultural commodities. The CFIA's Plant Biosafety Office (PBO) is responsible for conducting environmental assessments of biotechnology-derived plants, referred to as "plants with novel traits" (PNT). Authority for the PBO includes both approving confined field trials with the PNT through permits and authorizing their "unconfined release" as a first step towards commercialization. Second, under the Food and Drugs Act and related regulations, Health Canada is responsible for reviewing a pre-market safety assessment that must be submitted by the manufacturer or importer of a "novel food," a term of art that includes any PNT or other biotechnology-derived foods. Health Canada will evaluate the data and information about the novel food and make a determination regarding whether it is safe and nutritious before it can be sold in Canada, as well as whether any restrictions are warranted under applicable law or the product's safety profile. Any commercialization of our yield crops in Canada is expected to be done by a third-party collaborator or other partner and complying with Health Canada's pre-market notification requirement and safety assessment for novel foods would be the obligation of that third-party collaborator.

Our work involving the development, greenhouse testing and field testing of novel yield trait genes in crop plants requires certain government and municipal permits and we must ensure compliance with all applicable regulations including regulations relating to genetically engineered crops. With laboratories and greenhouses in both the U.S. and Canada, we are also subject to regulations governing the shipment of seeds and other plant material between our facilities in the U.S. and Canada, including USDA-APHIS permits for the import and export of plant materials that could pose a risk to domestic agriculture. We also have been conducting field studies of various yield traits in Canada since 2016 under PNT permits issued by Canadian regulators.

Complying with the Canadian regulations is a costly, time-consuming process and could substantially delay or prevent the commercialization of our products. In addition, we cannot assure you that CFIA and Health Canada regulations or the agencies' implementation of those regulations will not change or that the legislative framework in Canada for biotechnology-derived crops, whether for genome edited plants or plants modified using the insertion of recombinant DNA, will not be amended or otherwise changed in a manner that could result in additional compliance costs or delay or prevent the commercialization of any potential commercial products containing our seed traits, which could adversely affect our ability to generate revenues and to achieve profitability.

Failure to comply with applicable regulatory requirements may, among other things, result in fines, suspensions of regulatory approvals, product recalls, product seizures, operating restrictions and criminal prosecution.

If we or our future collaborators are unable to comply with and timely complete the regulatory process in the United States and Canada for our future products in development, our or our future collaborators' ability to market our traits could be delayed, prevented or limited.

We apply for and maintain the regulatory permits in the United States and Canada necessary for our operations, particularly those covering our field trials. We anticipate that we or our future collaborators will apply for and maintain regulatory approvals, if any, necessary for the commercialization of any future products containing our seed traits. Even if we and our collaborators make timely and appropriate applications for regulatory permits for our field trials, government delays in issuing such permits can significantly affect the development timelines for our traits, particularly if the planting period for a crop growing season expires before the necessary permits are obtained.

The regulatory process is expensive and time-consuming, and the time required to complete the process is difficult to predict and depends upon numerous factors, including the substantial discretion of the regulatory authorities. We have not completed all phases of the regulatory process for any of our traits in development. Our traits could require a significantly longer time to complete the regulatory process than expected, or may never gain approval, even if we and our collaborators expend substantial time and resources seeking such approval. The time required for regulatory approval, or any delay or denial of such approval, could negatively impact our ability to generate revenues and to achieve profitability and finance our ongoing operations. In addition, changes in regulatory review policies during the development period of any of our traits, changes in, or the enactment of, additional regulations or statutes, or changes in regulatory review practices for a submitted product application may cause a delay in obtaining approval or result in the rejection of an application for regulatory approval. Regulatory approval, if obtained, may be made subject to limitations on the intended uses for which we or our collaborators may market a future product containing our traits. These limitations could adversely affect our potential revenues.

The regulatory environment for genetically engineered crops in jurisdictions outside the United States and Canada varies greatly, and some jurisdictions have more restrictive regulations that could delay, prevent or limit our or our future collaborators' ability to market our traits.

Other jurisdictions and governmental authorities, including in South America and Asia, are increasingly taking an interest in regulating agricultural products of biotechnology. Regulatory approaches vary by jurisdiction as a result of the existing public health frameworks and phytosanitary laws, as well as other less tangible factors such as cultural and religious norms that may have an impact on individual country risk assessments and decision-making. Each jurisdiction may have its own regulatory framework, which may include restrictions and regulations on planting and growing genetically engineered plants and in the consumption and labeling of foods derived from such novel plants, and which may apply to future products containing our traits. We cannot predict future changes in the global regulatory landscape regarding genetically engineered plants or commercial products incorporating such novel plant varieties. The regulatory environment for such plants is greatly uncertain outside of the U.S. and Canada, and some jurisdictions have more restrictive regulations that could delay, prevent or limit our or our future collaborators' ability to market our traits.

For example, regulation of all genetically engineered plants in the European Union (EU) is far more stringent than in the U.S. and Canada. U.S. and Canadian regulators have determined that genome edited plants pose fewer risks than traditional biotechnology-derived plants subjected to modification through the insertion of recombinant DNA. In contrast, a recent EU legal ruling indicated that the existing EU regulations for genetically engineered plants modified by the insertion of recombinant DNA, which were already more stringent than corresponding U.S. and Canadian regulations, should be strictly applied to genome edited plants as well. As a result, there is a sharp distinction between how EU and U.S. and Canadian regulatory agencies oversee novel seed traits, and in particular those that are generated using the more modern techniques of genome editing.

Although we are not currently targeting EU markets for the development or commercialization of future products containing our traits, emerging oversight regimes for genetically engineered products in other jurisdictions may follow the EU approach and impose similarly strict requirements for the release of such products into the environment and their incorporation into human food or other consumer products. Such jurisdictions may also elect to regulate genetically engineered plants without distinguishing between traditional biotechnology-derived plants modified with recombinant DNA and genome edited plants. There is no guarantee that countries for which we may have or may develop future marketing plans would not take a stricter legal and regulatory approach to controlling genetically engineered plants similar to that of the EU,

which could increase regulatory costs and delay, prevent or limit our or our future collaborators' ability to market our traits in such jurisdictions.

Consumer resistance to genetically engineered crops may negatively affect the ability to commercialize future crops containing our traits, as well as our public image, and may reduce any future sales of seeds containing our yield traits.

Food and feed made from genetically engineered seeds and plants are not accepted by some consumers, and in certain countries production of certain genetically engineered crops is effectively prohibited, including throughout the European Union, due to concerns over such products' effects on food safety and the environment. Advocacy groups have engaged in publicity campaigns and filed lawsuits in various countries against companies and regulatory authorities, seeking to halt regulatory approval activities or influence public opinion against genetically engineered and/or genome edited products. Actions by consumer groups and others also may disrupt research and development or production of genetically engineered plants, seeds or food products that incorporate such novel plant varieties. The high public profile of the biotechnology industry in food and feed production, and a lack of consumer acceptance of the types of products to which we have devoted substantial development resources, could have a negative impact on the commercial success of any of products incorporating our traits that may successfully complete the development process, as to which no assurance can be given, and could materially and adversely affect our ability to obtain future collaborations and to finance our crop science program. Further, we could incur substantial liability and/or legal expenses if there are claims that genetically engineered crops damage the environment or contaminate other farm crops. This could distract our management and cause us to spend resources defending against such claims.

Government policies and regulations, particularly those affecting the agricultural sector and related industries, could adversely affect our operations and our ability to generate future revenues and to achieve profitability.

Agricultural production and trade flows are subject to government policies and regulations. Governmental policies and approvals of technologies affecting the agricultural industry, such as taxes, tariffs, duties, subsidies, incentives and import and export restrictions on agricultural commodities and commodity products can influence the planting of certain crops, the location and size of crop production, and the volume and types of imports and exports. Future government policies in the United States, Canada or in other countries could discourage farmers from using any of our products that may successfully complete the development process, as to which no assurance can be given. Similarly, these policies could discourage food processors from purchasing harvested crops containing our traits or could encourage the use of our competitors' products, which would put us at a commercial disadvantage and could negatively impact our ability to generate any revenues and to achieve profitability.

The products of third parties, or the environment itself, may be negatively affected by the unintended appearance of our yield trait genes.

The potential for unintended but unavoidable trace amounts, sometimes called "adventitious presence," of yield trait genes in conventional seed, or in the grain or products produced from conventional or organic crops, could affect acceptance by the general public or by the agricultural industry of these traits. Trace amounts of yield trait genes may unintentionally be found outside our containment area in the products of third parties, which may result in negative publicity and claims of liability brought by such third parties against us. Furthermore, in the event of an unintended dissemination of our genetically engineered materials to the environment, we could be subject to claims by multiple parties, including environmental advocacy groups, as well as governmental actions such as mandated crop destruction, product recalls or additional stewardship practices and environmental cleanup or monitoring. The occurrence of any of these events could have a material adverse effect on our business and results of operations.

Loss of or damage to our elite novel trait events and plant lines would significantly slow our product development efforts.

We have a collection of elite novel trait events and plant lines in which we are developing traits for incorporation into elite germplasm and potential seed products. Our elite novel trait events and plant lines are a key strategic asset since they form the basis for the introgression of our traits into plant breeding programs. If we suffer loss or damage to our elite novel trait events and plant lines, our research and development activities could be negatively impacted.

Our insurance coverage may be inadequate to cover all the liabilities we may incur.

We face the risk of exposure to liability claims if any products that are successfully developed containing our seed traits, as to which no assurance can be given, are defective and if any product that we develop or any product that uses our

technologies or incorporates any of our traits causes injury. Although we carry insurance at levels customary for companies in our industry, such coverage may become unavailable or be inadequate to cover all liabilities we may incur. There can be no assurance that we will be able to continue to maintain such insurance, or obtain comparable insurance at a reasonable cost, if at all. If we are unable to obtain sufficient insurance coverage at an acceptable cost or otherwise, or if the amount of any claim against us exceeds the coverage under our policies, we may face significant expenses.

We rely on third parties to conduct, monitor, support, and oversee field trials and, in some cases, to maintain regulatory files for those products in development, and any performance issues by third parties, or our inability to engage third parties on acceptable terms, may impact our or our future collaborators' ability to complete the regulatory process for or commercialize such products.

We rely on third parties to conduct, monitor, support, and oversee field trials. As a result, we have less control over the timing and cost of these trials than if we conducted these trials with our own personnel. If we are unable to maintain or enter into agreements with these third parties on acceptable terms, or if any such engagement is terminated prematurely, we may be unable to conduct and complete our trials in the manner we anticipate. In addition, there is no guarantee that these third parties will devote adequate time and resources to our studies or perform as required by our contract or in accordance with regulatory requirements, including maintenance of field trial information regarding our products in development. If any of these third parties fail to meet expected deadlines, fail to transfer to us any regulatory information in a timely manner, fail to adhere to protocols, or fail to act in accordance with regulatory requirements or our agreements with them, or if they otherwise perform in a substandard manner or in a way that compromises the quality or accuracy of their activities or the data they obtain, then field trials of our traits in development may be extended or delayed with additional costs incurred, or our data may be rejected by the applicable regulatory agencies. Ultimately, we are responsible for ensuring that each of our field trials is conducted in accordance with the applicable protocol and with legal, regulatory and scientific standards, and our reliance on third parties does not relieve us of our responsibilities. We could be subject to penalties, fines and liabilities if our third-party contractors fail to perform as required.

If our relationship with any of these third parties is terminated, we may be unable to enter into arrangements with alternative parties on commercially reasonable terms, or at all. Switching or adding service providers can involve substantial cost and require extensive management time and focus. Delays may occur, which can materially impact our ability to meet our desired development timelines. If we are required to seek alternative service arrangements, the resulting delays and potential inability to find a suitable replacement could materially and adversely impact our business.

In addition, there has been an increasing trend towards consolidation in the agricultural biotechnology industry. Consolidation among our competitors and third parties upon whom we rely could lead to changes in the competitive landscape, capabilities, and strategic priorities among potential service providers, which could have an adverse effect on our business and operations.

If we lose key personnel or are unable to attract and retain necessary talent, we may be unable to develop or commercialize our products under development.

We are highly dependent on our key technical and scientific personnel, who possess unique knowledge and skills related to our research and technology. If we were to lose the services of these individuals, we may be unable to readily find suitable replacements with comparable knowledge and the experience necessary to advance the research and development of our products. Because of the unique talents and experience of many of our scientific and technical staff, competition for our personnel is intense. The loss of key personnel or our inability to hire and retain personnel who have the required expertise and skills could have a material adverse effect on our research and development efforts, our business, and our ability to secure additional required financing.

Our business and operations would suffer in the event of system failures.

We utilize information technology, or IT, systems and networks to process, transmit and store electronic information in connection with our business activities. As use of digital technologies has increased, cyber incidents, including deliberate attacks and attempts to gain unauthorized access to computer systems and networks, have increased in frequency and sophistication. These threats pose a risk to the security of our systems and networks and the confidentiality, availability and integrity of our data. There can be no assurance that we will be successful in preventing cyber-attacks or successful in mitigating their efforts.

Despite the implementation of security measures, our internal computer systems and those of our contractors and consultants are vulnerable to damage from such cyber-attacks, including computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. Such an event could cause interruption of our operations. For example, the loss of data from completed field tests for our yield traits could result in delays in our regulatory approval efforts and significantly increase our costs. To the extent that any disruption or security breach were to result in a loss of or damage to our data, or inappropriate disclosure of confidential or proprietary information, we could suffer reputational harm or face litigation, or adverse regulatory action and the development of our product candidates could be delayed.

Risks Relating to Intellectual Property

Patent protection for our technologies is both important and uncertain.

Our commercial success may depend in part on our obtaining and maintaining patent protection for our technologies in the United States and other jurisdictions, as well as successfully enforcing and defending this intellectual property against third-party challenges. If we are not able to obtain or defend patent protection for our technologies, then we will not be able to exclude competitors from developing or marketing such technologies, and this could negatively impact our ability to generate sufficient revenues or profits from product sales and/or licensing to justify the cost of development of our technologies and to achieve or maintain profitability. Our currently issued patents relate to our historical business and have expiration dates ranging from 2020 through 2030. New outstanding patent applications owned by or licensed to us relating to crop yield improvements have filing dates ranging from 2013 through 2018.

Our patent position involves complex legal and factual questions. Accordingly, we cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. Patents may not be issued for any pending or future pending patent applications owned by or licensed to us, and claims allowed under any issued patent or future issued patent owned or licensed by us may not be valid or sufficiently broad to protect our technologies. Moreover, we may be unable to protect certain of our intellectual property in the United States or in foreign countries. Foreign jurisdictions may not afford the same protections as U.S. law, and we cannot ensure that foreign patent applications will have the same scope as the U.S. patents. There will be many countries in which we will choose not to file or maintain patents because of the costs involved. Competitors may also design around our patents or develop competing technologies.

Additionally, any issued patents owned by or licensed to us now or in the future may be challenged, invalidated, or circumvented. We could incur substantial costs to bring suits or other proceedings in which we may assert or defend our patent rights or challenge the patent rights of third parties. An unfavorable outcome of any such litigation could have a material adverse effect on our business and results of operations.

Third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result.

Various U.S. and foreign issued patents and pending patent applications owned by third parties exist in areas relevant to our products and processes. We could incur substantial costs to challenge third-party patents. If third parties assert claims against us or our customers alleging infringement of their patents or other intellectual property rights, we could incur substantial costs and diversion of management resources in defending these claims, and the defense of these claims could have a material adverse effect on our business. In addition, if we are unsuccessful in defending against these claims, these third parties may be awarded substantial damages, as well as injunctive or other equitable relief against us, which could effectively block our ability to make, use, sell, distribute, or market our technologies and services based on our technologies in the United States or abroad. Alternatively, we may seek licenses to such third-party intellectual property. However, we may be unable to obtain these licenses on acceptable terms, if at all. Our failure to obtain the necessary licenses or other rights could prevent the sale, manufacture, or distribution of some of our products based on our technologies and, therefore, could have a material adverse effect on our business.

Portions of our crop science technology are owned by or subject to retained rights of third parties.

We have licensed and optioned from academic institutions certain patent rights that may be necessary or important to the development and commercialization of our crop science technology. These licenses and options may not provide exclusive rights to use such intellectual property in all fields of use in which we may wish to develop or commercialize our technology. If we fail to timely exercise our option rights and/or we are unable to negotiate license agreements for optioned patent rights on acceptable terms, the academic institutions may offer such patent rights to third parties. If we fail to comply

with our obligations under these license agreements, or if we are subject to a bankruptcy or insolvency proceeding, the licensor may have the right to terminate the license. In some circumstances, we may not have the right to control the preparation, filing and prosecution of licensed patent applications or the maintenance of the licensed patents. Therefore, we cannot be certain that these patents and applications will be prosecuted, maintained and enforced in a manner consistent with the best interests of our business. Furthermore, the research resulting in certain of our licensed and optioned patent rights was funded by the U.S. government. As a result, the government may have certain rights to such patent rights and technology.

We may not be successful in obtaining necessary rights to additional technologies for the development of our products through acquisitions and in-licenses.

We may be unable to acquire or in-license additional technologies from third parties that we decide we need in order to develop our business. A number of more established companies may also pursue strategies to license or acquire crop science technologies that we may consider attractive. These established companies may have a competitive advantage over us due to their size, cash resources and greater development and commercialization capabilities. Any failure on our part to reach an agreement for any applicable intellectual property could result in a third party acquiring the related rights and thereby harm our business.

In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire relevant crop science technologies on terms that would allow us to make an appropriate return on our investment.

We expect that competition for acquiring and in-licensing crop science technologies that are attractive to us may increase in the future, which may mean fewer suitable opportunities for us as well as higher acquisition or licensing costs. If we are unable to successfully obtain rights to suitable crop science technologies on reasonable terms, or at all, our business and financial condition could suffer.

Our license agreements include royalty payments that we are required to make to third parties.

We are party to license agreements that require us to remit royalty payments and other payments related to our licensed intellectual property. Under our in-license agreements, we may pay upfront fees and milestone payments and be subject to future royalties. We cannot precisely predict the amount, if any, or timing of royalties we may owe in the future. Furthermore, we may enter into additional license agreements in the future, which may also include royalty, milestone and other payments.

The intellectual property landscape around genome editing technology, such as CRISPR, is highly dynamic and uncertain, and any resolution of this uncertainty could have a material adverse effect on our business.

The field of genome editing, especially in the area of CRISPR technology, is still in its infancy, and no products using this technology have reached the market. In 2018, we entered into a non-exclusive research license agreement jointly with the Broad Institute of MIT and Harvard and Pioneer, part of Corteva Agriscience™, Agriculture Division of DowDuPont Inc., for the use of CRISPR-Cas9 genome-editing technology for crops in order to demonstrate the utility of our yield trait genes in this field. The joint license covers intellectual property consisting of approximately 48 patents and patent applications on CRISPR-Cas9 technology controlled by the Broad Institute and Corteva Agriscience. Under the agreement, we have the option to renew the license on an annual basis and the right, subject to specified conditions, to convert the research license to a commercial license in the future, although there can be no assurance that we will be able to secure such commercial license on acceptable terms. CRISPR technology is uniquely suited to agricultural applications as it enables precise changes to plant DNA without the use of foreign DNA to incorporate new traits. Plants developed using CRISPR genome-editing technology have the potential to be designated as “non-regulated” by USDA-APHIS for development and commercialization in the U.S., which could result in shorter developmental timelines and lower costs associated with commercialization of new traits in the U.S. as compared to regulated crops. Due to the intense research and development that is taking place by several companies, including us and our competitors, in this field, the intellectual property landscape is in flux, and it may remain uncertain for the coming years. There has been, and may continue to be, significant intellectual property related litigation and proceedings relating to this area in the future. If it is later determined that the patent rights using the CRISPR technology that we obtained under license are invalid or owned by other parties, this could have a material adverse effect on our business.

We rely in part on trade secrets to protect our technology, and our failure to obtain or maintain trade secret protection could harm our business.

We rely on trade secrets to protect some of our technology and proprietary information, especially where we believe patent protection is not appropriate or obtainable. However, trade secrets are difficult to protect. Litigating a claim that a third party had illegally obtained and was using our trade secrets would be expensive and time consuming, and the outcome would be unpredictable. Moreover, if our competitors independently develop similar knowledge, methods and know-how, it will be difficult for us to enforce our rights and our business could be harmed.

Risks Relating to Owning our Common Stock

Raising additional funds may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies.

Execution of our business plan requires additional financing. If we raise additional funds through equity offerings or offerings of equity-linked securities, including warrants or convertible debt securities, we expect that our existing stockholders will experience significant dilution, and the terms of such securities may include liquidation or other preferences that adversely affect your rights as a stockholder. Debt financing, if available, may subject us to restrictive covenants that could limit our flexibility in conducting future business activities, including covenants limiting or restricting our ability to incur additional debt, dispose of assets or make capital expenditures. We may also incur ongoing interest expense and be required to grant a security interest in our assets in connection with any debt issuance. If we raise additional funds through strategic partnerships or licensing agreements with third parties, we may have to relinquish valuable rights to our technologies or grant licenses on terms that are not favorable to us.

Trading volume in our stock can fluctuate and an active trading market for our common stock may not be available on a consistent basis to provide stockholders with adequate liquidity. Our stock price may be extremely volatile, and our stockholders could lose a significant part of their investment.

The public trading price for our common stock will be affected by a number of factors, including:

- any change in the status of our Nasdaq listing;
- the need for near-term financing to continue operations;
- reported progress in our efforts to develop crop related technologies, relative to investor expectations;
- changes in earnings estimates, investors' perceptions, recommendations by securities analysts or our failure to achieve analysts' earnings estimates;
- quarterly variations in our or our competitors' results of operations;
- general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors;
- future issuances and/or sales of our securities;
- announcements or the absence of announcements by us, or our competitors, regarding acquisitions, new products, regulatory developments, significant contracts, commercial relationships or capital commitments;
- commencement of, or involvement in, litigation;
- any major change in our board of directors or management;
- changes in governmental regulations or in the status of our regulatory approvals;
- announcements related to patents issued to us or our competitors and to litigation involving our intellectual property;
- a lack of, or limited, or negative industry or security analyst coverage;
- uncertainty regarding our ability to secure additional cash resources with which to operate our business;
- a decision by our significant stockholders to increase or decrease their holdings in our common stock;
- short-selling or similar activities by third parties; and
- other factors described elsewhere in these risk factors.

As a result of these factors, our stockholders may not be able to resell their shares at, or above, their purchase price. In addition, the stock prices of many technology companies have experienced wide fluctuations that have often been unrelated to the operating performance of those companies. Any negative change in the public's perception of the prospects of industrial or agricultural biotechnology companies could depress our stock price regardless of our results of operations. These factors may have a material adverse effect on the market price and liquidity of our common stock and affect our ability to obtain required financing.

Provisions in our certificate of incorporation and by-laws and Delaware law might discourage, delay or prevent a change of control of our company or changes in our management and, therefore, depress the trading price of our common stock.

Provisions of our certificate of incorporation and by-laws and Delaware law may discourage, delay or prevent a merger, acquisition or other change in control that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their shares of our common stock. These provisions may also prevent or frustrate attempts by our stockholders to replace or remove our management.

In addition, Section 203 of the Delaware General Corporation Law prohibits a publicly-held Delaware corporation from engaging in a business combination with an interested stockholder, which generally refers to a person which together with its affiliates owns, or within the last three years has owned, 15 percent or more of our voting stock, for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner.

The existence of the foregoing provisions and anti-takeover measures could limit the price that investors might be willing to pay in the future for shares of our common stock. They could also deter potential acquirers of our company, thereby reducing the likelihood that our stockholders could receive a premium for their common stock in an acquisition.

Concentration of ownership among our officers, directors and principal stockholders may prevent other stockholders from influencing significant corporate decisions and depress our stock price.

Based on the number of shares outstanding as of March 26, 2019, our officers, directors and stockholders who hold at least 5% of our stock beneficially own a combined total of approximately 51.1 percent of our outstanding common stock, including shares of common stock subject to stock options and warrants that are currently exercisable or are exercisable within 60 days after March 26, 2019. If these officers, directors, and principal stockholders or a group of our principal stockholders act together, they will be able to exert a significant degree of influence over our management and affairs and control matters requiring stockholder approval, including the election of directors and approval of mergers, business combinations or other significant transactions. The interests of one or more of these stockholders may not always coincide with our interests or the interests of other stockholders. For instance, officers, directors, and principal stockholders, acting together, could cause us to enter into transactions or agreements that we would not otherwise consider. Similarly, this concentration of ownership may have the effect of delaying or preventing a change in control of our company otherwise favored by our other stockholders. As of March 26, 2019, Jack W. Schuler (and his related entities) beneficially owned approximately 47.5 percent of our common stock. To the extent that this or any other significant stockholders oppose any proposal put forth for stockholder approval by our board of directors, they control a sufficient percentage of our outstanding shares to cause such proposal to either fail or be very difficult to achieve without their support. This, in turn, could have a negative effect on the market price of our common stock. It could also prevent our stockholders from realizing a premium over the market price for their shares of common stock. The concentration of ownership also may contribute to the low trading volume and volatility of our common stock.

The comprehensive tax reform bill known as the Tax Cuts and Jobs Act could adversely affect our business and financial results.

On December 22, 2017, President Trump signed into law the "Tax Cuts and Jobs Act," or TCJA, that significantly reformed the Internal Revenue Code of 1986, as amended, or the Code. The TCJA, among other things, includes changes to U.S. federal tax rates, imposes significant additional limitations on the deductibility of interest and net operating loss carryforwards, allows for the expensing of capital expenditures, and puts into effect the migration from a "worldwide" system of taxation to a territorial system. Our net deferred tax assets and liabilities have been revalued at the newly enacted U.S. corporate rate as of December 31, 2018. We continue to examine the impact this tax reform legislation may have on our business and we urge our stockholders to consult with their legal and tax advisors with respect to such legislation and the potential tax consequences of investing in our common stock.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We do not own any real property. We are party to a lease agreement pursuant to which we lease approximately 30,000 square feet of office and research and development space located at 19 Presidential Way, Woburn, Massachusetts.

The lease began on June 1, 2016 and will end on November 30, 2026. Under the terms of the lease agreement, the landlord paid approximately $0.9 million for tenant improvements to the facility and paid an additional $0.4 million for tenant improvements that result in increased rental payments by the Company. Current and non-current portions of the lease incentive obligations related to the landlord's contributions toward the cost of tenant improvements are recorded within accrued expenses and long-term lease incentive obligation, respectively, in the Company's consolidated balance sheet contained herein. The lease incentive obligation will be amortized to rent expense over the lease term. As of December 31, 2018, the Company has a total remaining lease incentive obligation of approximately $1.0 million. Pursuant to the lease, the Company also pays certain taxes and operating costs associated with the premises during the term of the lease. To secure the lease, the Company provided the landlord with a deposit in the form of a letter of credit in the amount of $0.3 million.

The Company has a sublease agreement with a subsidiary of CJ CheilJedang Corporation ("CJ") for CJ's sublease of approximately 10,000 square feet of the Company's Woburn facility. The subleased space was determined to be in excess of the Company's needs as a result of its strategic shift and the related restructuring of its operations initiated during 2016. The sublease is coterminous with the Company's master lease. CJ will pay rent and operating expenses equal to approximately one-third of the amounts payable to the landlord by the Company, as adjusted from time-to-time in accordance with the terms of the master lease. CJ has provided the Company with a security deposit of $0.1 million in the form of an irrevocable letter of credit.

We also lease approximately 13,700 square feet of office and laboratory space at 650 Suffolk Street, Lowell, Massachusetts. Our lease for this facility expires in May 2020, with an option to renew for one five-year period. We are no longer utilizing this facility and are working with a commercial real estate broker to locate a subtenant. Our wholly-owned subsidiary, Metabolix Oilseeds, Inc. ("MOI"), located in Saskatoon, Saskatchewan, Canada, leases approximately 6,200 square feet of office, laboratory and greenhouse space. MOI's leases for these facilities expire at various times between April 2019 and May 2020.

ITEM 3. LEGAL PROCEEDINGS

From time to time, the Company may be subject to legal proceedings and claims in the ordinary course of business. We are not currently aware of any such proceedings or claims that we believe will have, individually or in the aggregate, a material adverse effect on our business, financial condition or results of operations.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock is traded on the Nasdaq Capital Market under the symbol "YTEN."

Stockholders

As of March 25, 2019, there were 12,468,219 shares of our common stock outstanding held by 46 stockholders of record.

Equity Compensation Plan Information

Please see Part III, Item 12, for information regarding securities authorized for issuance under our equity compensation plans.

Unregistered Sales of Securities

On October 8, 2018, we issued 14,416 shares of common stock to participants in our Yield10 Bioscience, Inc. 401(k) Plan as a matching contribution. The issuance of these securities was exempt from registration pursuant to Section 3(a)(2) of the Securities Act of 1933 as amended.

Issuer Purchases of Equity Securities

During the quarter ended December 31, 2018, there were no repurchases made by us or on our behalf, or by any "affiliated purchasers," of shares of our common stock.

ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

Not applicable.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis should be read in conjunction with the Consolidated Financial Statements and Notes thereto included in this Annual Report on Form 10-K. All dollar amounts are stated in thousands.

Overview

Yield10 Bioscience, Inc. ("Yield10 Bioscience," "Yield10" or the "Company") is an agricultural bioscience company which uses its "Trait Factory" to develop high value seed traits for the agriculture and food industries. Specifically, Yield10 plans to efficiently develop superior gene traits for the major grain crops, which are; corn, soybean, canola, wheat and rice. We consider 10-20 percent increases in crop yield to be step-change increases. We are currently progressing several novel yield gene traits in our pipeline in canola, soybean and corn, the major North American row crops, among others. Over the last three years, we have evaluated certain of our traits in greenhouse studies and field tests conducted in the United States and Canada. We currently have two non-exclusive research license agreements in place with the Monsanto division of Bayer Crop Science, a division of Bayer AG, for the evaluation of our C3003 and C3004 traits in soybean and with Forage Genetics International, LLC, a division of Land O'Lakes, Inc. for the evaluation of five yield traits in forage sorghum. Our business strategy is to progress our traits into field tests to generate validating yield data. Over the last three years, we have progressed our evaluation of C3003 in field test with Camelina and canola. We are planning to expand our field tests with additional traits and more events in 2019 and 2020. We plan to leverage data that we generate to support the performance of our traits in key crops to establish collaborations or sign licenses to the traits with major agricultural companies in order to generate revenue. Yield10 Bioscience is headquartered in Woburn, Massachusetts and has an oilseed development Center of Excellence in Saskatoon, Saskatchewan, Canada.

Government Grants

As of December 31, 2018, proceeds of $793 remain to be earned under our U.S. government grants. This includes amounts for reimbursement to our subcontractors, as well as reimbursement for our employees' time, benefits and other expenses related to future performance.

The status of our government grants is as follows:

Program Title	Funding Agency	Total Government Funds	Total revenue recognized through December 31, 2018	Remaining amount to be recognized as of December 31, 2018	Contract/Grant Expiration
Production of High Oil, Transgene Free Camelina Sativa Plants through Genome Editing ("Camelina")	Department of Energy	$ 1,997	$ 1,997	$ —	September 2018
Subcontract from Michigan State University project funded by DOE entitled "A Systems Approach to Increasing Carbon Flux to Seed Oil"	Department of Energy	1,212	419	793	September 2019
Total		$ 3,209	$ 2,416	$ 793	

Critical Accounting Estimates and Judgments

Our consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, costs and expenses, and related disclosures. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates.

We believe that our significant accounting policies, which are described in Note 2 to our consolidated financial statements, involve a degree of judgment and complexity. Accordingly, we believe that the specific accounting policies described below are the most critical to aid in fully understanding and evaluating our consolidated financial condition and results of operations.

Grant Revenue

Government research grants currently represent our sole source of revenue. We recognize government grants as revenue because the grants are central to the Company's ongoing crop science program. Revenue is earned as research expenses related to the grants are incurred and revenue earned on government grants, but not yet invoiced as of the balance sheet date, are recorded as unbilled receivables in the accompanying consolidated balance sheets for the years ended December 31, 2018 and December 31, 2017. Funds received from government grants in advance of work being performed are recorded as deferred revenue until earned.

Stock-Based Compensation

The accounting standards for stock-based compensation require that all stock-based awards be recognized as an expense in the consolidated financial statements and that such expense be measured based on the fair value of the award.

Determining the appropriate fair value model and calculating the fair value of stock-based payment awards requires the use of highly subjective assumptions, including the expected life of the stock-based payment awards and stock price volatility. We use the Black-Scholes option-pricing model to value our service-based option grants and to determine the related compensation expense. Generally, we recognize the fair value of stock awards evenly over their vesting periods provided the individual receiving the award meets continuing service conditions. The assumptions used in calculating the fair value of stock-based awards represent management's best estimates, but the estimates involve inherent uncertainties and the application of management judgment. See Note 10 to the consolidated financial statements for further discussion on the key assumptions used to determine the fair values of option grants pursuant to the Black-Scholes option pricing model.

Comparison of the Years Ended December 31, 2018 and 2017

Revenue

	Year ended December 31,		
	2018	**2017**	**Change**
Grant revenue	$ 556	$ 944	$ (388)

Total revenue was $556 and $944 for the years ended December 31, 2018 and 2017, respectively, and was derived solely from our research grants. Grant revenue for the year ended December 31, 2018 was primarily earned from the Company's sub-award with Michigan State University. During the year ended December 31, 2017, grant revenue primarily consisted of $913 in grant revenue earned from the DOE Camelina grant.

We anticipate that grant revenue will increase over the next twelve months as we dedicate greater resources to our DOE sub-award with Michigan State University.

Expenses

	Year ended December 31,		
	2018	**2017**	**Change**
Research and development expenses	$ 4,759	$ 4,597	$ 162
General and administrative expenses	5,071	5,630	(559)
Total expenses	$ 9,830	$ 10,227	$ (397)

Research and Development Expenses

Research and development expenses were fairly consistent at $4,759 and $4,597 for the years ended December 31, 2018 and 2017, respectively. The four percent increase of $162 was primarily due to a $106 net increase in employee compensation and benefits and a $103 increase in our research consulting and third-party analytical expenses. These increases were partially offset by an $46 decrease in sponsored research fees. The increase in employee compensation and benefits was primarily the result of hiring additional research personnel, partially offset by our elimination of the 2018 accrual for employee bonuses. Our increase in research consulting expense was primarily the result of payments we made to

our Scientific Advisory Board and for third-party bioinformatics support. Sponsored research expense decreased during 2018 compared to 2017 as a result of the discontinuation in research services performed for us by North Carolina State University as a subcontractor under our DOE Camelina grant that ended in 2017.

Based on our current financial forecasts, we expect research and development expenses during 2019 will remain at a level consistent with 2018 provided that we are able to raise additional funds to support our ongoing operations. Our forecasts related to research and development expenses are subject to significant change as events and opportunities occur during 2019 that could result in modifications to our business plans.

General and Administrative Expenses

General and administrative expenses were $5,071 and $5,630 for the fiscal years ended December 31, 2018 and December 31, 2017, respectively. The decrease of $559 was primarily due to reductions in employee compensation and related benefits expenses and professional fees, partially offset by increases in licensing and facility related charges. General and administrative employee compensation and benefits decreased by $515 from $2,483 during the year ended December 31, 2017 to $1,968 during the year ended December 31, 2018. The decrease stems from our elimination of the 2018 accrual for employee bonuses and lower stock compensation expense recorded during 2018. Professional fees decreased by $151 during the year ended December 31, 2018 in comparison to the previous year as a result of lower general legal and accounting fees. Licensing fees increased by $140 during the year ended December 31, 2018, primarily as a result of our signing a research license agreement with the University of Missouri for certain gene technologies. Facility related expenses increased during the year ended December 31, 2018 due to our recording a lease impairment charge of $249 for the Lowell, Massachusetts facility.

We expect our general and administrative expenses during 2019 will remain at a level consistent with 2018 provided that we are able to raise additional funds to support our ongoing operations. Our forecasts related to general and administrative expenses are subject to significant change as events and opportunities occur during 2019 that could result in modifications to our business plans.

Other Income (Expense), net

	Year ended December 31,		
	2018	2017	Change
Total other income (expense), net	$ 104	$ (113)	$ 217

Other income (expense), net, reflects net income of $104 and net expense of $113 for the years ended December 31, 2018 and December 31, 2017, respectively. Net income during 2018 is primarily the result of $158 of investment income earned from the Company's short-term investments and higher average cash balances held during the year partially offset by imputed interest charges related to the Company's lease obligations and final installment payments made in connection with the early termination of a third-party manufacturing agreement that ended during 2016. Other expense, net, of $113 during 2017 is primarily due to the imputed interest charges referred to above.

Deemed Dividend on Series A Convertible Preferred Stock Issuance

During December 2017, the Company closed on a public offering of securities that included 4,667,000 Class A Units, priced at a public offering price of $2.25 per unit, with each unit consisting of one share of common stock, a Series A five-year warrant to purchase one share of common stock at an exercise price of $2.25 per share, and a Series B nine-month warrant to purchase 0.5 share of common stock at an exercise price of $2.25 per share, and 3,987 Class B Units, priced at a public offering price of $1,000 per unit, with each unit consisting of one share of preferred stock convertible to 445 shares of common stock at a conversion price of $2.25 per common share, Series A five-year warrants to purchase 445 shares of common stock at an exercise price of $2.25 per share, and Series B nine-month warrants to purchase 223 shares of common stock with an exercise price of $2.25 per share. Proceeds received from the offering were allocated to the various elements of the offering based on their relative fair values. The Series A Convertible Preferred Stock was valued on an as-if-converted basis based on the underlying common stock. The Series A and Series B warrants were valued using the Black-Scholes model.

After allocation of the proceeds, the effective conversion price of the Series A Convertible Preferred Stock was determined to be beneficial and, as a result, the Company recorded a non-cash deemed dividend of approximately $1,427

equal to the intrinsic value of the beneficial conversion feature. The Series A Convertible Preferred Stock was considered a participating security. In accordance with applicable accounting guidance, the Company's net loss of $9,396 from continuing operations for the year ended December 31, 2017 was increased by the amount of the deemed dividend from the beneficial conversion feature, resulting in a net loss attributable to common shareholders of $10,823, or $3.29 per common share.

As of March 31, 2018, preferred shareholders had converted all 3,987 of the preferred shares into an aggregate of 1,772,000 shares of common stock.

Liquidity and Capital Resources

Currently, we require cash to fund our working capital needs, to purchase capital assets, to pay our operating lease obligations and other operating costs. The primary sources of our liquidity have historically included equity financings, government research grants and income earned on cash and short-term investments.

Since our inception, we have incurred significant expenses related to our research, development and commercialization efforts. With the exception of 2012, when we recognized $38,885 of deferred revenue from a terminated joint venture, we have recorded losses since the Company's initial founding, including our fiscal year ended December 31, 2018. As of December 31, 2018, we had an accumulated deficit of $351,923. Our total unrestricted cash, cash equivalents and short-term investments as of December 31, 2018, were $5,769 as compared to $14,487 at December 31, 2017. As of December 31, 2018, we had no outstanding debt.

Our cash, cash equivalents and short-term investments at December 31, 2018, were held for working capital purposes. As of December 31, 2018, we had restricted cash of $332 which consisted of $307 held in connection with the lease agreement for our Woburn, Massachusetts facility and $25 held in connection with our corporate credit card used for small and incidental purchases.

Investments are made in accordance with our corporate investment policy, as approved by our Board of Directors. The primary objective of this policy is to preserve principal and investments are limited to high quality corporate debt, U.S. Treasury bills and notes, money market funds, bank debt obligations, municipal debt obligations and asset-backed securities. The policy establishes maturity limits, concentration limits, and liquidity requirements. As of December 31, 2018, we were in compliance with this policy.

We currently anticipate $9,000 - $9,500 of cash usage during 2019 to fund our operations. In March 2019 we closed on a registered direct offering of our common stock, raising $2.6 million, net of offering costs. We estimate that our current cash resources, including funds raised in the March offering, will be sufficient to fund operations and meet our obligations, when due, into the fourth quarter of 2019. This forecast of cash resources is forward-looking information that involves risks and uncertainties, and the actual amount of expenses could vary materially and adversely as a result of a number of factors. We follow the guidance of Accounting Standards Codification ("ASC") Topic 205-40, *Presentation of Financial Statements-Going Concern,* in order to determine whether there is substantial doubt about the Company's ability to continue as a going concern for one year after the date our financial statements are issued. The Company's ability to continue operations after its current cash resources are exhausted depends on its ability to obtain additional financing through, among other sources, public or private equity financing, secured or unsecured debt financing, equity or debt bridge financing, additional government research grants or collaborative arrangements with third parties, as to which no assurances can be given. We do not know whether additional financing will be available on terms favorable or acceptable to the Company when needed, if at all. If adequate additional funds are not available when required, we will be forced to curtail our research efforts, explore strategic alternatives and/or wind down our operations and pursue options for liquidating our remaining assets, including intellectual property and equipment. Based on our cash forecast, we have determined that the Company's present capital resources are not sufficient to fund our planned operations for a twelve-month period ending in March 2020, and therefore, raise substantial doubt about our ability to continue as a going concern.

If we issue equity or debt securities to raise additional funds, (i) the Company may incur fees associated with such issuance, (ii) our existing stockholders will experience dilution from the issuance of new equity securities, (iii) the Company may incur ongoing interest expense and be required to grant a security interest in Company assets in connection with any debt issuance, and (iv) the new equity or debt securities may have rights, preferences and privileges senior to those of our existing stockholders. In addition, utilization of our net operating loss and research and development credit carryforwards may be subject to significant annual limitations under Section 382 of the Internal Revenue Code of 1986 due to ownership changes resulting from future equity financing transactions. If we raise additional funds through collaboration, licensing or other similar arrangements, it may be necessary to relinquish valuable rights to our potential products or proprietary technologies or grant licenses on terms that are not favorable to the Company.

Net cash used in operating activities was $8,754 during the year ended December 31, 2018, compared to net cash used by operating activities during 2017 of $8,202. Net cash used by operations during the year ended December 31, 2018 primarily reflects the net loss of $9,170, payment of 2017 employee bonuses of approximately $529 and payment of final obligations totaling $500 related to the Company's strategic restructuring initiated during 2016, partially offset by non-cash expenses, including stock-based compensation expense of $1,181, depreciation expense of $196, a 401(k) stock matching contribution expense of $102 and a facility lease impairment charge of $249.

Net cash of $2,788 was used in investing activities during the year ended December 31, 2018, compared to net cash used in investing activities during 2017 of $6. During the year ended December 31, 2018, the Company purchased $11,496 in short-term investments, including U.S. Treasury notes and federal agency bonds. Also, during 2018, $8,750 of short-term investments matured and converted to cash.

Net cash of $118 was provided by financing activities during the year ended December 31, 2018, compared to net cash provided by financing activities of $15,272 during the year ended December 31, 2017. During 2017, we completed a registered direct offering of our securities, receiving cash proceeds from the transaction of $1,966, net of issuance costs of $317. Also, during 2017, we completed a public offering of our securities, receiving cash proceeds of $13,097, net of issuance costs of $1,392. During the years ended December 31, 2018 and December 31, 2017, the Company paid taxes of $6 and $12, respectively, related to our net settlement of employee vested stock awards. These taxes include payment of minimum federal, state or Canadian provincial income tax withholdings associated with employee restricted stock units (RSUs) that vested during each year. As RSUs vest, we withhold a number of shares with an aggregate fair market value equal to the minimum tax withholding amount from the common stock issuable at the vest date.

Off-Balance Sheet Arrangements

As of December 31, 2018, we had no off-balance sheet arrangements as defined in Item 303(a)(4) of the Securities and Exchange Commission's Regulation S-K.

Related Party Transactions

The Company did not engage in any transactions during the years ended December 31, 2018 and December 31, 2017 that qualify as related party transactions.

Recent Accounting Standards Changes

For a discussion of recent accounting standards please read Note 2, Summary of Significant Accounting Policies, to our consolidated financial statements included in this report.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURE ABOUT MARKET RISK

Not applicable.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The consolidated financial statements and related financial statement schedules required to be filed are indexed on page F-1 and are incorporated herein.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Effectiveness of Disclosure Controls and Procedures

As of the end of the period covered by this Annual Report on Form 10-K, under the supervision of our Chief Executive Officer and our Chief Accounting Officer, we evaluated the effectiveness of our disclosure controls and procedures, as such term is defined in Rule 13a-15(e) and Rule 15d-15(e) under the Exchange Act. Based on this evaluation, our Chief Executive Officer and our Chief Accounting Officer concluded that as of December 31, 2018 our disclosure controls and procedures were effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act (1) is recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and forms, and (2) is accumulated and communicated to our management, including our Chief Executive Officer and our Chief Accounting Officer, as appropriate to allow timely decisions regarding required disclosure. Our disclosure controls and procedures include components of our internal control over financial reporting. Management's assessment of the effectiveness of our internal control over financial reporting is expressed at the level of reasonable assurance because a control system, no matter how well designed and operated, can provide only reasonable, but not absolute, assurance that the control system's objectives will be met.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act, as amended. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Our internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets; (ii) provide reasonable assurance that transactions are recorded to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are made only in accordance with authorizations of our management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on its assessment of internal control over financial reporting, management has concluded that, as of December 31, 2018, our internal control over financial reporting was effective to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.

Changes in Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) of the Exchange Act that occurred during our last fiscal quarter in the period covered by this Annual Report on Form 10-K that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

Pursuant to General Instruction G to Form 10-K, the information required for Part III, Items 10, 11, 12, 13 and 14, is incorporated herein by reference from the Company's proxy statement for the Annual Meeting of Stockholders to be held on May 22, 2019, which is expected to be filed not later than 120 days after the fiscal year end covered by this Form 10-K.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) The following documents are filed as part of this Report:

(1) **Financial Statements**

See Index to Financial Statements on page F-1.

(2) **Supplemental Schedules**

All schedules have been omitted because the required information is not present in amounts sufficient to require submission of the schedule, or because the required information is included in the consolidated financial statements or notes thereto.

(3) **Exhibits**

See Item 15(b) below.

(b) The following exhibits are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K:

Exhibit Number		Description
2.1	(11)	Purchase Agreement between Metabolix, Inc. and CJ Research Center LLC, dated September 16, 2016.
3.1	(16)	Amended and Restated Certificate of Incorporation, as amended, of the Registrant.
3.2	(12)	Amended and Restated By-laws of the Registrant.
4.1	(1)	Specimen Stock Certificate for shares of the Registrant's Common Stock.
4.1.1	(14)	Form of Investor Warrant to Purchase Common Stock
4.2	(15)	Form of Series A Common Warrant to purchase shares of Common Stock
10.1	†(1)	2006 Stock Option and Incentive Plan.
10.1.1	†(1)	2006 Stock Option and Incentive Plan, Form of Incentive Stock Option Agreement.
10.1.2	†(1)	2006 Stock Option and Incentive Plan, Form of Non-Qualified Stock Option Agreement.
10.1.3	†(1)	2006 Stock Option and Incentive Plan, Form of Director Non-Qualified Stock Option Agreement.
10.2	†(6)	2014 Stock Option and Incentive Plan, Revised and Restated.
10.2.1	†(7)	2014 Stock Option and Incentive Plan, Form of Incentive Stock Option Award.
10.2.2	†(7)	2014 Stock Option and Incentive Plan, Form of Non-Qualified Stock Option Award.

10.2.3	†(7)	2014 Stock Option and Incentive Plan, Form of Restricted Stock Unit Award.
10.2.4	†(16)	2018 Stock Option and Incentive Plan.
10.2.5	†*	2018 Stock Option and Incentive Plan, Form of Stock Option Agreement.
10.3	†(13)	Employment Agreement between the Company and Oliver P. Peoples dated March 28, 2017.
10.4	†(13)	Employment Agreement between the Company and Charles B. Haaser dated March 28, 2017.
10.5	†(13)	Employment Agreement between the Company and Lynne H. Brum dated March 28, 2017.
10.6	†(13)	Employment Agreement between the Company and Kristi Snell dated March 28, 2017.
10.7	†(13)	Noncompetition, Confidentiality and Inventions Agreement between the Company and each of Oliver Peoples, Charles Haaser, Lynne H. Brum and Kristi Snell, dated March 28, 2017.
10.8	†(1)	Form of Indemnification Agreement between the Registrant and its Directors and Officers.
10.9	†(5)	Non-Qualified Stock Option Agreement between the Company and Joseph Shaulson dated December 19, 2013.
10.10	†(5)	Restricted Stock Unit Award Agreement between the Registrant and Joseph Shaulson dated March 24, 2014.
10.11	†(4)	Employment Agreement between the Company and Joseph Shaulson dated December 19, 2013.
10.12	†(13)	Separation Agreement between the Company and Joseph Shaulson, dated as of November 3, 2016.
10.13	(2)	Lease between Fortune Wakefield, LLC and Metabolix, Inc. dated March 30, 2007.
10.13.1	(3)	First Amendment of Lease between Fortune Wakefield, LLC and Metabolix, Inc. dated February 29, 2012.
10.13.2	(4)	Second Amendment of Lease between Fortune Wakefield, LLC and Metabolix, Inc. dated October 24, 2013.
10.14	(8)	Securities Purchase Agreement dated June 15, 2015 between the Company and the Investors named therein.
10.15	(8)	Standstill Agreement dated June 19, 2015 between the Company and Jack W. Schuler, Renate Schuler and the Schuler Family Foundation.
10.16	(10)	Lease Agreement between the Company and ARE MA Region No. 20, LLC dated January 20, 2016 for the premises located at 19 Presidential Way, Woburn, MA.
10.17	(9)	Common Stock Purchase Agreement, dated October 7, 2015 between Metabolix, Inc. and Aspire Capital Fund, LLC.
10.18	@(13)	Exclusive License Agreement, dated as of June 30, 2015, between the Company and the University of Massachusetts.
10.19	(13)	Sublease between CJ Research Center LLC and the Company, dated as of September 16, 2016.
10.20	(14)	Form of Securities Purchase Agreement dated July 3, 2017 between the Company and the Purchasers named therein.

10.21	@(16)	Exclusive License Agreement, dated May 17, 2018, between the Company and the University of Missouri.
14.1	*	Yield10 Bioscience, Inc. Code of Business Conduct and Ethics.
21.1	*	Subsidiaries of the Registrant.
23.1	*	Consent of RSM US LLP, an independent registered public accounting firm.
31.1	*	Certification Pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934.
31.2	*	Certification Pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934.
32.1	*	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.1	*	The following financial information from the Yield10 Bioscience, Inc. Annual Report on Form 10-K for the year ended December 31, 2018 formatted in XBRL; (i) Consolidated Balance Sheets, December 31, 2018 and December 31, 2017; (ii) Consolidated Statements of Operations, Years Ended December 31, 2018 and 2017; (iii) Consolidated Statements of Comprehensive Income (Loss), Years Ended December 31, 2018 and 2017; (iv) Consolidated Statements of Cash Flows, Years Ended December 31, 2018 and 2017; (v) Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 2018 and 2017; and (vi) Notes to Consolidated Financial Statements.
101.INS	*	XBRL Instance Document.
101.SCH	*	XBRL Taxonomy Extension Schema.
101.CAL	*	XBRL Taxonomy Extension Calculation Linkbase.
101.DEF	*	XBRL Taxonomy Extension Definition Linkbase.
101.LAB	*	XBRL Taxonomy Extension Label Linkbase.
101.PRE	*	XBRL Taxonomy Extension Presentation Linkbase.

† Indicates a management contract or any compensatory plan, contract or arrangement.

* Filed herewith

@ Confidential treatment has been granted for certain portions of this document.

(1) Incorporated by reference herein to the exhibits to the Company's Registration Statement on Form S-1 (File No. 333-135760)

(2) Incorporated by reference herein to the exhibits to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2007 (File No. 001-33133)

(3) Incorporated by reference herein to the exhibits to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012 (File No. 001-33133)

(4) Incorporated by reference herein to the exhibits to the Company's 2013 Annual Report on Form 10-K filed March 28, 2014 (File No. 001-33133)

(5) Incorporated by reference herein to the exhibits to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 (File No. 001-33133)

(6) Incorporated herein by reference herein to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2015 (File No. 001-33133)

(7) Incorporated by reference herein to the exhibits to the Company's 2014 Annual Report on Form 10-K filed March 25, 2015 (File No. 001-33133)

(8) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on June 17, 2015 (File No. 001-33133)

(9) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on October 7, 2015 (File No. 001-33133)

(10) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on January 26, 2016 (File No. 001-33133)

(11) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on September 21, 2016 (File No. 001-33133)

(12) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on January 6, 2017 (File No. 001-33133)

(13) Incorporated by reference herein to the exhibits to the Company's Annual Report on Form 10-K filed March 30, 2017 (File No. 001-33133)

(14) Incorporated by reference herein to the exhibits to the Company's Report on Form 8-K filed on July 5, 2017 (File No. 001-33133)

(15) Incorporated by reference herein to the exhibits to the Company's Registration Statement on Form S-1/A filed December 15, 2017 (File No. 333-221283)

(16) Incorporated by reference herein to the exhibits to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2018 (File No. 001-33133)

ITEM 16. FORM 10-K SUMMARY

Registrants may voluntarily include a summary of information required by Form 10-K under this Item 16. We have elected not to include such summary.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

YIELD10 BIOSCIENCE, INC.

March 28, 2019 By: /s/ OLIVER P. PEOPLES

Oliver P. Peoples, Ph.D.
President and Chief Executive Officer
(Principal Executive Officer)

POWER OF ATTORNEY

Each person whose signature appears below constitutes and appoints Oliver P. Peoples, Charles B. Haaser, and Lynne H. Brum, jointly and severally, his or her attorney-in-fact, with the power of substitution, for him or her in any and all capacities, to sign any amendments to this Annual Report on Form 10-K and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his or her substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Name	Title	Date
/s/ OLIVER P. PEOPLES Oliver P. Peoples, Ph.D.	President and Chief Executive Officer and Director (Principal Executive Officer)	March 28, 2019
/s/ CHARLES B. HAASER Charles B. Haaser	Vice President, Finance, and Chief Accounting Officer (Principal Financial and Accounting Officer)	March 28, 2019
/s/ PETER N. KELLOGG Peter N. Kellogg	Director	March 28, 2019
/s/ RICHARD W. HAMILTON Richard W. Hamilton, Ph.D.	Director	March 28, 2019
/s/ JOSEPH SHAULSON Joseph Shaulson	Director	March 28, 2019
/s/ ANTHONY J. SINSKEY Anthony J. Sinskey, Sc.D.	Director	March 28, 2019
/s/ ROBERT L. VAN NOSTRAND Robert L. Van Nostrand	Chairman	March 28, 2019

YIELD10 BIOSCIENCE, INC.
Index to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Yield10 Bioscience, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Yield10 Bioscience, Inc. and its subsidiaries (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the years then ended, and the related notes to the consolidated financial statements (collectively, the financial statements). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Going Concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1, the Company has suffered recurring losses from operations and has diminishing capital resources, which raises substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis of Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ RSM US LLP

We have served as the Company's auditor since 2017.

Boston, Massachusetts
March 28, 2019

YIELD10 BIOSCIENCE, INC.
(formerly known as Metabolix, Inc.)

CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share amounts)

	December 31, 2018	December 31, 2017
Assets		
Current Assets:		
Cash and cash equivalents	$ 3,023	$ 14,487
Short-term investments	2,746	—
Accounts receivable	94	54
Unbilled receivables	66	65
Prepaid expenses and other current assets	448	311
Total current assets	6,377	14,917
Restricted cash	332	317
Property and equipment, net	1,385	1,539
Other assets	100	109
Total assets	$ 8,194	$ 16,882
Liabilities and Stockholders' Equity		
Current Liabilities:		
Accounts payable	$ 117	$ 76
Accrued expenses	1,429	2,299
Total current liabilities	1,546	2,375
Other liabilities, net of current portion	935	1,005
Total liabilities	2,481	3,380
Commitments and contingencies (Note 7)		
Stockholders' Equity:		
Series A Convertible Preferred Stock ($0.01 par value per share); 5,000,000 authorized at December 31, 2018 and 2017, respectively; 0 and 1,826 shares issued and outstanding at December 31, 2018 and 2017, respectively	—	818
Common stock ($0.01 par value per share); 60,000,000 shares and 40,000,000 shares authorized at December 31, 2018 and 2017, respectively; 10,025,811 and 9,089,159 shares issued and outstanding at December 31, 2018 and 2017, respectively	100	91
Additional paid-in capital	357,646	355,431
Accumulated other comprehensive loss	(110)	(85)
Accumulated deficit	(351,923)	(342,753)
Total stockholders' equity	5,713	13,502
Total liabilities and stockholders' equity	$ 8,194	$ 16,882

The accompanying notes are an integral part of these consolidated financial statements.

YIELD10 BIOSCIENCE, INC.
(formerly known as Metabolix, Inc.)

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except share and per share amounts)

	Years Ended December 31,	
	2018	**2017**
Revenue:		
Grant revenue	$ 556	$ 944
Total revenue	556	944
Expenses:		
Research and development	4,759	4,597
General and administrative	5,071	5,630
Total expenses	9,830	10,227
Loss from operations	(9,274)	(9,283)
Other income (expense), net	104	(113)
Net loss	$ (9,170)	$ (9,396)
Loss attributable to common shareholders and loss per common share:		
Net loss	$ (9,170)	$ (9,396)
Deemed dividend on Series A Convertible Preferred Stock issuance	—	(1,427)
Net loss applicable to common shareholders	$ (9,170)	$ (10,823)
Basic and Diluted net loss per share	$ (0.92)	$ (3.29)
Number of shares used in per share calculations:		
Basic & Diluted	9,932,487	3,288,618

The accompanying notes are an integral part of these consolidated financial statements.

YIELD10 BIOSCIENCE, INC.
(formerly known as Metabolix, Inc.)

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

(In thousands)

	Years Ended December 31,	
	2018	**2017**
Net loss	$ (9,170)	$ (9,396)
Other comprehensive income (loss):		
Change in foreign currency translation adjustment	(25)	(1)
Total other comprehensive loss	(25)	(1)
Comprehensive loss	$ (9,195)	$ (9,397)

The accompanying notes are an integral part of these consolidated financial statements.

YIELD10 BIOSCIENCE, INC.
(formerly known as Metabolix, Inc.)

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Years Ended December 31,	
	2018	**2017**
Cash flows from operating activities		
Net loss	$ (9,170)	$ (9,396)
Adjustments to reconcile net loss to cash used in operating activities:		
Depreciation	196	206
Expense for 401(k) company common stock match	102	85
Stock-based compensation	1,181	1,395
Changes in operating assets and liabilities:		
Accounts receivable	(40)	12
Due from related parties	—	1
Unbilled receivables	(1)	56
Prepaid expenses and other assets	(128)	660
Accounts payable	41	17
Accrued expenses	(865)	(622)
Other long-term liabilities	(70)	(616)
Net cash used in operating activities	(8,754)	(8,202)
Cash flows from investing activities		
Purchase of property and equipment	(42)	(6)
Purchase of investments	(11,496)	—
Proceeds from sale and maturity of short-term investments	8,750	—
Net cash used by investing activities	(2,788)	(6)
Cash flows from financing activities		
Proceeds from warrants exercised	124	—
Proceeds from private placement offering, net of issuance costs	—	1,966
Proceeds from public stock offerings, net of issuance costs	—	13,318
Taxes paid on employees' behalf related to vesting of stock awards	(6)	(12)
Net cash provided by financing activities	118	15,272
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(25)	(1)
Net (decrease) increase in cash, cash equivalents and restricted cash	(11,449)	7,063
Cash, cash equivalents and restricted cash at beginning of period	14,804	7,741
Cash, cash equivalents and restricted cash at end of period	$ 3,355	$ 14,804
Supplemental Cash Flow Disclosure:		
Interest paid	$ 50	$ 116
Supplemental Disclosure of Non-cash Information:		
Stock offering costs remaining in accounts payable and accrued expenses	—	$ 221
Deemed dividend related to Series A Convertible Preferred Stock beneficial conversion feature	—	$ 1,427

The accompanying notes are an integral part of these consolidated financial statements

YIELD10 BIOSCIENCE, INC.
(formerly known as Metabolix, Inc.)

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands, except share amounts)

	Series A Convertible Preferred Stock		Common Stock					
	Shares	Par Value	Shares	Par Value	Additional Paid-In Capital	Accumulated other Comprehensive Income (loss)	Accumulated Deficit	Total Stockholders' Equity
Balance, December 31, 2016	—	$ —	2,834,244	$ 28	$ 339,782	$ (84)	$ (333,357)	$ 6,369
Non-cash stock-based compensation expense	—	—	—	—	1,395	—	—	1,395
Issuance of common stock for 401k match	—	—	22,493	—	84	—	—	84
Issuance of stock for restricted stock unit release, net of 2,724 shares withheld for employee taxes (See Note 10)	—	—	34,193	1	(13)	—	—	(12)
Issuance of common stock in connection with registered direct offering, net of offering costs of $317	—	—	570,784	5	1,961	—	—	1,966
Issuance of common stock, preferred stock and warrants in connection with public offering, net of offering costs of $1,392	3,987	1,786	4,667,000	47	11,264	—	—	13,097
Beneficial conversion feature of Series A Convertible Preferred Stock	—	(1,427)	—	—	1,427	—	—	—
Deemed dividend to Series A Convertible Preferred Stockholders	—	1,427	—	—	(1,427)	—	—	—
Issuance of common stock upon conversion of Series A Convertible Preferred Stock	(2,161)	(968)	960,445	10	958	—	—	—
Effect of foreign currency translation	—	—	—	—	—	(1)	—	(1)
Net loss	—	—	—	—	—	—	(9,396)	(9,396)
Balance, December 31, 2017	1,826	$ 818	9,089,159	$ 91	$ 355,431	$ (85)	$ (342,753)	$ 13,502
Non-cash stock-based compensation expense	—	—	—	—	1,181	—	—	1,181
Issuance of common stock for 401k match	—	—	65,594	—	107	—	—	107
Issuance of stock for restricted stock unit release, net of 2,703 shares withheld for employee taxes (see Note 10)	—	—	4,401	—	(6)	—	—	(6)
Issuance of common stock upon conversion of Series A Convertible Preferred Stock	(1,826)	(818)	811,557	8	810	—	—	—
Issuance of common stock in connection upon exercise of Class B Warrants	—	—	55,100	1	123	—	—	124
Effect of foreign currency translation	—	—	—	—	—	(25)	—	(25)
Net loss	—	—	—	—	—	—	(9,170)	(9,170)
Balance, December 31, 2018	—	$ —	10,025,811	$ 100	$ 357,646	$ (110)	$ (351,923)	$ 5,713

The accompanying notes are an integral part of these consolidated financial statements

YIELD10 BIOSCIENCE, INC.
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NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS
(In thousands, except for share and per share amounts)

1. Nature of Business and Basis of Presentation

Yield10 Bioscience, Inc. ("Yield10 Bioscience," "Yield10" or the "Company") is an agricultural bioscience company which uses its "Trait Factory" development process, which is a combination of the Company's unique background and expertise in metabolic modeling, genetic engineering, genome editing and next generation microbial gene systems, in order to develop high value seed traits for the agriculture and food industries. Specifically, Yield10 plans to efficiently develop superior gene traits for the major grain crops, which are; corn, soybean, canola, wheat and rice. The Company considers 10-20 percent increases in crop yield to be step-change increases. Yield10 is currently progressing several novel yield gene traits in its pipeline in canola, soybean and corn, the major North American row crops, among others. Over the last three years, the Company has evaluated certain of its traits in greenhouse studies and field tests conducted in the United States and Canada. Yield10 currently has two non-exclusive research license agreements in place with the Monsanto division of Bayer Crop Science, a division of Bayer AG, for the evaluation of the Company's C3003 and C3004 traits in soybean and with Forage Genetics International, LLC, a division of Land O'Lakes, Inc. for the evaluation of five yield traits in forage sorghum. The Company's business strategy is to progress its traits into field tests to generate validating yield data. Over the last three years, the Company has progressed its evaluation of C3003 in field test with Camelina and canola. Yield10 is planning to expand its field tests with additional traits and more events in 2019 and 2020. The Company plans to leverage data that it generates to support the performance of its traits in key crops to establish collaborations or sign licenses to the traits with major agricultural companies in order to generate revenue. Yield10 Bioscience is headquartered in Woburn, Massachusetts and has an oilseed development Center of Excellence in Saskatoon, Saskatchewan, Canada.

The accompanying consolidated financial statements have been prepared on a basis which assumes that the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the normal course of business. With the exception of a single year, the Company has recorded losses since its initial founding, including its fiscal year ending December 31, 2018.

As of December 31, 2018, the Company held unrestricted cash, cash equivalents and short-term investments of $5,769. In March 2019 the Company closed on a registered direct offering of its common stock, raising $2,607, net of offering costs. The Company follows the guidance of Accounting Standards Codification ("ASC") Topic 205-40, *Presentation of Financial Statements-Going Concern,* in order to determine whether there is substantial doubt about its ability to continue as a going concern for one year after the date its financial statements are issued. Based on its current cash forecast, which includes funds raised from the March 2019 offering, management expects that the Company's present capital resources will be sufficient to fund its planned operations and meet its obligations into the fourth quarter of 2019. This forecast of cash resources is forward-looking information that involves risks and uncertainties, and the actual amount of expenses could vary materially and adversely as a result of a number of factors. The Company's ability to continue operations after its current cash resources are exhausted depends on its ability to obtain additional financing through, among other sources, public or private equity financing, secured or unsecured debt financing, equity or debt bridge financing, warrant holders' ability and willingness to exercise the Company's outstanding warrants, additional government grants or collaborative arrangements with third parties, as to which no assurance can be given. Management does not know whether additional financing will be available on terms favorable or acceptable to the Company when needed, if at all. If adequate additional funds are not available when required, management will be forced to curtail the Company's research efforts, explore strategic alternatives and/or wind down its operations and pursue options for liquidating its remaining assets, including intellectual property and equipment. Based on its cash forecast, management has determined that the Company's present capital resources will not be sufficient to fund its planned operations for the twelve months from the date that these financial statements are issued, which raises substantial doubt about the Company's ability to continue as a going concern.

If the Company issues equity or debt securities to raise additional funds, (i) the Company may incur fees associated with such issuance, (ii) its existing stockholders may experience dilution from the issuance of new equity securities, (iii) the Company may incur ongoing interest expense and be required to grant a security interest in Company assets in connection with any debt issuance, and (iv) the new equity or debt securities may have rights, preferences and privileges senior to those of the Company’s existing stockholders. In addition, utilization of the Company’s net operating loss and research and development credit carryforwards may be subject to significant annual limitations under Section 382 of the Internal Revenue Code of 1986 due to ownership changes resulting from equity financing transactions. If the Company raises additional funds

YIELD10 BIOSCIENCE, INC.
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through collaboration, licensing or other similar arrangements, it may be necessary to relinquish valuable rights to its potential products or proprietary technologies or grant licenses on terms that are not favorable to the Company.

2. Summary of Significant Accounting Policies

Principles of Consolidation

The Company's consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States of America. The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. All intercompany transactions were eliminated, including transactions with its Canadian subsidiary, Metabolix Oilseeds, Inc.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Actual results could differ from those estimates.

Cash, Cash Equivalents and Restricted Cash

The Company considers all highly liquid investments purchased with an original maturity date of ninety days or less at the date of purchase to be cash equivalents.

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the Company's condensed consolidated balance sheets included herein:

	December 31, 2018	December 31, 2017
Cash and cash equivalents	$ 3,023	$ 14,487
Restricted cash	332	317
Total cash, cash equivalents and restricted cash	$ 3,355	$ 14,804

Amounts included in restricted cash represent those required to be set aside by contractual agreement. Restricted cash of $332 at December 31, 2018 and $317 at December 31, 2017 primarily consists of funds held in connection with the Company's lease agreement for its Woburn, Massachusetts facility.

Investments

The Company considers all investments purchased with an original maturity date of ninety days or more at the date of purchase and a maturity date of one year or less at the balance sheet date to be short-term investments. All other investments are classified as long-term. The Company held no long-term investments at December 31, 2018 and no short or long-term investments at December 31, 2017.

Other-than-temporary impairments of equity investments are recognized in the Company's statements of operations if the Company has experienced a credit loss and has the intent to sell the investment or if it is more likely than not that the Company will be required to sell the investment before recovery of the amortized cost basis. Realized gains and losses, dividends, interest income and declines in value judged to be other-than-temporary credit losses are included in other income (expense). Any premium or discount arising at purchase is amortized and/or accreted to interest income.

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Deferred Equity Financing Costs

The Company entered into a common stock purchase agreement in 2015 with Aspire Capital Fund, LLC, (Aspire) under which Aspire committed to purchase up to an aggregate of $20,000 of the Company's common stock over a 30-month period. Offering costs of $622 incurred to establish this agreement were recorded as deferred equity financing costs. During 2017 these deferred offering costs were recognized in full within general and administrative expense when the Aspire agreement ended before any shares of common stock were sold.

Foreign Currency Translation

Foreign denominated assets and liabilities of the Company's wholly-owned foreign subsidiaries are translated into U.S. dollars at the prevailing exchange rates in effect on the balance sheet date. Revenues and expenses are translated at average exchange rates prevailing during the period. Any resulting translation gains or losses are recorded in accumulated other comprehensive income (loss) in the consolidated balance sheet. When the Company dissolves, sells or substantially sells all of the assets of a consolidated foreign subsidiary, the cumulative translation gain or loss of that subsidiary is released from comprehensive income (loss) and included within its consolidated statement of operations during the fiscal period when the dissolution or sale occurs.

Comprehensive Income (Loss)

Comprehensive income (loss) is comprised of net income (loss) and certain changes in stockholders' equity that are excluded from net income (loss). The Company includes unrealized gains and losses on debt securities and foreign currency translation adjustments in other comprehensive income (loss).

Concentration of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk primarily consist of cash and cash equivalents, short-term investments and accounts receivable. The Company has historically invested its cash equivalents in highly rated money market funds, corporate debt, federal agency notes and U.S. treasury notes. Investments are acquired in accordance with the Company's investment policy which establishes a concentration limit per issuer.

The Company's receivables related to government grants are believed to have a low risk of default. At December 31, 2018, the Company's accounts and unbilled receivables of $160 are all due from research grants with the U.S. government under which the Company serves as either the primary contractor or as a subcontractor. At December 31, 2017, the Company's accounts and unbilled receivables of $119 included $104, or 87%, from grants with the U.S. government.

Fair Value Measurements

The carrying amounts of the Company's financial instruments as of December 31, 2018 and December 31, 2017, which include cash equivalents, accounts receivable, unbilled receivables, accounts payable, and accrued expenses, approximate their fair values due to the short-term nature of these instruments. See Note 4 for further discussion on fair value measurements.

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Segment Information

The accounting guidance for segment reporting establishes standards for reporting information on operating segments in annual financial statements. The Company is an agricultural bioscience company operating in one segment, which is the development of new technologies to enable step-change increases in crop yield to enhance global food security. The Company's chief operating decision-maker does not manage any part of the Company separately, and the allocation of resources and assessment of performance are based on the Company's consolidated operating results. As of December 31, 2018, and December 31, 2017, less than 10% of the Company's combined total assets were located outside of the United States. During the year ended December 31, 2018, reported net income (loss) from the Company's wholly-owned subsidiaries located outside of the United States totaled $3,103, primarily as a result of the Company's accounting for the dissolution of its inactive German subsidiary, Metabolix GmbH. During the year ended December 31, 2017, the reported net income (loss) from the Company's foreign subsidiaries was less than 10% of the combined net income (loss) of the consolidated Company.

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation. Repairs and maintenance are charged to operating expense as incurred. Depreciation is computed using the straight-line method over the estimated useful lives of the assets once they are placed in service as follows:

Asset Description	Estimated Useful Life (years)
Equipment	3
Furniture and Fixtures	5
Software	3
Leasehold improvements	Shorter of useful life or term of lease

The Company records incentive payments received from its landlords as a lease incentive obligation and amortizes these amounts as reductions to lease expense over the lease term.

Impairment of Long-Lived Assets

Long-lived assets, such as property and equipment, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Accounting guidance further requires that companies recognize an impairment loss only if the carrying amount of a long-lived asset is not recoverable based on its undiscounted future cash flows and measure an impairment loss as the difference between the carrying amount and fair value of the asset.

Grant Revenue

The Company's source of continuing revenue is from its government research grants in which it serves as either the primary contractor or as a subcontractor. These grants are considered an ongoing major and central operation of the Company's business. Revenue is earned as research expenses related to the grants are incurred. Revenue earned on government grants, but not yet invoiced as of the balance sheet date, are recorded as unbilled receivables in the accompanying consolidated balance sheets for the years ended December 31, 2018 and December 31, 2017. Funds received from government grants in advance of work being performed are recorded as deferred revenue until earned.

Research and Development

All costs associated with internal research and development are expensed as incurred. Research and development expenses include, among others, direct costs for salaries, employee benefits, subcontractors, product trials, facility related expenses, depreciation, and stock-based compensation. Costs incurred in connection with government research grants are recorded as research and development expenses.

YIELD10 BIOSCIENCE, INC.
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(In thousands, except for share and per share amounts)

General and Administrative Expenses

The Company's general and administrative expense includes costs for salaries, employee benefits, facilities expenses, consulting and professional service fees, travel expenses, depreciation expenses and office related expenses incurred to support the administrative operations of the Company.

Intellectual Property Costs

The Company includes all costs associated with the prosecution and maintenance of patents within general and administrative expenses in the consolidated statement of operations.

Stock-Based Compensation

All share-based payments to employees, members of the Board of Directors and non-employees are recognized within operating expense based on the straight-line recognition of their grant date fair value over the period during which the recipient is required to provide service in exchange for the award. See Note 10 for a description of the types of stock-based awards granted, the compensation expense related to such awards and detail of equity-based awards outstanding.

Basic and Diluted Net Loss per Share

Basic net income (loss) per share is computed by dividing net income (loss) available to common shareholders by the weighted-average number of common shares outstanding. Diluted net loss per share is computed by dividing net income available to common shareholders by the weighted-average number of dilutive common shares outstanding during the period. Diluted shares outstanding is calculated by adding to the weighted shares outstanding any potential (unissued) shares of common stock from outstanding stock options and warrants based on the treasury stock method, as well as weighted shares outstanding of any potential (unissued) shares of common stock from restricted stock units. In periods when a net loss is reported, such as the Company's fiscal years ending December 31, 2018 and 2017, all common stock equivalents are excluded from the calculation because they would have an anti-dilutive effect in the calculation of loss per share; meaning the loss per share would be reduced. Therefore, in periods when a loss is reported, there is no difference in basic and dilutive loss per share. Common stock equivalents include stock options, restricted stock awards, convertible preferred stock and warrants.

The Company follows the two-class method when computing net loss per share, when it has issued shares that meet the definition of participating securities. The two-class method determines net income per share for each class of common and participating securities according to dividends declared or accumulated and participating rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based on their respective rights to receive dividends, as if all income for the period has been distributed or losses to be allocated if they are contractually required to fund losses. In periods of net loss, a participating security that does not have a contractual obligation to share in the loss is not allocated a portion of the net loss when determining loss per share under the two-class method. During 2017, the Company completed an offering of its securities that included preferred shares meeting the definition of participating securities (See Note 9). However, due to the Company's net loss in 2017, no allocation of the net loss was allocated to the preferred shares as the holders of the preferred shares do not have a contractual obligation to fund losses and loss per share has been computed and presented based on the loss being fully assigned to the Company's weighted average outstanding common shares during the year. There were no amounts allocated to participating securities during the year ended December 31, 2018, as the Company had no outstanding securities that met the definition of participating securities.

The number of shares of potentially dilutive common stock presented on a weighted average basis, related to options, restricted stock units, convertible preferred stock and warrants (prior to consideration of the treasury stock method) that were excluded from the calculation of dilutive shares since the inclusion of such shares would be anti-dilutive for the years ended December 31, 2018 and 2017, respectively, are shown below:

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	Year Ended December 31,	
	2018	2017
Options	1,294,180	622,329
Restricted stock awards	8,866	16,165
Series A Convertible Preferred Stock	—	30,553
Warrants	7,433,084	943,749
Total	8,736,130	1,612,796

Income Taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in the consolidated financial statements or in the Company's tax returns. Under this method, deferred tax assets and liabilities are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. A valuation allowance is provided to reduce the deferred tax asset to a level which, more likely than not, will be realized.

In December 2017, the Tax Cuts and Jobs Act, or the Tax Act ("TCJA"), was signed into law. Among other things, the Tax Act permanently lowered the corporate federal income tax rate to 21% effective for tax years including or commencing January 1, 2018. As a result of the reduction of the corporate federal income tax rate, GAAP requires companies to revalue their deferred tax assets and deferred tax liabilities as of the date of enactment, with the resulting tax effects accounted for in the reporting period of enactment. Due to its ongoing tax losses and 100% valuation allowance assigned to its deferred tax assets, the enactment of TCJA was immaterial to the Company's financial statements.

The Company accounts for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. The evaluation of uncertain tax positions is based on factors that include, but are not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, new audit activity and changes in facts or circumstances related to a tax position. The provision for income taxes includes the effects of any resulting tax reserves or unrecognized tax benefits that are considered appropriate as well as the related net interest and penalties, if any. The Company evaluates uncertain tax positions on a quarterly basis and adjusts the level of the liability to reflect any subsequent changes in the relevant facts surrounding the uncertain positions.

See Note 11 for further discussion of income taxes. The Company had no amounts recorded for any unrecognized tax benefits as of December 31, 2018 and 2017.

Restructuring Charges

The Company records estimated restructuring charges for employee severance and contract termination costs as a current period expense as those costs become contractually fixed, probable and estimable. Obligations associated with these charges are reduced or adjusted as payments are made or the Company's estimates are revised.

Recent Accounting Standards Changes

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board ("FASB") or other standard setting bodies that the Company adopts as of the specified effective date.

In May 2014, the FASB issued ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606).* The ASU is the result of a joint project by the FASB and the International Accounting Standards Board ("IASB") to clarify the principles for recognizing revenue and to develop a common revenue standard for GAAP and International Financial Reporting Standards ("IFRS") that would: remove inconsistencies and weaknesses in the treatment of this area between GAAP and IFRS, provide a more robust framework for addressing revenue issues, improve comparability of revenue recognition

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practices across entities, jurisdictions, industries, and capital markets, improve disclosure requirements and resulting financial statements, and simplify the presentation of financial statements. The core principle of the new guidance is that an entity should recognize revenue to depict the transfer of promised goods or services in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. The Company adopted the new standard effective January 1, 2018 using the modified retrospective method and determined that its grant revenue, which is its sole source of revenue, does not fall within the guidance of the new standard. The Company will review future customer revenue agreements against the guidance provided by ASU No. 2014-09 to ensure that revenue is recorded appropriately.

In January 2016 the FASB issued ASU No. 2016-01, *Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*. This new standard amended certain aspects of accounting and disclosure requirements for financial instruments, including the requirement that equity investments with readily determinable fair values are to be measured at fair value with any changes in fair value recognized in a company's statements of operations. Prior to adoption of ASU 2016-01, companies recognized changes in fair value in accumulated other comprehensive income (loss), net. Equity investments that do not have readily determinable fair values may be measured at fair value or at cost minus impairment adjusted for changes in observable prices. In addition, a valuation allowance should be evaluated on deferred tax assets related to available-for-sale debt securities in combination with other deferred tax assets. The Company adopted this new standard on January 1, 2018, using the modified retrospective method, and determined that it did not have a material impact on its financial statements.

In August 2016, the FASB issued ASU No. 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments*. The new standard clarifies certain aspects of the statement of cash flows, including the classification of debt prepayment or debt extinguishment costs, settlement of zero-coupon debt instruments or other debt instruments with coupon interest rates that are insignificant in relation to the effective interest rate of the borrowing, contingent consideration payments made after a business combination, proceeds from the settlement of insurance claims, proceeds from the settlement of corporate-owned life insurance policies, distributions received from equity method investees and beneficial interests in securitization transactions. The new standard also clarifies that an entity should determine each separately identifiable source or use within the cash receipts and cash payments on the basis of the nature of the underlying cash flows. In situations in which cash receipts and payments have aspects of more than one class of cash flows and cannot be separated by source or use, the appropriate classification should depend on the activity that is likely to be the predominant source or use of cash flows for the item. The Company adopted this new standard on January 1, 2018 and determined that it did not have a material impact on its financial statements.

In October 2016, the FASB issued ASU No. 2016-16, *Income Taxes (Topic 740): Intra-Entity Transfer of Assets Other Than Inventory*. This new standard eliminates the deferral of the tax effects of intra-entity asset transfers other than inventory. As a result, the income tax consequences from the intra-entity transfer of an asset other than inventory and associated changes to deferred taxes will be recognized when the transfer occurs. The Company adopted this new standard on January 1, 2018 and determined that it did not have a material impact on its financial statements.

In November 2016, the FASB issued ASU 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash* ("ASU 2016-18"). The new standard provides uniform guidance for the classification and presentation of changes in restricted cash on the statement of cash flows under Topic 230, *Statement of Cash Flows*. ASU 2016-18 requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash. Therefore, amounts included in restricted cash should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 was effective for the Company for its fiscal year beginning January 1, 2018, including interim periods, and requires a retrospective presentation of each period presented. As a result, the Company's consolidated statement of cash flows for the fiscal years ended December 31, 2018 and December 31, 2017 have been prepared in accordance with the new requirements of ASU 2016-18.

In July 2018, the FASB issued ASU 2018-07, *Stock-based Compensation: Improvements to Nonemployee Share-based Payment Accounting*, which amends the existing accounting standards for share-based payments to nonemployees. ASU 2018-07 aligns much of the guidance on measuring and classifying nonemployee awards with that of awards to employees. Under the new guidance, the measurement of nonemployee equity awards is fixed on the grant date. Entities are required to apply ASU 2018-07 by recognizing a cumulative effect adjustment to retained earnings as of the beginning of the

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annual period of adoption. The ASU becomes effective during the first quarter of 2019 with early adoption permitted. The Company adopted ASU 2018-07 on July 1, 2018 and determined that it did not have a material impact on its financial statements.

New pronouncements that are not yet effective but may impact the Company's financial statements in the future are described below.

In February 2016, the FASB issued ASU No. 2016-02, *Leases* ("ASU 2016-02"). ASU 2016-02 will require lessees to recognize most leases on their balance sheet as right-of-use assets and lease liabilities. Leases will be classified as either operating or finance leases, and classification will be based on criteria similar to current lease accounting, but without explicit bright lines. In July 2018, the FASB issued ASU No. 2018-10, "*Codification Improvements to Topic 842, Leases*" ("ASU 2018-10"), which provides narrow amendments to clarify how to apply certain aspects of the new lease standard, and ASU No. 2018-11, "*Leases (Topic 842 - Targeted Improvements"* ("ASU 2018-11"), which addresses implementation issues related to the new lease standard. The new guidance is effective for annual reporting periods beginning after December 15, 2018 and interim periods within those fiscal years, and early adoption is permitted. Under this standard, disclosures are required to enable users of financial statements to better assess the amount, timing, and uncertainty of cash flows arising from leases. The standard permits two transition methods; (1) to apply the new lease requirements at the beginning of the earliest period presented, or (2) to apply the new lease requirements at the effective date. Under both methods, there is a cumulative effect adjustment.

The Company will adopt the new standard effective January 1, 2019 by applying new requirements to the earliest financial period presented. The Company will elect the package of practical expedients permitted under the transition guidance within the new standard, which, among other things, allows the carry forward of the historical lease classification for leases that are within the scope of the standard. The Company is currently evaluating the potential changes from this ASU to future financial reporting and disclosures and is designing and implementing related processes and internal controls. The Company expects the standard to have a material impact by increasing assets by approximately $5 million and increasing liabilities by approximately $7 million for the recognition of right-of-use assets and lease liabilities, which are primarily related to the lease of the Company's corporate headquarters in Woburn, Massachusetts. The Company does not expect the standard to have a material impact on its results of operations or liquidity.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. The new standard changes the impairment model for most financial assets and certain other instruments. Under the new standard, entities holding financial assets and net investment in leases that are not accounted for at fair value through net income are to be presented at the net amount expected to be collected. An allowance for credit losses will be a valuation account that will be deducted from the amortized cost basis of the financial asset to present the net carrying value at the amount expected to be collected on the financial asset. The new standard will be effective for the Company on January 1, 2020. The Company is in the process of evaluating the impact of this new guidance.

3. INVESTMENTS

The Company's investments consist of the following:

	Accumulated Cost at December 31, 2018	Unrealized Gain	Unrealized (Loss)	Market Value at December 31, 2018
Short-term investments				
Government securities	$ 2,746	$ —	$ —	$ 2,746
Total	$ 2,746	$ —	$ —	$ 2,746

The Company did not own any investments at December 31, 2017.

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4. Fair Value Measurements

The Company has certain financial assets recorded at fair value which have been classified as Level 1 within the fair value hierarchy as described in the accounting standards for fair value measurements. Fair value is the price that would be received from the sale of an asset or the price paid to transfer a liability in an orderly transaction between independent market participants at the measurement date. Fair values determined by Level 1 inputs utilize observable data such as quoted prices in active markets for identical instruments. Fair values determined by Level 2 inputs utilize data points other than quoted prices in active markets that are observable either directly or indirectly. Fair values determined by Level 3 inputs utilize unobservable data points in which there is little or no market data, which require the reporting entity to develop its own assumptions. The fair value hierarchy level is determined by the lowest level of significant input.

The Company's financial assets classified as Level 2 at December 31, 2018, were initially valued at the transaction price and subsequently valued utilizing third-party pricing services. Because the Company's investment portfolio may include securities that do not always trade on a daily basis, the pricing services use many observable market inputs to determine value including reportable trades, benchmark yields and benchmarking of like securities. The Company validates the prices provided by the third-party pricing services by reviewing their pricing methods and obtaining market values from other pricing sources. After completing the validation procedures, the Company did not adjust or override any fair value measurements provided by these pricing services as of December 31, 2018.

The tables below present information about the Company's assets that are measured at fair value on a recurring basis as of December 31, 2018 and December 31, 2017 and indicate the fair value hierarchy of the valuation techniques utilized to determine such fair value.

	Fair value measurements at reporting date using			
Description	**Quoted prices in active markets for identical assets (Level 1)**	**Significant other observable inputs (Level 2)**	**Significant unobservable inputs (Level 3)**	**Balance as of December 31, 2018**
Cash equivalents:				
Money market funds	$ 2,663	$ —	$ —	$ 2,663
Short-term investments:				
U.S. government and agency securities	—	2,746	—	2,746
Total	$ 2,663	$ 2,746	$ —	$ 5,409

	Fair value measurements at reporting date using			
Description	**Quoted prices in active markets for identical assets (Level 1)**	**Significant other observable inputs (Level 2)**	**Significant unobservable inputs (Level 3)**	**Balance as of December 31, 2017**
Cash equivalents:				
Money market funds	$ 11,025	$ —	$ —	$ 11,025
Total	$ 11,025	$ —	$ —	$ 11,025

There were no transfers of financial assets or liabilities between category levels for the years ended December 31, 2018 and December 31, 2017.

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5. Property and Equipment, Net

Property and equipment consist of the following:

	Year ended December 31,	
	2018	**2017**
Equipment	$ 907	$ 1,059
Furniture and fixtures	119	119
Leasehold improvements	1,749	1,749
Software	72	96
Total property and equipment, at cost	2,847	3,023
Less: Accumulated depreciation	(1,462)	(1,484)
Property and equipment, net	$ 1,385	$ 1,539

Depreciation expense for the years ended December 31, 2018 and December 31, 2017, was $196 and $206, respectively.

6. Accrued Expenses

Accrued expenses consist of the following:

	Year ended December 31,	
	2018	**2017**
Employee compensation and benefits	$ 98	$ 646
Leased facilities	799	585
Commercial manufacturing	—	489
Professional services	234	335
Other	298	244
Total accrued expenses	$ 1,429	$ 2,299

Included within the employee compensation and benefits accrual at December 31, 2017 is $542 for 2017 employee bonuses that were paid in early 2018. A bonus accrual was not recorded at December 31, 2018. Accrued professional services at December 31, 2017 includes $216 of professional fees related to the Company's securities offering that was completed in December of that year and accrued commercial manufacturing expenses at December 31, 2017 represents a manufacturing contract obligation recorded in connection with the Company's discontinuation of its biopolymer business during 2016. See Note 14.

7. Commitments and Contingencies

Leases

The Company rents its facilities under operating leases, which expire at various dates through December 2026. Rent expense for the years ended December 31, 2018 and 2017, was $1,235 and $954, respectively.

At December 31, 2018, the Company's future minimum payments required under operating leases are as follows:

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Year ended December 31,	Minimum lease payment
2019	$ 1,025
2020	777
2021	654
2022	676
2023	695
2024 and thereafter	2,137
Total	$ 5,964

Lease Commitments

During 2016 the Company entered into a lease agreement, pursuant to which the Company leases approximately 29,622 square feet of office and research and development space located at 19 Presidential Way, Woburn, Massachusetts. The lease began on June 1, 2016 and will end on November 30, 2026. The Company provided the landlord with a security deposit in the form of a letter of credit in the amount of $307. Pursuant to the lease, the Company also will pay certain taxes and operating costs associated with the premises throughout the term of the lease. During the buildout of the rented space, the landlord paid $889 for tenant improvements to the facility and an additional $444 for tenant improvements that result in increased rental payments by the Company. The current and non-current portions of the lease incentive obligations related to the landlord's contributions toward the cost of tenant improvements are recorded within accrued expenses and long-term lease incentive obligation, respectively, in the Company's consolidated balance sheets contained herein.

In October 2016, the Company entered into a sublease agreement with a subsidiary of CJ CheilJedang Corporation ("CJ") with respect to CJ's sublease of approximately 9,874 square feet of its leased facility located in Woburn, Massachusetts. The sublease space was determined to be in excess of the Company's needs. The sublease is coterminous with the Company's master lease and CJ will pay rent and operating expenses equal to approximately one-third of the amounts payable to the landlord by the Company, as adjusted from time-to-time in accordance with the terms of the master lease. Total future minimum operating lease payments of $5,964 shown above are net of the CJ sublease payments. CJ provided the Company with a security deposit of $103 in the form of an irrevocable letter of credit.

The Company also leases approximately 13,702 square feet of office and laboratory space at 650 Suffolk Street, Lowell, Massachusetts. The lease for this facility expires in May 2020. During July 2018, the Company discontinued further use of the Lowell space, and as a result, the Company recorded a non-cash lease exit charge of $249 for the facility in accordance with ASC Topic 420-10, *Exit or Disposal Obligations*. Current and long-term portions of the associated lease liability for this exit charge are included within accrued expenses and other liabilities, net of current portion, in the Company's consolidated balance sheets included herein. The Company will continue to make monthly rental payments for the Lowell facility through its expiration in May 2020.

The Company's wholly-owned subsidiary, Metabolix Oilseeds, Inc. ("MOI"), located in Saskatoon, Saskatchewan, Canada, leases approximately 6,200 square feet of office, laboratory and greenhouse space. MOI's leases for these facilities expire at various times between April 2019 and May 2020.

Contractual Commitments

In connection with the wind down of its biopolymer operations during 2016, the Company ceased pilot production of biopolymer material and reached agreements with the owner-operators of its biopolymer production facilities regarding the early termination of their services. The Company recorded contract termination costs and an associated contract termination obligation related to these manufacturing agreements of $2,641 during 2016. The Company made the final payments of $489 against the termination obligation during 2018.

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Litigation

From time to time, the Company may be subject to legal proceedings and claims in the ordinary course of business. The Company is not currently aware of any such proceedings or claims that it believes will have, individually or in the aggregate, a material adverse effect on the business, financial condition or the results of operations.

Guarantees

As of December 31, 2018, and December 31, 2017, the Company did not have significant liabilities recorded for guarantees.

The Company enters into indemnification provisions under various agreements with other companies in the ordinary course of business, typically with business partners, contractors, and customers. Under these provisions, the Company generally indemnifies and holds harmless the indemnified party for losses suffered or incurred by the indemnified party as a result of its activities. These indemnification provisions generally survive termination of the underlying agreement. The maximum potential amount of future payments the Company could be required to make under these indemnification provisions is unlimited. However, to date Yield10 Bioscience has not incurred material costs to defend lawsuits or settle claims related to these indemnification provisions. As a result, the estimated fair value of these agreements is minimal. Accordingly, the Company has no liabilities recorded for these agreements as of December 31, 2018 and December 31, 2017.

8. License Agreements

During 2018 and 2017 the Company entered into two non-exclusive licensing arrangements with third parties for the evaluation of the Company's yield trait genes. Neither of these research arrangements will provide licensing revenue to the Company while the third parties perform their trait evaluations.

In December 2017, the Company granted a license to the Monsanto Division of Bayer Crop Science (formerly Monsanto Company), a division of Bayer AG, to evaluate the Company's novel C3003 and C3004 yield traits in soybean. Under this license, Monsanto Crop Science has the non-exclusive right to begin work with C3003 in its soybean program as a strategy to improve seed yield. Monsanto may also conduct research with the Company's C3004 yield trait, a trait accessible through genome editing, in combination with C3003 to evaluate the effectiveness of the combination in improving seed yield in soybean.

In September 2018, the Company granted a non-exclusive license to Forage Genetics International, LLC ("Forage Genetics"), a subsidiary of Land O'Lakes, Inc., to evaluate five of the Company's novel traits in forage sorghum. The traits included in the research license include C3003 as well as four traits from the Company's GRAIN platform, C4001, C4002, C4003 and C4029. The C4000 series traits have been shown to significantly increase photosynthesis and biomass in research conducted by the Company. The key objective of the licensing agreement is to provide Forage Genetics with novel traits to test alone and/or in any combination in sorghum that may lead to the identification of new yield traits for potential future licensing from the Company for development and commercial deployment.

9. Capital Stock

Common Stock

On May 23, 2018, the Company held its 2018 Annual Meeting, at which stockholders approved an amendment to the Certificate of Incorporation to increase from 40,000,000 shares to 60,000,000 shares the aggregate number of shares of common stock that are authorized to be issued. As a result of this vote, on May 23, 2018, the Company filed a Certificate of Amendment to its Certificate of Incorporation with the Secretary of State of the State of Delaware to increase the number of authorized shares. Also, at the Annual Meeting, stockholders approved the adoption of the Company's 2018 Stock Plan. The 2018 Stock Plan reserves for issuance 1,300,000 shares of the Company's common stock for grants of incentive stock options, nonqualified stock options, stock grants and stock-based awards. Shares available under the 2018 Stock Plan will be increased on the first day of January 2019 and 2020 in an amount equal to 5% of the outstanding shares of common stock on

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the day prior to the increase in each respective year or such smaller number of shares of common stock as determined by the Board of Directors.

During December 2017, the Company closed on a public offering of its securities, receiving cash proceeds of $13,097, net of issuance costs of $1,392. The offering included 4,667,000 Class A Units, priced at a public offering price of $2.25 per unit, with each unit consisting of one share of common stock, a Series A five-year expiration warrant to purchase one share of common stock at an exercise price of $2.25 per share, and a Series B nine-month expiration warrant to purchase 0.5 share of common stock at an exercise price of $2.25 per share, and 3,987 Class B Units, priced at a public offering price of $1,000 per unit, with each unit consisting of one share of preferred stock, having a conversion price of $2.25, Series A five-year warrants to purchase 445 shares of common stock at an exercise price of $2.25 per share, and Series B nine-month warrants to purchase 223 shares of common stock with an exercise price of $2.25 per share. The Company determined that both the preferred stock and the warrants should be recorded within stockholders' equity at December 31, 2017.

Proceeds received from the offering were allocated to the various elements of the offering based on their relative fair values. The fair value of the Common Stock is its closing market price on December 21, 2017, the closing date of the offering. The Series A Convertible Preferred Stock was valued on an as-if-converted basis based on the underlying common stock and the Series A and Series B warrants were valued using the Black-Scholes model with the following weighted-average input at the time of issuance:

- an expected term of 5.0 years and 0.75 years for the Series A and Series B warrants, respectively,
- risk free rates of 2.2 percent and 1.7 percent for the Series A and Series B warrants, respectively, based on the published rates of U.S. treasury bills with similar terms, and
- volatility of 125 percent based on the Company’s historical volatility.

After allocation of the proceeds, the effective conversion price of the Series A Convertible Preferred Stock was determined to be beneficial and, as a result, the Company recorded a one-time non-cash deemed dividend during December 2017 of $1,427 equal to the intrinsic value of the beneficial conversion feature. The Series A Convertible Preferred Stock did not have a stated redemption date, and as a consequence, accounting guidance required immediate recognition of a beneficial conversion feature rather than amortization of the benefit over time. The Series A Convertible Preferred Stock was considered a participating security. In accordance with applicable accounting guidance, the Company's 2017 loss of $9,396 from operations was increased by the amount of the deemed dividend resulting in a net loss attributable to common shareholders of $10,823. As of March 19, 2018, preferred shareholders had converted all 3,987 of the preferred shares into 1,772,000 shares of common stock.

On September 12, 2017, the Company issued warrants to purchase 30,000 shares of common stock to the Company's investor relations consultant, in consideration for services rendered and to be rendered by the consultant. These warrants have an exercise price of $2.90 per share and are exercisable in whole or part at any time during the period commencing on September 12, 2017 and ending on September 11, 2024. The Company reviewed the accounting guidance for warrants and determined that the warrants should be recorded as equity within additional paid-in capital.

On July 7, 2017, the Company completed a registered direct offering of its securities. Proceeds from the transaction were approximately $1,966, net of issuance costs of $317. Investors participating in the transaction purchased a total of 570,784 shares of common stock at a price of $4.00 per share and an equal number of warrants with an exercise price of $5.04 per share, exercisable beginning on January 7, 2018 and until their expiration on January 7, 2024. In accordance with accounting guidance for warrants, these warrants were also recorded as equity within additional paid-in capital.

On May 26, 2017, the Company effected a 1-for-10 reverse stock split of its common stock. The ratio for the reverse stock split was determined by the Company's board of directors following approval by stockholders at the Company's annual meeting held on May 24, 2017. The reverse stock split reduced the number of shares of the Company's common stock outstanding at the time of the reverse stock split from approximately 28.7 million shares to approximately 2.9 million shares. Proportional adjustments were made to the Company's outstanding stock options and restricted stock units and to the number of shares issued and issuable under the Company's equity compensation plans.

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Preferred Stock

The Company's certificate of incorporation, as amended and restated, authorizes it to issue up to 5,000,000 shares of $0.01 par value preferred stock.

As discussed above, during December 2017 the Company closed on a public offering of its securities that included issuance of 3,987 shares of Series A Convertible Preferred Stock. Each preferred share was convertible, at the holder's option, into 445 shares of common stock at a conversion price of $2.25 per share, subject to adjustments as a result of stock dividends and stock splits. The Company determined the Series A Convertible Preferred Stock should be classified as equity as it was not mandatorily redeemable, there were no unconditional obligations requiring the Company to settle in a variable number of common shares or settle through the transfer of assets and the monetary value of the preferred shares was fixed. As of March 19, 2018, all of the 3,987 preferred shares had been converted to 1,772,000 shares of common stock. When converted, the shares of converted Series A Convertible Preferred Stock were restored to the status of authorized but unissued shares of preferred stock, subject to reissuance by the Board of Directors.

Warrants

The following table summarizes information with regard to outstanding warrants to purchase common stock as of December 31, 2018:

Issuance	Number of Shares Issuable Upon Exercise of Outstanding Warrants	Exercise Price	Expiration Date
June 2015 Private Placement	393,300	$ 39.80	June 15, 2019
July 2017 Registered Direct Offering	570,784	$ 5.04	January 7, 2024
December 2017 Public Offering - Series A	6,439,000	$ 2.25	December 21, 2022
Consultant	30,000	$ 2.90	September 11, 2024
Total	7,433,084		

During 2018 a total of 55,100 Series B warrants from the December 2017 public offering were exercised resulting in the issuance of 55,100 shares of common stock and the Company's receipt of $124 in cash proceeds. On September 21, 2018, the remaining unexercised Series B warrants expired in accordance with their terms.

Reserved Shares

The following common stock shares were reserved for future issuance upon exercise of stock options, release of Restricted Stock Units ("RSUs"), conversion of outstanding Series A Convertible Preferred Stock and conversion of outstanding warrants:

	December 31, 2018	December 31, 2017
Stock Options	1,745,037	702,033
RSUs	7,101	14,367
Series A Convertible Preferred Stock	—	811,555
Warrants	7,433,084	10,652,586
Total number of common shares reserved for future issuance	9,185,222	12,180,541

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10. Stock-Based Compensation

Stock Option Plans

The Company adopted a stock plan in 2006 (the "2006 Plan"), which provided for the granting of incentive stock options, nonqualified stock options, stock appreciation rights, deferred stock awards, restricted stock awards, unrestricted stock awards, cash-based awards and dividend equivalent rights. In October 2014, the 2006 Plan was terminated, and the Company adopted a new plan (the "2014 Plan"). No further grants or awards were subsequently made under the 2006 Plan. A total of 146,724 options were awarded from the 2006 Plan and as of December 31, 2018, 21,867 of these options remain outstanding and eligible for future exercise.

The 2014 Plan provides for the granting of incentive stock options, nonqualified stock options, stock appreciation rights, deferred stock awards, restricted stock awards, unrestricted stock awards, cash-based awards and dividend equivalent rights. In May 2018, the 2014 Plan was terminated, and the Company adopted a new 2018 Stock Option and Incentive Plan (the "2018 Stock Plan"). A total of 675,529 options have been awarded from the 2014 Plan and as of December 31, 2018, 667,699 of these options remain outstanding and eligible for future exercise. A total of 144,541 restricted stock awards have been awarded from the 2014 Plan and as of December 31, 2018, 7,101 of these restricted stock awards are unvested and outstanding. No further stock awards may be issued from the 2014 Plan.

The 2018 Stock Plan reserves for issuance 1,300,000 shares of the Company's common stock for grants of incentive stock options, nonqualified stock options, stock grants and stock-based awards. Shares available under the 2018 Stock Plan will be increased on the first day of January 2019 and 2020 in an amount equal to 5% of the outstanding shares of common stock on the day prior to the increase in each respective year or such smaller number of shares of common stock as determined by the Board of Directors. In its meeting held on February 12, 2019, the Company's Board of Directors approved the addition of 501,290 shares to the 2018 Stock Plan which represented 5% of the outstanding shares of common stock on December 31, 2018. As of December 31, 2018, a total of 1,038,242 options have been awarded from the 2018 Stock Plan, and as of that date, 1,036,304 options remain outstanding.

Expense Information for Stock Awards

The Company recognized stock-based compensation expense, related to employee stock awards, including awards to non-employees and members of the Board of Directors, of $1,181 and $1,395 for the years ended December 31, 2018 and 2017, respectively. At December 31, 2018, there was approximately $1,184 of stock-based compensation expense related to unvested awards not yet recognized which is expected to be recognized over a weighted average period of 3.31 years.

Stock Options

Options granted under the 2006 Plan, 2014 Plan and 2018 Stock Plan generally vest ratably over periods of one to four years from the date of hire for new employees, or date of award for existing employees, or date of commencement of services with the Company for non-employees, and generally expire ten years from the date of issuance. The Company's policy is to issue new shares upon the exercise of stock options.

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A summary of the activity related to the shares of common stock covered by outstanding options is as follows:

	Number of Shares	Weighted Average Exercise Price	Remaining Contractual Term (in years)	Aggregate Intrinsic Value
Balance at December 31, 2017	702,033	$16.21		
Granted	1,050,667	1.62		
Exercised	—	—		
Forfeited	(2,979)	4.75		
Expired	(4,684)	412.74		
Balance at December 31, 2018	1,745,037	6.38	8.63	$—
Vested and expected to vest at December 31, 2018	1,745,037	6.38	8.63	—
Exercisable at December 31, 2018	877,058	11.05	7.87	—

The weighted average grant date fair value per share of options granted during fiscal years 2018 and 2017, was $1.33, and $2.10, respectively. No options were exercised during 2018 and 2017, and therefore the intrinsic value for exercised options during the two years was not applicable. The weighted average remaining contractual term for options outstanding as of December 31, 2018 was 8.6 years.

For the years ended December 31, 2018, and 2017, the Company determined the fair value of stock options using the Black-Scholes option pricing model with the following assumptions for option grants, respectively:

	Year Ended December 31,	
	2018	2017
Expected dividend yield	—	—
Risk-free rate	2.6% - 3.1%	1.8% - 2.2%
Expected option term (in years)	5.5 - 5.9	5.3 - 5.5
Volatility	107% - 110%	97% - 104%

The Company determined its volatility assumption based on actual market price fluctuations experienced during its trading history. The risk-free interest rate used for each grant is equal to the U.S. Treasury yield curve in effect at the time of grant for instruments with a term similar to the expected life of the related option. The expected term of the options is based upon evaluation of historical and expected future exercise behavior.

The stock price volatility and expected terms utilized in the calculation involve management's best estimates at that time, both of which impact the fair value of the option calculated under the Black-Scholes methodology and, ultimately, the expense that will be recognized over the life of the option. The accounting standard for stock-based compensation requires that the Company recognize compensation expense for only the portion of options that vest. The Company recognizes stock option forfeitures resulting from award terminations in the period in which the forfeiture occurs.

Restricted Stock Units ("RSUs")

The Company records stock compensation expense for RSUs on a straight-line basis over their vesting period based on each RSU's award date market value. The Company did not award any RSUs during the year ended December 31, 2018. During the year ended December 31, 2017, the Company awarded a total of 25,337 RSUs to its non-employee directors in lieu of cash compensation for their services. These RSUs vested upon issuance resulting in immediate recognition of stock compensation expense for the fair value of the awards.

The Company will pay minimum required income tax withholding associated with RSUs for its employees. As the RSUs vest, the Company will withhold a number of shares with an aggregate fair market value equal to the minimum tax

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withholding amount (unless the employee makes other arrangements for payment of the tax withholding) from the common stock issuable at the vest date. During the years ended December 31, 2018 and December 31, 2017, the Company withheld vested shares with a fair value of $6 and $12 to pay for minimum tax withholding associated with RSU vesting.

A summary of RSU activity for the year ended December 31, 2018 is as follows:

	Number of RSUs	Weighted Average Remaining Contractual Life (years)
Outstanding at December 31, 2017	14,367	
Awarded	—	
Released	(7,104)	
Forfeited	(162)	
Outstanding at December 31, 2018	7,101	0.25
Weighted average remaining recognition period (years)	0.25	

11. Income Taxes

Tax Cuts and Jobs Act

In December 2017, the Tax Cuts and Jobs Act, or the Tax Act ("TCJA"), was signed into law. Among other things, the Tax Act permanently lowered the corporate federal income tax rate to 21% from the existing maximum rate of 35%, effective for tax years including or commencing January 1, 2018. As a result of the reduction of the corporate federal income tax rate GAAP required companies to revalue their deferred tax assets and deferred tax liabilities as of the date of enactment, with the resulting tax effects accounted for in the reporting period of enactment. For the year ending December 31, 2017, this revaluation resulted in a provision of $10,609 to income tax expense in continuing operations and a corresponding reduction the Company's valuation allowance. There was no impact, therefore, to the Company's income statement for the year ended December 31, 2017 as a result of the reduction in federal income tax rates. During 2018 the Company completed its review of new tax regulations issued under TCJA and finalized adjustments related to its deferred tax assets and liabilities that resulted from changes in the tax law.

Income Taxes and Deferred Tax Assets and Liabilities

The components of loss from operations before provision for income taxes consist of the following:

	Year Ended December 31,	
	2018	2017
Domestic	$ (12,273)	$ (9,523)
Foreign	3,103	126
Loss before taxes	$ (9,170)	$ (9,397)

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Significant components of the Company's net deferred tax assets are as follows:

	Year Ended December 31,	
	2018	2017
Deferred Tax Assets:		
Net operating loss carryforward	$ 24,261	$ 20,490
Capitalization of research and development expense	1,385	1,606
Credit carryforwards	2,664	2,493
Depreciation	—	990
Stock compensation	966	1,035
Other temporary differences	695	794
Total deferred tax assets.	29,971	27,408
Valuation allowance	(29,672)	(27,408)
Net deferred tax assets	299	—
Deferred Tax Liabilities:		
Depreciation	(299)	—
Net deferred taxes	$ —	$ —

Tax Rate

The items accounting for the difference between the income tax computed at the federal statutory rate of 21% and the provision for income taxes were as follows:

	Year Ended December 31,	
	2018	2017
Federal income tax at statutory federal rate	21.0 %	34.0 %
State taxes	8.0 %	4.9 %
Permanent differences	(0.1)%	(2.3)%
Tax credits	3.1 %	3.7 %
Federal rate change under tax reform	0.0 %	(112.9)%
State rate change on deferred balances	0.0 %	0.1 %
Stock compensation	(3.6)%	(12.7)%
Other	0.6 %	1.2 %
Change in valuation allowance	(25.2)%	84.0 %
German subsidiary dissolution	(3.8)%	0.0 %
Total	0.0 %	0.0 %

Tax Attributes

At December 31, 2018, the Company had U.S. net operating loss carryforwards (NOLs) for federal and state income tax purposes of approximately $89,971 and $84,918, respectively. The Company's existing federal and state operating loss carryforwards will begin to expire on various dates through 2038. Included in the $89,971 of federal net operating losses are losses of $12,162 that will carry forward indefinitely as a result of new regulations issued under TCJA. The Company also had available research and development and investment tax credits for federal and state income tax purposes of approximately $1,382 and $846, respectively. These federal and state research and development credits will begin to expire on various dates through 2038. In Canada, the Company has cumulative research tax credits totaling $614 that may be carried forward up to twenty years from the year earned. These credits will begin to expire in 2032 if not used. Management

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of the Company has evaluated the positive and negative evidence bearing upon the realizability of its deferred tax assets, which are comprised principally of net operating loss carryforwards and research and development credits. Under the applicable accounting standards, management has considered the Company's history of losses and concluded that it is more likely than not that the Company will not recognize the benefits of federal and state deferred tax assets. Accordingly, a full valuation allowance has been established against the deferred tax assets.

Utilization of the net operating loss and research and development credit carryforwards may be subject to a substantial annual limitation under Section 382 of the Internal Revenue Code of 1986 due to ownership change limitations that have occurred previously or that could occur in the future. These ownership changes may limit the amount of net operating loss and research and development credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively. The Company completed an evaluation of its ownership changes through December 31, 2015 and determined that an ownership change occurred on August 22, 2014 in connection with an equity offering. As a consequence of this ownership change, the Company's NOLs, tax credit carryforwards and other tax deductions allocable to the tax periods preceding the ownership change became subject to limitation under Section 382. The Company has reduced its associated deferred tax assets accordingly. The Company has not yet completed an evaluation of ownership changes for the years 2016 through 2018. To the extent an ownership change occurs in the future, the net operating loss, credit carryforwards and other deferred tax assets may be subject to further limitations.

Other

During the year ended December 31, 2018, the Company decided to dissolve its wholly-owned German subsidiary, Metabolix GmbH, that has been inactive since 2014. As a result of this decision, the Company has written off the German deferred tax assets and related full valuation allowance resulting in no impact to the tax provision. The majority of the deferred tax asset value related to net operating loss carryforwards.

The tax years 2014 through 2017 remain open to examination by major taxing jurisdictions to which the Company is subject, which are primarily in the U.S. The statute of limitations for net operating losses utilized in future years will remain open beginning in the year of utilization.

The Company's policy is to record estimated interest and penalties related to uncertain tax positions as income tax expense. As of December 31, 2018 and 2017, the Company had no accrued interest or penalties recorded related to uncertain tax positions.

No additional provision has been made for U.S. income taxes related to the undistributed earnings of the wholly-owned subsidiaries of Yield10 Bioscience, Inc. or for unrecognized deferred tax liabilities for temporary differences related to investments in subsidiaries as the amounts are not significant. As such, earnings are expected to be permanently reinvested, the investments are essentially permanent in duration, or the Company has concluded that no additional tax liability will arise as a result of the distribution of such earnings. A liability could arise if amounts are distributed by such subsidiaries or if such subsidiaries are ultimately disposed. It is not practical to estimate the additional income taxes related to permanently reinvested earnings or the basis differences related to investment in subsidiaries. Unremitted earnings at December 31, 2018 and December 31, 2017 approximated $491 and $482, respectively.

12. Employee Benefits

The Company maintains a 401(k) savings plan in which substantially all of its regular U.S. employees are eligible to participate. Participants may contribute up to 60% of their annual compensation to the plan, subject to eligibility requirements and annual IRS limitations. The Company's plan provides for a matching contribution in common stock of up to 4.5% of a participant's total compensation dependent upon the level of participant contributions made during the plan year. Pursuant to this plan, the Company issued 65,594, and 22,493 shares of common stock during the years ended December 31, 2018, and December 31, 2017, respectively, and recorded $102, and $85, respectively, of related expense. Company contributions are fully vested upon issuance.

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13. U.S. Department of Energy Grants

On April 17, 2018 the Company entered into a sub-award with Michigan State University ("MSU") to support a Department of Energy funded grant entitled "*A Systems Approach to Increasing Carbon Flux to Seed Oil*." The Company's participation under this grant commenced on September 15, 2017 and as of December 31, 2018, the first two years of the sub-award totaling $1,212 have been authorized. The Company anticipates that additional option years will be awarded annually to Yield10 through September 14, 2022 for total sub-award funding of $2,957, provided the U.S. Congress continues to appropriate funds for the program, the Company is able to make progress towards meeting grant objectives and it remains in compliance with other terms and conditions of the sub-award. During the years ended December 31, 2018 and December 31, 2017, the Company recognized $419 and $0, respectively, in revenue related to this sub-award.

In 2015, the Company entered into a multi-year $1,997 grant agreement entitled, *Production of High Oil, Transgene Free Camelina Sativa Plants through Genome Editing*, with the U.S. Department of Energy for the development of Camelina sativa feedstock. The Company is used the funds to perform research to increase oil content and/or seed yield to maximize oil yields per acre. The Company recognized revenue from the grant over the term of the agreement as it incurred related research and development costs and it met its prorated cost-sharing obligation of approximately $500. During the years ended December 31, 2018 and December 31, 2017, the Company recognized $137 and $913, respectively, in revenue related to this grant. The grant ended September 30, 2018 and all revenue under the grant has been recognized.

14. Restructuring

During 2016, the Company initiated a strategic restructuring under which Yield10 Bioscience became its core business and its biopolymer operations were discontinued. As part of its strategic restructuring, the Company significantly reduced staffing levels and in January 2017, the Company formally changed its name to Yield10 Bioscience, Inc.

In connection with the wind down of its biopolymer operations, the Company ceased pilot production of biopolymer materials and reached agreements with the owner-operators of its biopolymer production facilities regarding the termination of their services. Through May 2018, the Company made cash payments of $3,317, issued 27,500 shares of common stock with a fair value of $85 and transferred certain biopolymer-related production equipment with a net book value of $111 to fully settle these agreements and other restructuring activities. No further restructuring obligations remain outstanding at December 31, 2018.

15. Geographic Information

The geographic distribution of the Company's revenues and long-lived assets from continuing operations is summarized as follows:

	U.S.	Canada	Eliminations	Total
Year Ended December 31, 2018				
Net revenues to unaffiliated customers	$ 556	$ —	$ —	$ 556
Inter-geographic revenues	—	1,418	(1,418)	—
Net revenues	$ 556	$ 1,418	$ (1,418)	$ 556
Identifiable long-lived assets	$ 1,372	$ 13	$ —	$ 1,385
Year Ended December 31, 2017				
Net revenues to unaffiliated customers	$ 944	$ —	$ —	$ 944
Inter-geographic revenues	—	1,154	(1,154)	—
Net revenues	$ 944	$ 1,154	$ (1,154)	$ 944
Identifiable long-lived assets	$ 1,533	$ 6	$ —	$ 1,539

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Foreign revenue is based on the country in which the Company's subsidiary that earned the revenue is domiciled. During 2018, grant revenue earned from the Company's now completed Camelina grant with the Department of Energy and with the new Michigan State University sub-award totaled $137 and $419, or 100% of the Company's total revenue.

16. Subsequent Event

On March 18, 2019, the Company completed a registered direct offering of its securities. Proceeds from the transaction were approximately $2,607, net of issuance costs of $323. Investors participating in the transaction purchased a total of 2,421,662 shares of common stock at a price of $1.21 per share.

Exhibit 10.2.5

YIELD10 BIOSCIENCE, INC.

Stock Option Grant Notice

Stock Option Grant under the Company's
2018 Stock Option and Incentive Plan

1. Name and Address of Participant: _____

2. Date of Option Grant: _____

3. Type of Grant: _____

4. Maximum Number of Shares for which this Option is exercisable: _____

5. Exercise (purchase) price per share: _____

6. Option Expiration Date: _____

7. Vesting Start Date: _____

8. Vesting Schedule: This Option shall become exercisable (and the Shares issued upon exercise shall be vested) as follows provided the Participant is an Employee, director or Consultant of the Company or of an Affiliate on the applicable vesting date:

[Vesting Schedule]

The foregoing rights are cumulative and are subject to the other terms and conditions of this Agreement and the Plan.

The Company and the Participant acknowledge receipt of this Stock Option Grant Notice and agree to the terms of the Stock Option Agreement attached hereto and incorporated by reference herein, the Company's 2018 Stock Option and Incentive Plan and the terms of this Option Grant as set forth above.

Yield10 Bioscience, Inc.

By: _____
Name: _____
Title: _____

_____
Participant

YIELD10 BIOSCIENCE, INC.

STOCK OPTION AGREEMENT - INCORPORATED TERMS AND CONDITIONS

AGREEMENT made as of the date of grant set forth in the Stock Option Grant Notice by and between Yield10 Bioscience, Inc. (the "Company"), a Delaware corporation, and the individual whose name appears on the Stock Option Grant Notice (the "Participant").

WHEREAS, the Company desires to grant to the Participant an Option to purchase shares of its common stock, $0.01 par value per share (the "Shares"), under and for the purposes set forth in the Company's 2018 Stock Option and Incentive Plan (the "Plan");

WHEREAS, the Company and the Participant understand and agree that any terms used and not defined herein have the same meanings as in the Plan; and

WHEREAS, the Company and the Participant each intend that the Option granted herein shall be of the type set forth in the Stock Option Grant Notice.

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth and for other good and valuable consideration, the parties hereto agree as follows:

1. GRANT OF OPTION. The Company hereby grants to the Participant the right and option to purchase all or any part of an aggregate of the number of Shares set forth in the Stock Option Grant Notice, on the terms and conditions and subject to all the limitations set forth herein, under United States securities and tax laws, and in the Plan, which is incorporated herein by reference. The Participant acknowledges receipt of a copy of the Plan.

2. EXERCISE PRICE. The exercise price of the Shares covered by the Option shall be the amount per Share set forth in the Stock Option Grant Notice, subject to adjustment, as provided in the Plan, in the event of a stock split, reverse stock split or other events affecting the holders of Shares after the date hereof (the "Exercise Price"). Payment shall be made in accordance with Paragraph 10 of the Plan.

3. EXERCISABILITY OF OPTION. Subject to the terms and conditions set forth in this Agreement and the Plan, the Option granted hereby shall become vested and exercisable as set forth in the Stock Option Grant Notice and is subject to the other terms and conditions of this Agreement and the Plan.

4. TERM OF OPTION. This Option shall terminate on the Option Expiration Date as specified in the Stock Option Grant Notice and, if this Option is designated in the Stock Option Grant Notice as an ISO and the Participant owns as of the date hereof more than 10% of the total combined voting power of all classes of capital stock of the Company or an Affiliate, such date may not be more than five years from the date of this Agreement, but shall be subject to earlier termination as provided herein or in the Plan.

If the Participant ceases to be an Employee, director or Consultant of the Company or of an Affiliate for any reason other than the death or Disability of the Participant, or termination of the Participant for Cause (the "Termination Date"), the Option to the extent then vested and exercisable pursuant to Section 3 hereof as of the Termination Date, and not previously terminated in accordance with this Agreement, may be exercised within three months after the Termination Date, or on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice, whichever is earlier, but may not be exercised thereafter except as set forth below. In such event, the unvested portion of the Option shall not be exercisable and shall expire and be cancelled on the Termination Date.

If this Option is designated in the Stock Option Grant Notice as an ISO and the Participant ceases to be an Employee of the Company or of an Affiliate but continues after termination of employment to provide service to the Company or an Affiliate as a director or Consultant, this Option shall continue to vest in accordance with Section 3 above as if this Option had not terminated until the Participant is no longer providing services to the Company. In such case, this Option shall automatically convert and be deemed a Non-Qualified Option as of the date that is three months from termination of the Participant's employment and this Option shall continue on the same terms and conditions set forth herein until such Participant is no longer providing service to the Company or an Affiliate.

Notwithstanding the foregoing, in the event of the Participant's Disability or death within three months after the Termination Date, the Participant or the Participant's Survivors may exercise the Option within one year after the Termination Date, but in no event after the Option Expiration Date as specified in the Stock Option Grant Notice.

In the event the Participant's service is terminated by the Company or an Affiliate for Cause, the Participant's right to exercise any unexercised portion of this Option even if vested shall cease immediately as of the time the Participant is notified his or her service is terminated for Cause, and this Option shall thereupon terminate. Notwithstanding anything herein to the contrary, if subsequent to the Participant's termination, but prior to the exercise of the Option, the Administrator determines that, either prior or subsequent to the Participant's termination, the Participant engaged in conduct which would constitute Cause, then the Participant shall immediately cease to have any right to exercise the Option and this Option shall thereupon terminate.

In the event of the Disability of the Participant, as determined in accordance with the Plan, the Option shall be exercisable within one year after the Participant's termination of service due to Disability or, if earlier, on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice. In such event, the Option shall be exercisable:

(a) to the extent that the Option has become exercisable but has not been exercised as of the date of the Participant's termination of service due to Disability; and

(b) in the event rights to exercise the Option accrue periodically, to the extent of a pro rata portion through the date of the Participant's termination of service due to Disability of any additional vesting rights that would have accrued on

the next vesting date had the Participant not become Disabled. The proration shall be based upon the number of days accrued in the current vesting period prior to the date of the Participant's termination of service due to Disability.

In the event of the death of the Participant while an Employee, director or Consultant of the Company or of an Affiliate, the Option shall be exercisable by the Participant's Survivors within one year after the date of death of the Participant or, if earlier, on or prior to the Option Expiration Date as specified in the Stock Option Grant Notice. In such event, the Option shall be exercisable:

(x) to the extent that the Option has become exercisable but has not been exercised as of the date of death; and

(y) in the event rights to exercise the Option accrue periodically, to the extent of a pro rata portion through the date of death of any additional vesting rights that would have accrued on the next vesting date had the Participant not died. The proration shall be based upon the number of days accrued in the current vesting period prior to the Participant's date of death.

5. METHOD OF EXERCISING OPTION. Subject to the terms and conditions of this Agreement, the Option may be exercised by written notice to the Company or its designee, in substantially the form of Exhibit A attached hereto (or in such other form acceptable to the Company, which may include electronic notice). Such notice shall state the number of Shares with respect to which the Option is being exercised and shall be signed by the person exercising the Option (which signature may be provided electronically in a form acceptable to the Company). Payment of the Exercise Price for such Shares shall be made in accordance with Paragraph 10 of the Plan. The Company shall deliver such Shares as soon as practicable after the notice shall be received, provided, however, that the Company may delay issuance of such Shares until completion of any action or obtaining of any consent, which the Company deems necessary under any applicable law (including, without limitation, state securities or "blue sky" laws). The Shares as to which the Option shall have been so exercised shall be registered in the Company's share register in the name of the person so exercising the Option (or, if the Option shall be exercised by the Participant and if the Participant shall so request in the notice exercising the Option, shall be registered in the Company's share register in the name of the Participant and another person jointly, with right of survivorship) and shall be delivered as provided above to or upon the written order of the person exercising the Option. In the event the Option shall be exercised, pursuant to Section 4 hereof, by any person other than the Participant, such notice shall be accompanied by appropriate proof of the right of such person to exercise the Option. All Shares that shall be purchased upon the exercise of the Option as provided herein shall be fully paid and nonassessable.

6. PARTIAL EXERCISE. Exercise of this Option to the extent above stated may be made in part at any time and from time to time within the above limits, except that no fractional share shall be issued pursuant to this Option.

7. NON-ASSIGNABILITY. The Option shall not be transferable by the Participant otherwise than by will or by the laws of descent and distribution. If this Option is a Non-Qualified

Option then it may also be transferred pursuant to a qualified domestic relations order as defined by the Code or Title I of the Employee Retirement Income Security Act or the rules thereunder. Except as provided above in this paragraph, the Option shall be exercisable, during the Participant's lifetime, only by the Participant (or, in the event of legal incapacity or incompetency, by the Participant's guardian or representative) and shall not be assigned, pledged or hypothecated in any way (whether by operation of law or otherwise) and shall not be subject to execution, attachment or similar process. Any attempted transfer, assignment, pledge, hypothecation or other disposition of the Option or of any rights granted hereunder contrary to the provisions of this Section 7, or the levy of any attachment or similar process upon the Option shall be null and void.

8. NO RIGHTS AS STOCKHOLDER UNTIL EXERCISE. The Participant shall have no rights as a stockholder with respect to Shares subject to this Agreement until registration of the Shares in the Company's share register in the name of the Participant. Except as is expressly provided in the Plan with respect to certain changes in the capitalization of the Company, no adjustment shall be made for dividends or similar rights for which the record date is prior to the date of such registration.

9. ADJUSTMENTS. The Plan contains provisions covering the treatment of Options in a number of contingencies such as stock splits and mergers. Provisions in the Plan for adjustment with respect to stock subject to Options and the related provisions with respect to successors to the business of the Company are hereby made applicable hereunder and are incorporated herein by reference**,** including, but not limited to, the acceleration of vesting provision contained in Paragraph 25(b) of the Plan.

10. TAXES. The Participant acknowledges and agrees that (i) any income or other taxes due from the Participant with respect to this Option or the Shares issuable pursuant to this Option shall be the Participant's responsibility; (ii) the Participant was free to use professional advisors of his or her choice in connection with this Agreement, has received advice from his or her professional advisors in connection with this Agreement, understands its meaning and import, and is entering into this Agreement freely and without coercion or duress; (iii) the Participant has not received and is not relying upon any advice, representations or assurances made by or on behalf of the Company or any Affiliate or any employee of or counsel to the Company or any Affiliate regarding any tax or other effects or implications of the Option, the Shares or other matters contemplated by this Agreement; and (iv) neither the Administrator, the Company, its Affiliates, nor any of its officers or directors, shall be held liable for any applicable costs, taxes, or penalties associated with the Option if, in fact, the Internal Revenue Service were to determine that the Option constitutes deferred compensation under Section 409A of the Code.

If this Option is designated in the Stock Option Grant Notice as a Non-Qualified Option or if the Option is an ISO and is converted into a Non-Qualified Option and such Non-Qualified Option is exercised, the Participant agrees that the Company may withhold from the Participant's remuneration, if any, the minimum statutory amount of federal, state and local withholding taxes attributable to such amount that is considered compensation includable in such person's gross income. At the Company's discretion, the amount required to be withheld may be withheld in cash from such remuneration, or in kind from the Shares otherwise deliverable to the

Participant on exercise of the Option. The Participant further agrees that, if the Company does not withhold an amount from the Participant's remuneration sufficient to satisfy the Company's income tax withholding obligation, the Participant will reimburse the Company on demand, in cash, for the amount under-withheld.

11. PURCHASE FOR INVESTMENT. Unless the offering and sale of the Shares to be issued upon the particular exercise of the Option shall have been effectively registered under the Securities Act, the Company shall be under no obligation to issue the Shares covered by such exercise unless the Company has determined that such exercise and issuance would be exempt from the registration requirements of the Securities Act and until the following conditions have been fulfilled:

(a) The person(s) who exercise the Option shall warrant to the Company, at the time of such exercise, that such person(s) are acquiring such Shares for their own respective accounts, for investment, and not with a view to, or for sale in connection with, the distribution of any such Shares, in which event the person(s) acquiring such Shares shall be bound by the provisions of the following legend which shall be endorsed upon any certificate(s) evidencing the Shares issued pursuant to such exercise:

"The shares represented by this certificate have been taken for investment and they may not be sold or otherwise transferred by any person, including a pledgee, unless (1) either (a) a Registration Statement with respect to such shares shall be effective under the Securities Act of 1933, as amended, or (b) the Company shall have received an opinion of counsel satisfactory to it that an exemption from registration under such Act is then available, and (2) there shall have been compliance with all applicable state securities laws;" and

(b) If the Company so requires, the Company shall have received an opinion of its counsel that the Shares may be issued upon such particular exercise in compliance with the Securities Act without registration thereunder. Without limiting the generality of the foregoing, the Company may delay issuance of the Shares until completion of any action or obtaining of any consent, which the Company deems necessary under any applicable law (including without limitation state securities or "blue sky" laws).

12. RESTRICTIONS ON TRANSFER OF SHARES.

(a) The Participant agrees that in the event the Company proposes to offer for sale to the public any of its equity securities and such Participant is requested by the Company and any underwriter engaged by the Company in connection with such offering to sign an agreement restricting the sale or other transfer of Shares, then it will promptly sign such agreement and will not transfer, whether in privately negotiated transactions or to the public in open market transactions or otherwise, any Shares or other securities of the Company held by him or her during such period as is determined by the Company and the underwriters, not to exceed 180 days following the closing of the offering,

plus such additional period of time as may be required to comply with FINRA rules or similar rules thereto promulgated by another regulatory authority (such period, the "Lock-Up Period"). Such agreement shall be in writing and in form and substance reasonably satisfactory to the Company and such underwriter and pursuant to customary and prevailing terms and conditions. Notwithstanding whether the Participant has signed such an agreement, the Company may impose stop-transfer instructions with respect to the Shares or other securities of the Company subject to the foregoing restrictions until the end of the Lock-Up Period.

(b) The Participant acknowledges and agrees that neither the Company, its stockholders nor its directors and officers, has any duty or obligation to disclose to the Participant any material information regarding the business of the Company or affecting the value of the Shares before, at the time of, or following a termination of the service of the Participant by the Company, including, without limitation, any information concerning plans for the Company to make a public offering of its securities or to be acquired by or merged with or into another firm or entity.

13. NO OBLIGATION TO MAINTAIN RELATIONSHIP . The Participant acknowledges that: (i) the Company is not by the Plan or this Option obligated to continue the Participant as an employee, director or Consultant of the Company or an Affiliate; (ii) the Plan is discretionary in nature and may be suspended or terminated by the Company at any time; (iii) the grant of the Option is a one-time benefit which does not create any contractual or other right to receive future grants of options, or benefits in lieu of options; (iv) all determinations with respect to any such future grants, including, but not limited to, the times when options shall be granted, the number of shares subject to each option, the option price, and the time or times when each option shall be exercisable, will be at the sole discretion of the Company; (v) the Participant's participation in the Plan is voluntary; (vi) the value of the Option is an extraordinary item of compensation which is outside the scope of the Participant's employment or consulting contract, if any; and (vii) the Option is not part of normal or expected compensation for purposes of calculating any severance, resignation, redundancy, end of service payments, bonuses, long-service awards, pension or retirement benefits or similar payments.

14. IF OPTION IS INTENDED TO BE AN ISO. If this Option is designated in the Stock Option Grant Notice as an ISO so that the Participant (or the Participant's Survivors) may qualify for the favorable tax treatment provided to holders of Options that meet the standards of Section 422 of the Code then any provision of this Agreement or the Plan which conflicts with the Code so that this Option would not be deemed an ISO is null and void and any ambiguities shall be resolved so that the Option qualifies as an ISO. The Participant should consult with the Participant's own tax advisors regarding the tax effects of the Option and the requirements necessary to obtain favorable tax treatment under Section 422 of the Code, including, but not limited to, holding period requirements.

Notwithstanding the foregoing, to the extent that the Option is designated in the Stock Option Grant Notice as an ISO and is not deemed to be an ISO pursuant to Section 422(d) of the Code because the aggregate Fair Market Value (determined as of the Date of Option Grant) of any of the Shares with respect to which this ISO is granted becomes exercisable for the first time during any calendar year in excess of $100,000, the portion of the Option representing such excess value shall be treated as a Non-Qualified Option and the Participant shall be deemed to have taxable income measured by the difference between the then Fair Market Value of the Shares received upon exercise and the price paid for such Shares pursuant to this Agreement.

Neither the Company nor any Affiliate shall have any liability to the Participant, or any other party, if the Option (or any part thereof) that is intended to be an ISO is not an ISO or for any action taken by the Administrator, including without limitation the conversion of an ISO to a Non-Qualified Option.

15. NOTICE TO COMPANY OF DISQUALIFYING DISPOSITION OF AN ISO. If this Option is designated in the Stock Option Grant Notice as an ISO then the Participant agrees to notify the Company in writing immediately after the Participant makes a Disqualifying Disposition of any of the Shares acquired pursuant to the exercise of the ISO. A Disqualifying Disposition is defined in Section 424(c) of the Code and includes any disposition (including any sale) of such Shares before the later of (a) two years after the date the Participant was granted the ISO or (b) one year after the date the Participant acquired Shares by exercising the ISO, except as otherwise provided in Section 424(c) of the Code. If the Participant has died before the Shares are sold, these holding period requirements do not apply and no Disqualifying Disposition can occur thereafter.

16. NOTICES. Any notices required or permitted by the terms of this Agreement or the Plan shall be given by recognized courier service, facsimile, registered or certified mail, return receipt requested, addressed as follows:

If to the Company:
Yield10 Bioscience, Inc.
19 Presidential Way
Woburn, MA 01801
Attention:

If to the Participant at the address set forth on the Stock Option Grant Notice

or to such other address or addresses of which notice in the same manner has previously been given. Any such notice shall be deemed to have been given upon the earlier of receipt, one business day following delivery to a recognized courier service or three business days following mailing by registered or certified mail.

17. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the laws of the Delaware, without giving effect to the conflict of law principles thereof. For the purpose of litigating any dispute that arises under this Agreement, the parties hereby consent to exclusive jurisdiction in Massachusetts and agree that such litigation shall be conducted

in the state courts of Middlesex, Massachusetts or the federal courts of the United States for the District of Massachusetts**.**

18. BENEFIT OF AGREEMENT. Subject to the provisions of the Plan and the other provisions hereof, this Agreement shall be for the benefit of and shall be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

19. ENTIRE AGREEMENT. This Agreement, together with the Plan, embodies the entire agreement and understanding between the parties hereto with respect to the subject matter hereof and supersedes all prior oral or written agreements and understandings relating to the subject matter hereof (with the exception of acceleration of vesting provisions contained in any other agreement with the Company). No statement, representation, warranty, covenant or agreement not expressly set forth in this Agreement shall affect or be used to interpret, change or restrict, the express terms and provisions of this Agreement. Notwithstanding the foregoing in all events, this Agreement shall be subject to and governed by the Plan.

20. MODIFICATIONS AND AMENDMENTS . The terms and provisions of this Agreement may be modified or amended as provided in the Plan.

21. WAIVERS AND CONSENTS . Except as provided in the Plan, the terms and provisions of this Agreement may be waived, or consent for the departure therefrom granted, only by written document executed by the party entitled to the benefits of such terms or provisions. No such waiver or consent shall be deemed to be or shall constitute a waiver or consent with respect to any other terms or provisions of this Agreement, whether or not similar. Each such waiver or consent shall be effective only in the specific instance and for the purpose for which it was given, and shall not constitute a continuing waiver or consent.

22. DATA PRIVACY. By entering into this Agreement, the Participant: (i) authorizes the Company and each Affiliate, and any agent of the Company or any Affiliate administering the Plan or providing Plan recordkeeping services, to disclose to the Company or any of its Affiliates such information and data as the Company or any such Affiliate shall request in order to facilitate the grant of options and the administration of the Plan; (ii) to the extent permitted by applicable law waives any data privacy rights he or she may have with respect to such information, and (iii) authorizes the Company and each Affiliate to store and transmit such information in electronic form for the purposes set forth in this Agreement.

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Exhibit A

NOTICE OF EXERCISE OF STOCK OPTION

[Form for Shares registered in the United States]

To: Yield10 Bioscience, Inc.

IMPORTANT NOTICE: This form of Notice of Exercise may only be used at such time as the Company has filed a Registration Statement with the Securities and Exchange Commission under which the issuance of the Shares for which this exercise is being made is registered and such Registration Statement remains effective.

Ladies and Gentlemen:

I hereby exercise my Stock Option to purchase _____ shares (the "Shares") of the common stock, $0.01 par value, of Yield10 Bioscience, Inc. (the "Company"), at the exercise price of $_____ per share, pursuant to and subject to the terms of that Stock Option Grant Notice dated _____, 20__.

I understand the nature of the investment I am making and the financial risks thereof. I am aware that it is my responsibility to have consulted with competent tax and legal advisors about the relevant national, state and local income tax and securities laws affecting the exercise of the Option and the purchase and subsequent sale of the Shares.

I am paying the option exercise price for the Shares as follows:

_____

Please issue the Shares (check one):

to me; or

to me and _____, as joint tenants with right of survivorship,

at the following address:

_____

_____

_____

My mailing address for stockholder communications, if different from the address listed above, is:

_____

_____

_____

Very truly yours,

_____

Participant (signature)

_____

Print Name

_____

Date

Exhibit A-2

Exhibit 14.1

Yield10 Bioscience, Inc.
Code of Business Conduct and Ethics

Introduction

Purpose and Scope

The Board of Directors of Yield10 Bioscience, Inc. (together with its subsidiaries, the "Company") established this *Code of Business Conduct and Ethics* to aid the Company's directors, officers and employees in making ethical and legal decisions when conducting the Company's business and performing their day-to-day duties.

The Company's Board of Directors or a committee of the Board is responsible for administering the Code. The Board of Directors has delegated day-to-day responsibility for administering and interpreting the Code to a Compliance Officer. Our Chief Accounting Officer has been appointed the Company's Compliance Officer under this Code.

The Company expects its directors, officers and employees to exercise reasonable judgment when conducting the Company's business. The Company encourages its directors, officers and employees to refer to this Code frequently to ensure that they are acting within both the letter and the spirit of this Code. The Company also understands that this Code will not contain the answer to every situation you may encounter or every concern you may have about conducting the Company's business ethically and legally. In these situations, or if you otherwise have questions or concerns about this Code, the Company encourages each officer and employee to speak with his or her supervisor (if applicable) or, if you are uncomfortable doing that, with the Compliance Officer or the Company's Chief Executive Officer.

Contents of this Code

This Code has two sections which follow this Introduction. The first section, "***Standards of Conduct***," contains the actual guidelines that our directors, officers and employees are expected to adhere to in the conduct of the Company's business. The second section, "***Compliance Procedures***," contains specific information about how this Code functions including who administers the Code, who can provide guidance under the Code and how violations may be reported, investigated and adjudicated. This second section also contains a discussion about waivers of and amendments to this Code.

A Note About Other Obligations

The Company's directors, officers and employees generally have other legal and contractual obligations to the Company. This Code is not intended to reduce or limit the other obligations that you may have to the Company. Instead, the standards in this Code should be viewed as the *minimum standards* that the Company expects from its directors, officers and employees in the conduct of its business.

Standards of Conduct

Conflicts of Interest

The Company recognizes and respects the right of its directors, officers and employees ("Associates") to engage in outside activities which they may deem proper and desirable, provided that these activities do not impair or interfere with the performance of their duties to the Company or their ability to act in the Company's best interests. In most, if not all, cases this will mean that Associates must avoid situations that present a potential or actual conflict between their personal interests and the Company's interests.

A "conflict of interest" occurs when an Associate's personal interest interferes with the Company's interests. Conflicts of interest may arise in many situations. For example, conflicts of interest can arise when an Associate takes an action or has an outside interest, responsibility or obligation that may make it difficult for him or her to perform the responsibilities of his or her position objectively and/or effectively in the Company's best interests. Conflicts of interest may also occur when an Associate or his or her immediate family member receives some personal benefit (whether improper or not) as a result of the Associate's position with the Company. Each Associate's situation is different and in evaluating his or her own situation, a director, officer or employee will have to consider many factors.

Any transaction or relationship that reasonably could be expected to give rise to a conflict of interest should be reported promptly to the Compliance Officer. The Compliance Officer may notify the Board of Directors or a committee thereof as he deems appropriate. Actual or potential conflicts of interest involving an Associate director should be disclosed directly to the Chairman of the Board of Directors.

Factors that may be considered in evaluating a potential conflict of interest are, among other things:

- whether it may interfere with the Associate's job performance, responsibilities or morale;
- whether the Associate has access to confidential information;
- whether it may interfere with the job performance responsibilities or morale of others within the organization;
- any potential adverse or beneficial impact on the Company's business;
- any potential adverse or beneficial impact on our relationships with the Company's customers or suppliers or other service providers;
- whether it would enhance or support a competitor's position;
- the extent to which it would result in financial or other benefit (direct or indirect) to the Associate;
- the extent to which it would result in financial or other benefit (direct or indirect) to one of Company's customers; suppliers or other service providers; and

- the extent to which it would appear improper to an outside observer.

The following are **examples** of situations that may, depending on the facts and circumstances, involve conflicts of interest:

- **Employment by (or consulting for) or service on the board of a competitor, customer, supplier, or other service provider.** "Moonlighting" does not necessarily create a conflict of interest, if such activities do not interfere with the performance of duties for the Company. However, any activity that enhances or supports the position of a competitor to the detriment of the Company, including employment by or service on the board of a competitor, is prohibited. Employment by or service on the board of a customer or supplier or other service provider is generally discouraged and must be approved by the Compliance Officer prior to acceptance.
- **Owning, directly or indirectly, a significant financial interest in any entity that does business, seeks to do business, or competes with the Company.** In addition to the factors described above, factors to be considered in evaluating ownership for conflicts of interest include the size and nature of the investment; the nature of the relationship between the Company and the other entity; the Associate's access to confidential information, and their ability to influence Company decisions.
- **Soliciting or accepting gifts, favors, loans or preferential treatment from any person or entity that does business or seeks to do business with the Company.** Business gifts and entertainment are meant to create goodwill and sound working relationships and not to gain improper advantage with customers or facilitate approvals from government officials. Associates should not accept gifts, services, travel or entertainment that may reasonably be deemed to affect their judgment or actions in the performance of their duties for the Company. Gifts and entertainment should not be offered, provided or accepted unless consistent with customary business practices and **not** (a) excessive in value, (b) in cash or cash equivalents, (c) susceptible of being construed as a bribe or kickback, or (d) in violation of any laws. This principle applies to the Company's transactions everywhere in the world, even where the practice is considered "a way of doing business." An Associate who is uncertain about the appropriateness or acceptability of a particular gift should consult with the Compliance Officer, who may seek guidance from the Nominating and Corporate Governance Committee.
- **Soliciting contributions to any charity or for any political candidate from any person or entity that does business or seeks to do business with the Company.**
- **Conducting Company business transactions with a family member, significant other, or person who shares a household with an Associate.** Related-party transactions must be approved by the Nominating and Corporate Governance Committee and will be publicly disclosed to the extent required by applicable laws and regulations.
- **Exercising supervisory or other authority (directly or indirectly) on behalf of the Company over a co-worker who is also a family member.** No family member of a Director or executive officer should be employed by the Company. Human Resources should be notified of any relationship between non-executive employees. No employee

should be in a position of exercising supervisory or other authority (directly or indirectly) on behalf of the Company over a co-worker who is also a family member. The employee's supervisor and/or the Compliance Officer may consult with Human Resources to assess the advisability of reassignment.

Compliance with Laws, Rules and Regulations

The Company seeks to conduct its business in compliance with both the letter and the spirit of applicable laws, rules and regulations. No Associate shall engage in any unlawful activity in conducting the Company's business or in performing his or her day-to-day company duties, nor shall any Associate instruct others to do so.

Protection and Proper Use of the Company's Assets

Loss, theft and misuse of the Company's assets has a direct impact on the Company's business and its profitability. Associates are expected to protect the Company's assets that are entrusted to them and to protect the Company's assets in general. Associates are also expected to take steps to ensure that the Company's assets are used only for legitimate business purposes.

Corporate Opportunities

Directors, officers and employees owe a duty to the Company to advance its legitimate business interests when the opportunity to do so arises. Each Associate is prohibited from:

- diverting to himself or herself or to others any opportunities that are discovered through the use of the Company's property or information or as a result of his or her position with the Company unless such opportunity has first been presented to, and rejected by, the Company,
- using the Company's property or information or his or her position for improper personal gain**,** or
- competing with the Company.

Confidentiality

Confidential information generated and gathered in the Company's business plays a vital role in its business, prospects and ability to compete. "Confidential information" includes all
non-public information that might be of use to competitors or harmful to the Company or its customers if disclosed. Associates may not disclose or distribute the Company's confidential information, except when disclosure is authorized by the Company or required by applicable law, rule or regulation or pursuant to an applicable legal proceeding. Associates shall use confidential information solely for legitimate company purposes. Associates must return all of the Company's confidential and/or proprietary information in their possession to the Company when they cease to be employed by or to otherwise serve the Company.

Fair Dealing

Competing vigorously, yet lawfully, with competitors and establishing advantageous, but fair, business relationships with customers and suppliers is a part of the foundation for long-

term success. However, unlawful and unethical conduct, which may lead to short-term gains, may damage a company's reputation and long-term business prospects. Accordingly, it is the Company's policy that Associates must endeavor to deal ethically and lawfully with the Company's customers, suppliers, competitors and employees in all business dealings on the Company's behalf. No Associate should take unfair advantage of another person in business dealings on the Company's behalf through the abuse of privileged or confidential information or through improper manipulation, concealment or misrepresentation of material facts.

Accuracy of Records

The integrity, reliability and accuracy in all material respects of the Company's books, records and financial statements is fundamental to the Company's continued and future business success. No Associate may cause the Company to enter into a transaction with the intent to document or record it in a deceptive or unlawful manner. In addition, no Associate may create any false or artificial documentation or book entry for any transaction entered into by the Company. Similarly, officers and employees who have responsibility for accounting and financial reporting matters have a responsibility to accurately record all funds, assets and transactions on the Company's books and records.

Quality of Public Disclosures

The Company is committed to providing its stockholders with complete and accurate information about its financial condition and results of operations as required by the securities laws of the United States. It is the Company's policy that the reports and documents it files with or submits to the Securities and Exchange Commission, and its earnings releases and similar public communications made by the Company, include fair, timely and understandable disclosure. Officers and employees who are responsible for these filings and disclosures, including the Company's principal executive, financial and accounting officers, must use reasonable judgment and perform their responsibilities honestly, ethically and objectively in order to ensure that this disclosure policy is fulfilled. The Company's Disclosure Committee, along with senior management, is primarily responsible for monitoring the Company's public disclosure.

Compliance Procedures

Communication of Code

All Associates will be supplied with a copy of the Code upon the later of the adoption of the Code and beginning service at the Company. Updates of the Code will be provided from time to time. A copy of the Code is also available to all Associates by requesting one from the Compliance Officer or by accessing the Company's website at www.yield10bio.com.

Monitoring Compliance and Disciplinary Action

The Company's management, under the supervision of its Nominating and Corporate Governance Committee or, in the case of accounting, internal accounting controls or auditing matters, the Audit Committee, shall take reasonable steps from time to time to (i) monitor and audit compliance with the Code, including the establishment of monitoring and auditing systems

that are reasonably designed to investigate and detect conduct in violation of the Code, and (ii) when appropriate, impose and enforce appropriate disciplinary measures for violations of the Code.

Disciplinary measures for violations of the Code may include, but are not limited to, counseling, oral or written reprimands, warnings, probation or suspension with or without pay, demotions, reductions in salary, termination of employment or service and restitution.

The Company's management shall periodically report to the Nominating and Corporate Governance Committee on these compliance efforts including, without limitation, periodic reporting of alleged violations of the Code and the actions taken with respect to any such violation.

Reporting Concerns/Receiving Advice

Be Proactive. Every employee is encouraged to act proactively by asking questions, seeking guidance and reporting suspected violations of the Code and other policies and procedures of the Company, as well as any violation or suspected violation of applicable law, rule or regulation arising in the conduct of the Company's business or occurring on the Company's property. **If any employee believes that actions have taken place, may be taking place, or may be about to take place that violate or would violate the Code, he or she is obligated to bring the matter to the attention of the Compliance Officer or to make a report through the Company's Hotline.**

Seeking Guidance. The best starting point for an officer or employee seeking advice on ethics-related issues or reporting potential violations of the Code will usually be his or her supervisor. However, if the conduct in question involves his or her supervisor, if the employee has reported the conduct in question to his or her supervisor and does not believe that he or she has dealt with it properly, or if the officer or employee does not feel that he or she can discuss the matter with his or her supervisor, the employee may raise the matter with the Compliance Officer.

Communication Alternatives. Any officer or employee may communicate with the Compliance Officer by any of the following methods:

- By writing (which may be anonymous) to the Compliance Officer either by facsimile to 617-583-1767 (Attn: Compliance Officer) or by U.S. mail to Yield10 Bioscience, Inc., 19 Presidential Way, Woburn, MA 01801, Attn: Compliance Officer;
- By e-mail to complianceofficer@yield10bio.com (anonymity cannot be maintained); or
- By phoning an off-site Hotline voicemail account which the Company has established for receipt of questions and reports of potential violations of the Code. The off-site voicemail account may be reached at 866-553-4729 and calls may be made anonymously as set forth below under "Reporting; Anonymity; Retaliation".

Reporting Accounting and Similar Concerns. Any concerns or questions regarding any potential violations of the Code, any other company policy or procedure or applicable law, rules or regulations involving accounting, internal accounting controls or auditing matters should be directed to the Audit Committee. Officers and employees may communicate with the Audit Committee:

- by phoning the Hotline at 866-553-4729.
- by mail, addressed to "Audit Committee Chairman, Yield10 Bioscience, Inc., 19 Presidential Way, Woburn, MA 01801."

Officers and employees may use the above methods to communicate anonymously with the Audit Committee.

Misuse of Reporting Channels. Employees must not use these reporting channels in bad faith or in a false or frivolous manner. **Further, employees should not use the off-site voicemail account to report grievances that do not involve the Code or other ethics-related issues.**

Reporting; Anonymity; Retaliation. When reporting suspected violations of the Code, the Company prefers that officers and employees identify themselves to facilitate the Company's ability to take appropriate steps to address the report, including conducting any appropriate investigation. However, the Company also recognizes that some people may feel more comfortable reporting a suspected violation anonymously.

If an officer or employee wishes to remain anonymous, he or she may do so, and the Company will use reasonable efforts to protect the confidentiality of the reporting person subject to applicable law, rule or regulation or to any applicable legal proceedings. In the event a report is made anonymously, however, the Company may not have sufficient information to investigate or evaluate the allegations. Accordingly, an anonymous report should provide as much detail as is reasonably necessary to permit the Company to perform an evaluation and, if appropriate, conduct an appropriate investigation.

No Retaliation

The Company expressly forbids any retaliation against any officer or employee who, acting in good faith, reports suspected misconduct. Any person who participates in any such retaliation is subject to disciplinary action, including termination.

Waivers and Amendments

No waiver of any provisions of the Code for the benefit of a director or an executive officer (which includes without limitation, for purposes of this Code, the Company's principal executive, financial and accounting officers) shall be effective unless (i) approved by the Board of Directors or, if permitted, a committee thereof, and (ii) if applicable, such waiver is promptly disclosed to the Company's stockholders in accordance with applicable U.S. securities laws and/or the rules and regulations of the exchange or system on which the Company's shares are traded or quoted, as the case may be.

Any waivers of the Code for other employees may be made by the Compliance Officer, the Board of Directors or, if permitted, a committee thereof.

All amendments to the Code must be approved by the Board of Directors or a committee thereof and, if applicable, must be promptly disclosed to the Company's shareholders in accordance with applicable United States securities laws and/or the rules and regulations of the exchange or system on which the Company's shares are traded or quoted, as the case may be.

/s/ Oliver Peoples	December 3, 2018
Oliver Peoples President and Chief Executive Officer	Date

Exhibit 21.1

Subsidiary Name	**Jurisdiction of Organization**
Yield10 Bioscience Securities Corp.	MA
Metabolix Oilseeds, Inc.	Canada
Metabolix GmbH	Germany

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statements on Form S-1 (No. 333-220040), Form S-3 (No. 333-217051) and Form S-8 (Nos.333-138631, 333-145232, 333-155115, 333-157869, 333-165405, 333-172724, 333-181268, 333-187589, 333-194858, 333-194859, 333-202983, 333-217052 and 333-226731) of Yield10 Bioscience, Inc. of our report dated March 28, 2019, relating to our audit of the consolidated financial statements for the year ending December 31, 2018 of Yield10 Bioscience, Inc. and its subsidiaries which appears in this Annual Report on Form 10-K of Yield10 Bioscience, Inc., for the year ending December 31, 2018.

/s/RSM US LLP

Boston, Massachusetts
March 28, 2019

EXHIBIT 31.1

CERTIFICATIONS

I, Oliver P. Peoples certify that:

1. I have reviewed this annual report on Form 10-K of Yield10 Bioscience, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 28, 2019

/s/ OLIVER P. PEOPLES

Name: Oliver P. Peoples

Title: *President and Chief Executive Officer (Principal Executive Officer)*

EXHIBIT 31.2

CERTIFICATIONS

I, Charles B. Haaser, certify that:

1. I have reviewed this annual report on Form 10-K of Yield10 Bioscience, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 28, 2019

/s/ CHARLES B. HAASER

Name: Charles B. Haaser

Title: *Chief Accounting Officer*
(Principal Financial and Accounting Officer)

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the annual report on Form 10-K of Yield10 Bioscience, Inc. (the "Company") for the year ended December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), we, Oliver P. Peoples, President, Chief Executive Officer and Principal Executive Officer of the Company and Charles B. Haaser, Chief Accounting Officer and Principal Financial and Accounting Officer of the Company, certify, pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to my knowledge that:

1. the Report fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended, and

2. the information in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

This certification is being provided pursuant to 18 U.S.C. 1350 and is not to be deemed a part of the Report, nor is it to be deemed to be "filed" for any purpose whatsoever.

YIELD10 BIOSCIENCE, INC.

Date: March 28, 2019 By: /s/ OLIVER P. PEOPLES

Oliver P. Peoples
President and Chief Executive Officer (Principal Executive Officer)

Date: March 28, 2019 By: /s/ CHARLES B. HAASER

Charles B. Haaser
Chief Accounting Officer (Principal Financial and Accounting Officer)