Table of Contents

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

FORM 10-K

(Mark One)

☑ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2019;

or

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission file number 001-38161

Calyxt, Inc.

(Exact name of registrant as specified in its charter)

Delaware	27-1967997
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
2800 Mount Ridge Road Roseville, MN	55113-1127
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (651) 683-2807

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock ($(0.0001 par value)	CLXT	The NASDAQ Global 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 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 (check one):

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 has 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 ☑

Aggregate market value of the common stock held by non-affiliates of the registrant: As of June 28, 2019, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of shares of common stock held by non-affiliates of the registrant was $125,417,099 based upon the closing sale price of the registrant's common stock of $12.48 on such date.

The number of outstanding shares of the registrant's common stock on March 4, 2020 was 32,990,647 shares.

DOCUMENTS INCORPORATED BY REFERENCE

The information required by Part III of this Annual Report on Form 10-K, to the extent not set forth herein, is incorporated herein by reference from the registrant's definitive proxy statement relating to the registrant's Annual Meeting of Stockholders to be held in 2020, which definitive proxy statement shall be filed with the Securities and Exchange Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

Table of Contents

Terms

When we use the terms "we," "us," the "Company," or "our" in this report, unless the context otherwise requires, we are referring to Calyxt, Inc. When we use the term "Cellectis," we are referring to Cellectis S.A., our majority stockholder. Cellectis is a leading gene-editing company focused on the development of immuno-oncology therapeutics.

We own the names and trademarks Calyxt® and Calyno®; we also own or license other trademarks, trade names and service marks of Calyxt appearing in this Annual Report on Form 10-K. The names and trademarks "Cellectis®" and "TALEN®", and other trademarks, trade names and service marks of Cellectis appearing in this Annual Report on Form 10-K are the property of Cellectis. This Annual Report on Form 10-K also contains additional trade names, trademarks and service marks belonging to other companies. We do not intend our use or display of other parties' trademarks, trade names or service marks to imply, and such use or display should not be construed to imply, a relationship with, or endorsement or sponsorship of us by, these other parties.

Cautionary Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K contains "forward-looking statements" within the meaning of the federal securities laws, including Section 27A of the Securities Act of 1933, as amended (the Securities Act), and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act). We may also make forward-looking statements in other reports filed with the Securities and Exchange Commission, in materials delivered to stockholders and in press releases. In addition, our representatives may from time to time make oral forward-looking statements.

We have made these forward-looking statements in reliance on the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. In some cases, you can identify these statements by forward-looking words such as "may," "might," "will," "should," "expects," "plans," "anticipates," "believes," "estimates," "predicts," "potential" or "continue," the negative of these terms and other comparable terminology. These forward-looking statements, which are based on our current assumptions and expectations, are subject to risks and uncertainties. Forward-looking statements in this report may include statements about our future financial performance, product pipeline and development, commercialization efforts, regulatory progression, potential collaborations and partnerships, growth strategies, and anticipated trends in our business. These statements are predictions based on our current expectations and projections about future events and trends. Our actual results could be materially different than those expressed, implied or anticipated by forward-looking statements.

There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements, including, without limitation, the factors discussed in Part I, Item 1A, "Risk Factors," of this Annual Report on Form 10-K, which should be considered an integral part of Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations."

Any forward-looking statement made by us in this Annual Report on Form 10-K is based only on information currently available to us and speaks only as of the date of this report. We do not assume any obligation to publicly provide revisions or updates to any forward-looking statements after the date of this Annual Report on Form 10-K, whether as a result of new information, future developments or otherwise, should circumstances change, except as otherwise required by law.

Market Data

Unless otherwise indicated, information contained in this Annual Report on Form 10-K concerning our industry and the markets in which we operate is based on information from various sources, including independent industry publications. In presenting this information, we have also made assumptions based on such data and other similar sources, and on our knowledge of, and our experience to date in, the potential markets for our product. The industry in which we operate is subject to a high degree of uncertainty and risk due to a variety of factors, including those described in Part I, Item 1A, "Risk Factors" in this Annual Report on Form 10-K. These and other factors could cause results to differ materially from those expressed in the estimates made by the independent parties and by us.

Website Disclosure

We use our website (www.calyxt.com), our corporate Twitter account (@Calyxt_Inc) and our corporate LinkedIn account (https://www.linkedin.com/company/calyxt-inc) as routine channels of distribution of company information, including press releases, analyst presentations, and supplemental financial information, as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation FD. Accordingly, investors should monitor our website and our corporate Twitter and LinkedIn accounts in addition to following press releases, filings with the SEC and public conference calls and webcasts.

Additionally, we provide notifications of announcements as part of our website. Additionally, we provide notifications of announcements as part of our website.

None of the information provided on our website, in our press releases or public conference calls and webcasts or through social media is incorporated into, or deemed to be a part of, this Annual Report on Form 10-K or in any other report or document we file with the SEC, and any references to our website or our corporate Twitter and LinkedIn accounts are intended to be inactive textual references only.

JOBS Act

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups (JOBS) Act of 2012 (the JOBS Act). As an emerging growth company, we may take advantage of certain reduced disclosure and other requirements that are otherwise applicable generally to public companies. Pursuant to these provisions:

- we are not required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002 (the Sarbanes-Oxley Act);
- we have (i) reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and (ii) exemptions from the requirements of holding a non-binding advisory vote on executive compensation, including golden parachute compensation.

We may take advantage of these provisions for up to five years or until such earlier time that we are no longer an emerging growth company.

We would cease to be an emerging growth company upon the earliest to occur of (1) the last day of the fiscal year in which we have more than $1.07 billion in annual revenue; (2) the date we qualify as a "large accelerated filer," with at least $700 million of public float (3) the issuance, in any three-year period, by us of more than $1.0 billion in non-convertible debt securities held by non-affiliates; and (4) the last day of the fiscal year ending after the fifth anniversary of our initial public offering, or December 31, 2022.

In addition, Section 107 of the JOBS Act also provides that an emerging growth company can use the extended transition period provided in Section 7(a)(2)(B) of the Securities Act for complying with new or revised accounting standards. This permits an emerging growth company to delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We intend to take advantage of the exemptions discussed above. Accordingly, the information contained herein may be different than the information you receive from other public companies.

PART I

Item 1. Business.

Company Overview

Calyxt was incorporated in the State of Delaware in 2010 and is a majority-owned subsidiary of Cellectis.

We are a technology company focused on delivering plant-based solutions that are healthy and sustainable. We intend to bring these products to market one of two ways. First, through an integrated business model where we leverage third party assets in the agricultural supply chain to process grains and sell the resulting products. Second, through collaboration arrangements or license agreements with third parties to develop or license products. In a collaboration arrangement we expect to receive payments for the use of our innovations, upon the achievement of development milestones, and from royalties upon commercial sale of products. We also have an option to monetize our technology platform by strategically licensing our innovations to others. We evaluate the go-to-market strategy and business model for product candidates on a case-by-case basis. We are currently exploring product opportunities in alfalfa, canola, hemp, oats, peanuts, peas, potato, soybeans, wheat, and other crops.

Using our proprietary technologies and expertise, including TALEN® gene-editing technology exclusively licensed to us in the field of agriculture, we develop crops with targeted traits quickly and more cost effectively than through traditional methods. Our technologies enable precise cuts to DNA in a single plant cell, and then the plant's natural repair mechanism occurs resulting in the edited plant. We then regenerate the edited single cell into a full plant. We believe that we can assess the viability of a trait in less than two years by utilizing these proprietary technologies.

Our first product is a high oleic soybean designed to produce a "heart healthy[1]" oil that has increased heat stability with zero grams trans fat per serving. We derive high oleic oil and meal from our soybean and completed our first sales in the first quarter of 2019. Among our other product candidates are an improved digestibility alfalfa, a high fiber wheat and a cold storable potato. We also intend to explore the ability to add value to our existing product candidates by combining traits in the same crop, which may allow us to deliver products with additional benefits without adding significant supply chain costs.

Our current commercial focus is North America. This may expand over time to other geographies, subject to customer demand and regulatory requirements, among other factors.

Market and Industry Overview

We are poised to take advantage of trends that include increasing demand for products that support healthier eating, improved traceability and global sustainability.

Consumers have developed an increasingly heightened awareness of the role that dietary habits play in long-term wellness. This trend is especially prevalent in wealthier, developed nations where consumers have greater access to information that is helping to shift their consumption habits. In the United States and other developed nations, changes in buying habits are creating dynamic shifts in the grocery aisle and for out-of-home eating. Consumers view food as a key to good health. More food, functional food and supplement products are being launched that go beyond basic nutrition to support wellness, digestive health, and higher energy levels. Locally sourced foods are becoming more attractive to consumers and the demand for transparency in food origin, growing method, sourcing, production and labeling is gaining traction. We believe that as consumers continue the shift from production-driven food culture to a modern demand-driven food culture, they will continue to demand more information and accountability about how ingredients are sourced and processed, how "real" their food products are, and how responsive food companies are to consumers' desire for choice and customization. Regulatory changes including with respect to labeling, are also expected to help drive change in consumer consumption and expectation.

As these consumer demands for sourcing, transparency, traceability, environmental impact, and climate impact data increase for food products, they are also increasing for non-food products. We see plant-based products having a significant role in addressing these consumer demands for non-food products as well.

1 Supportive but not conclusive scientific evidence suggests that daily consumption of about 1½ tablespoons (20 grams) of oils containing high levels of oleic acid, may reduce the risk of coronary heart disease. To achieve this possible benefit, oleic acid-containing oils should replace fats and oils higher in saturated fat and not increase the total number of calories you eat in a day. One serving of Calyxt high oleic soybean oil provides 16 grams of oleic acid (which is 16.3 grams of monounsaturated fatty acid).

Furthermore, consumers and investors alike are concerned about the impact agricultural practices may have on climate change, and climate change itself will pressure the world's food supply, food chain and adjacent non-food value chains. Whether the concern is methane gas output from livestock and dairy production, the fossil fuel impact of importing vegetable oils into the United States, the direct use of oilseed crops for energy, or the ability to raise wheat in Kansas in 2040, we believe our technologies will allow us to collaborate with others to bring sustainability solutions to market. For example, our first collaboration project in alfalfa has been designed to improve alfalfa digestibility and thereby reduce methane gas output per gallon of milk production.

For our first product, high oleic soybean oil, we anticipate taking share within the premium vegetable oil market. The premium vegetable oil market in the United States was estimated to be nearly 15 billion pounds, valued at $7.5 billion, in 2018. We expect our oil to compete against other premium oils in the foodservice, food ingredient, animal nutrition, and industrial market segments. All these market segments represent a multi-billion-pound addressable market for our oil, and we believe the potential premiums will offer us better economics than other segments of the market. We sell our high oleic soybean meal to dairy, poultry and pork producers.

From a sustainability perspective, most other premium oils are imported and therefore have a higher carbon footprint than ours. We are also focused on environmental stewardship, biodiversity and sustainable practices in agriculture through our agreements with contracted growers. We are also able to trace our product to the field level to meet customer and consumer demands for sustainable sourcing, environmental impact and transparency of production.

Our Technology

Our proprietary technologies and intellectual property portfolio enable us to edit the plant genome by knocking out genes or making precise gene edits. We take advantage of our knowledge about plant gene function to identify and select beneficial genetic variation that results in traits of value. A key difference between our gene-edited products and genetically modified organisms, commonly referred to as GMOs, is a GMO product contains foreign DNA whereas our products contain no foreign DNA.

Our gene-editing platform relies on our capacity to custom design DNA-sequence specific cutting enzymes (nucleases) for a chosen gene and our capability to enable such custom-made nucleases to make a desired edit into the living plant cells we want to edit. Our platform also relies on precisely chosen binding elements that can specifically recognize unique DNA sequences and can be tailored to target such sequences in a chosen gene or genetic region.

We use transcription activator-like effector nucleases, or TALEN, as the foundation of our gene editing platform. TALEN enable gene editing by first recognizing a specific DNA sequence and then precisely inducing a controlled DNA double-strand break. A DNA double-strand break is the key to unlocking gene editing. The removal of nucleotides (through non-homologous end-joining) can result in gene inactivation or a gene knock-out. If a DNA fragment from a different region of the genome with a similar sequence to the TALEN binding site is provided at the time of the DNA break, then the DNA fragment can be moved or copied into the targeted region of the plant genome to repair a broken gene (through homologous recombination). We are currently focused on using gene knockouts and gene repair to develop new traits, which result in products containing no foreign DNA.

Key Advantages of TALEN Technology

- Intellectual property—We have a strong intellectual property position with respect to TALEN® technology and its use to make our product candidates.
- Specificity—TALEN® may be designed to limit its DNA cleavage to the desired sequence and to avoid cutting elsewhere in the genome. This parameter is essential as plant genomes are highly complex; for example, the wheat genome comprises approximately 16 billion base pairs across three unique genomes.
- Precision—It is possible to design a TALEN® that cleaves at any selected region in any gene. For example, there are multiple FAD genes in the soybean genome. For our high oleic soybean, our TALEN® edited the two genes that produce fatty acids in the seed.
- Efficiency—A large percentage of cells treated by TALEN® bear the desired gene edit. Because of TALEN® efficiency, only a handful of plants must be regenerated to recover those with edits in the target gene.
- Validation—We have successfully edited genes in several plant species since our inception in 2010 and can generate thousands of TALEN® per week.
- Speed to Market—We can assess the viability of a trait in less than two years and commercialize it in an additional three to four years with a significantly reduced development cost compared to GMO and other development processes.

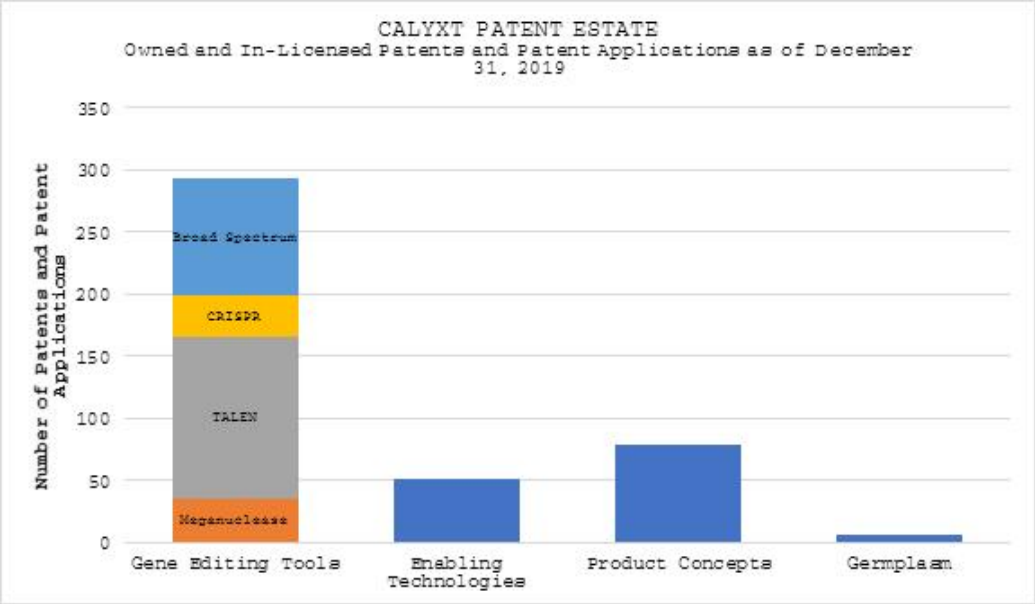
The following chart depicts our development process:

Intellectual Property

Intellectual property protection is key to our business. As of December 31, 2019, our patent estate is composed of patents and patent applications owned by us and in-licensed from other parties. Most of the in-licensed patents and patent applications are licensed from Cellectis or the University of Minnesota. The license from Cellectis includes technologies invented at Cellectis, technologies invented at Calyxt when we were a wholly owned subsidiary of Cellectis, and technologies licensed to Cellectis from third parties. We also have access to additional patents and patent applications through in-licensing agreements with other research institutions and universities.

Our patent portfolio is directed to: (1) gene editing tools, (2) enabling technologies, (3) product concepts, and (4) germplasm.

(1) Gene Editing Tools: Gene editing tools are the core of our portfolio with almost 300 patents and patent applications focused on plant gene editing technologies using meganuclease, TALEN, or CRISPR technologies as well as broad-spectrum technologies that can be used with multiple gene editing platforms. Most of our patent estate related to gene editing tools is licensed to us by Cellectis and the University of Minnesota, with the remainder either in-licensed from other research institutions or owned by us.
(2) Enabling Technologies: Enabling technologies are technologies used to develop products once the gene editing nuclease has been designed. The majority of our enabling technology patent estate was developed by us and either owned by us or licensed to us by Cellectis, with the remainder in-licensed from the University of Minnesota and other research institutions.
(3) Product Concepts: Product concepts include gene edited crops (e.g., TALEN edited high oleic soybean plants) and resulting food products (e.g., Calyxt's high oleic soybean oil). All of our patent estate covering product concepts was developed by us and are either owned by us or licensed to us by Cellectis.
(4) Germplasm are plant varieties developed by us as part of our plant breeding program. Our germplasm patents and patent applications cover germplasm we developed.



We are actively involved in the prosecution and protection of our key technology, which globally includes approximately 70 patent families comprised of approximately 300 patents and over 100 patent applications. Of those patents, 30 have been issued in the U.S., with the remaining issued in key geographies outside the U.S., primarily Europe, Japan, and China. This number also includes European patents validated in individual European countries. Of those patent applications, 34 are pending in the United States, with the remaining pending in key geographies outside the U.S.

Individual patent terms extend for varying periods of time, depending upon the date of filing of the patent application, the date of patent issuance, and the legal term of patents in the countries in which they are obtained. The issued patents that we have in-licensed will expire on dates ranging from 2020 to 2037. If patents are issued on the pending patent applications owned by us or that we have in-licensed, the resulting patents are projected to expire on dates ranging from 2022 to 2040. For more information regarding the risks related to our intellectual property, please see “Risk Factors—Risks Related to Intellectual Property.”

License Agreement with Cellectis

Through our license agreement with Cellectis, we have access to intellectual property that broadly covers the use of engineered nucleases for plant gene editing. This intellectual property covers methods to edit plant genes using “chimeric restriction endonucleases,” which include TALEN®, CRISPR/Cas9, zinc finger nucleases, and some types of meganucleases. We believe this umbrella intellectual property applies broadly across gene editing in plants and makes us a key player in the gene editing intellectual property space.

Under our license agreement with Cellectis, we have exclusive sublicense rights (subject to existing non-exclusive sublicenses to third parties) to intellectual property exclusively licensed to Cellectis from the University of Minnesota in the field of researching, developing and commercializing agricultural and food products, including traits, seeds, and feed and food ingredients (excluding any application in connection with animals or animal cells). These patent applications cover the use of DNA replicons for gene editing.

We have also been granted a non-exclusive license to use the TALEN® trademark in connection with our use of licensed products under the agreement. Any improvements we make to the in-licensed intellectual property are owned by us and licensed back to Cellectis on an exclusive basis for any use outside of our exclusive agricultural field of use. The exclusivity of our license agreement with Cellectis is subject to certain non-exclusive licenses Cellectis granted to third parties in the field of research.

In consideration for the license from Cellectis, we are required to pay to Cellectis, on a product-by-product and country-by-country basis, a royalty of 3 percent of net sales less certain items as defined including costs for grain and seed of any products that are covered by the patents licensed from Cellectis. In addition, we are required to pay Cellectis 30 percent of revenue we receive for sublicensing our rights under the agreement to third parties. Our payment obligations to Cellectis will expire upon the expiration of the last-to-expire valid claim of the patents licensed to us by Cellectis.

Under our license agreement with Cellectis, and as between the parties, Cellectis has the first right to control the prosecution, maintenance, defense and enforcement of the licensed intellectual property and we will have the right to step in and assume such control with respect to the patents owned by Cellectis and exclusively licensed to us under the agreement if Cellectis elects to not prosecute, maintain, defend or enforce such patents. In certain circumstances, if Cellectis elects to abandon any patents owned by Cellectis and exclusively licensed to us under the agreement, we have the right to assume ownership of such patents. In addition, some of the intellectual property that is licensed to us by Cellectis consists of a sublicense of intellectual property originally licensed to Cellectis by the University of Minnesota. Our license from Cellectis is subject to the license agreement between the University of Minnesota and Cellectis and should our activities under such sublicense violate the license agreement between Cellectis and the University of Minnesota, we are responsible for any related damages that Cellectis may incur. In addition, we are required to reimburse Cellectis for any payments made by Cellectis to the University of Minnesota pursuant to the license agreement between the University of Minnesota and Cellectis to the extent that such payments are required to be made as a result of our applicable activities. Under the license agreement between Cellectis and the University of Minnesota, the University of Minnesota has the first right to control the prosecution and maintenance of the licensed intellectual property.

Our license agreement with Cellectis is perpetual. However, it may be terminated at any time upon the mutual written agreement of both parties, either party's uncured material breach of the agreement, or upon certain bankruptcy and insolvency related events.

License Agreement between Cellectis and Regents of the University of Minnesota—TALEN®

In January 2011, Cellectis entered into an exclusive license agreement with the University of Minnesota, which was amended in 2012, 2014 and 2015. Pursuant to the agreement, as amended, Cellectis and its affiliates were granted an exclusive, worldwide, royalty-bearing, sublicensable license, under certain patents and patent applications owned by the University of Minnesota, to make, use, sell, import and otherwise dispose of products covered by the licensed patents, in all fields of use. These licensed patents relate to TALEN molecules and their use in gene editing.

Pursuant to the agreement, with respect to the agricultural field, Cellectis is required to pay to the University of Minnesota a yearly fee, as well as a commercialization fee for every seed variety containing new traits developed using the licensed technology. Cellectis is also required to pay the University of Minnesota milestone payments based on the net sales of licensed products in the agricultural field. Cellectis must also pay the University of Minnesota certain patent-related expenses for prosecuting and maintaining the licensed patents; and under our license agreement with Cellectis, we are obligated to reimburse Cellectis for these prosecution costs.

The agreement will expire upon the expiration of the last to expire valid claim of the licensed patents. The University of Minnesota may terminate the agreement upon advance written notice in the event of the insolvency or bankruptcy of Cellectis, and immediately upon written notice if Cellectis challenges the validity or enforceability of any licensed patent in a court or other applicable authority. Cellectis and the University of Minnesota may terminate the agreement by written notice in the event of the other party's breach that has not been cured within a specified number of days after receiving notice of such breach.

License Agreement between Calyxt and Regents of the University of Minnesota—CRISPR

In December 2014, we entered into an exclusive license with the University of Minnesota, pursuant to which we were granted an exclusive, worldwide, sublicensable license under a specified patent application and any patents that issue therefrom owned by the University of Minnesota relating to the use of the CRISPR-Cas9 technology to make use, and commercialize products covered by the licensed patents in any field of use. Pursuant to the terms of the agreement, we must use commercially reasonable efforts to commercialize the licensed technology and to manufacture, offer to sell, and sell licensed products as soon as practicable and to maximize sales. We must also achieve certain sales- and patent-related milestones.

Per the terms of the agreement, we paid the University of Minnesota an upfront license fee. We are also required to pay an annual fee, patent-related expenses for prosecution and maintenance of the licensed patents, and a percentage of any revenues received by us under sublicenses. If we undergo a change of control and wish to assign all our rights and duties under the agreement, we must pay the University of Minnesota a specified transfer fee.

Unless earlier terminated under the terms of the agreement, the agreement will continue in effect until no licensed patent is active and until no licensed patent application is pending. The University of Minnesota may terminate the agreement for our uncured breach of the agreement upon 90 days' prior written notice, or 60 days' prior written notice if the breach relates to our payment obligations under the agreement. The University of Minnesota may also terminate the agreement, upon 10 days' prior written notice, if we file for bankruptcy or become insolvent. The University of Minnesota may also immediately terminate the agreement if we or our agents or representatives commences or maintains an action in any court or before any governmental agency asserting or alleging the invalidity or unenforceability of the licensed patent rights. We may terminate the agreement for The University of Minnesota's uncured breach of the agreement upon 90 days' prior written notice. We may also terminate the agreement at any time upon 60 days' prior written notice.

Trademarks

As of December 31, 2019, we have four issued trademarks in the United States.

Our Products

In late February 2019, we commercialized our first products, high oleic soybean oil and meal, and began generating revenue from their sale.

High Oleic Soybean

Soybean oil has historically been partially hydrogenated to enhance its oxidative stability in order to increase shelf life and improve frying characteristics. This process creates trans-unsaturated fatty acids, or trans fats, which have been demonstrated to raise low-density lipoprotein (LDL) cholesterol levels and lower high-density lipoprotein (HDL) cholesterol levels. High LDL and low HDL have been tied to increased risk for cardiovascular disease. The discovery that dietary trans fats increase the risk of several adverse health issues led the FDA to rule in 2003 that manufacturers must include trans-fat content information on the "Nutrition Facts" label of foods. In 2015, the FDA banned the addition of partially hydrogenated oils to food products in a phased approach, with full effectiveness commencing January 2020.

Monounsaturated fats, such as oleic acid, have been linked to reducing LDL cholesterol and triglycerides and raising HDL cholesterols. Diets rich in monounsaturated acids are associated with lower fat mass and decreased blood pressure. High levels of oleic acids can be found in olive, canola, sunflower and safflower oils.

We developed a soybean trait that has produced oils with a fatty acid profile that contains 80% oleic acid, 20% less saturated fatty acids compared to commodity soybean oil and zero grams of trans fat per serving.

Oil produced from our high oleic soybean also has multiple desirable characteristics as an ingredient for the food industry. The high level of oleic acid in our soybean oil enhances oxidative stability compared to other premium and commodity oils. This eliminates the need for partial hydrogenation, and thus little to no trans fats are produced during oil production. Furthermore, our high oleic soybean oil offers additional potential benefits, including a threefold increase in fry-life and reduced polymerization upon frying at high temperatures. Our high oleic soybean oil is also neutral in flavor, odorless and colorless and is therefore desired as a food ingredient because it has limited impact on the sensory characteristics of the final food product. Because we require segregation of our soybeans from others in the supply chain, which we refer to as identity preservation, our customers can make traceability statements if they elect to do so. In addition, our high oleic soybean oil requires less fossil fuel to process and transport to customer manufacturing sites than imported premium oils. We are currently targeting sales of our high oleic soybean oil to foodservice, food manufacturing, animal nutrition, and industrial market segments. We are targeting sales of our high oleic soybean meal to dairy, poultry, and pork producers.

Our high oleic soybean seed is sold either directly by us or through distributors to farmers. We introduced a single variety of our high oleic soybean in the northern United States in 2017. This single variety was designed to grow well in parts of South Dakota and Minnesota. In 2019 and 2018 we operated with that single variety as our only seed product. In 2019 we contracted more than 36,000 acres in South Dakota and Minnesota to grow our high oleic soybean. Also in 2019 we completed the processing and sale of all grain harvested from crops grown in 2018 and prior. We also took delivery of the bushels from approximately 30 percent of the acres grown in 2019 In 2018 we contracted more than 17,000 acres in South Dakota and Minnesota to grow our high oleic soybean.

Our 2020 acreage goal was initially 100,000 acres contracted. As of March 1, 2020, we had exceeded this goal. To drive this acreage expansion, we are planning to launch five new soybean seed varieties for the 2020 planting season. These launches will expand our maturity groups and enable north to south expansion of growers, as well as a move east to Iowa. It will also diversify our weather risk. In 2019 we added three distributors for our seed: Agtegra Cooperative, focused on South Dakota and North Dakota; Landus Cooperative, focused on Iowa; and Central Valley Agriculture, focused on Nebraska and Kansas. These cooperatives will also all assist us with agronomy support, grain storage and transportation. Landus Cooperative is also a key soybean crusher in our supply chain. As a result of this expansion we will have access to distribution in states where over 45% of the total U.S. soybean acres are grown. Going forward, we expect to continue to double our acres annually for each of the next several years. We intend to support continued acreage growth with the launch of three to five new soybean varieties in 2021 and 2022 and adding additional seed distributors and other processors to our portfolio as needed.

We operate an identity-preserved supply chain to segregate our soybeans from field to processor. In 2019 we built a supply chain network by contracting on a toll basis with elevators, processors, refiners and transportation companies. As we move forward, we will work to optimize our supply chain, including where we contract acres, whether and how we transport grain, and what level of toll charges we pay as we scale. We expect these activities will help us improve our product margins on a go-forward basis.

We intend to continue growing, processing, and storing our high oleic soybeans using existing third-party infrastructure and standard industry practices currently used for non-transgenic products. We believe a supply chain of this nature enables us to maintain flexibility and allows us to apply our resources toward maximizing innovation and product development while minimizing our capital expenditures and overhead.

Our Product Pipeline

We identify product concepts from our own research and inbound interest from potential collaborators. We continue to refine our portfolio and seek to take advantage of the largest market opportunities. We categorize our stages of pre-commercial development as follows:

- Discovery, where we identify genes of interest or make initial development crosses between favorable breeding lines;
- Phase I, where we conduct our gene editing and or produce our initial breeding stock with desired traits, and produce the initial seed for testing;
- Phase II, where we perform validation testing and voluntarily consult with applicable regulatory authorities; and
- Phase III, where we or our collaborator develop the first commercial-scale pilot production and perform final testing prior to commercialization.

We disclose projects by name that are in Phase II or later in our development process and provide more general information about our earlier projects.

We are currently exploring product opportunities in alfalfa, canola, hemp, oats, peanuts, peas, potato, soybeans, wheat, and other crops. In the future, we expect to expand our product pipeline to include other crops.

As of December 31, 2019, we had a total of 15 products or product candidates, comprised of one commercial product, three product candidates in Phase 2, and eleven product candidates in Phase I or Discovery. We continue to evaluate additional product concepts as part of our development process and innovation efforts. We expect to launch at least six product candidates from now through 2024, including our hemp product candidate in 2020, our alfalfa product in 2021 through our collaboration with S&W, our high fiber wheat product candidate as early as 2022, and three additional product candidates either via our integrated business model or in collaboration with third parties.

As of December 31, 2018, we had six product candidates in our development funnel.

A summary of our pipeline at December 31, 2019 is as follows:

Improved Digestibility Alfalfa

Alfalfa is a key feedstock in the production of milk from dairy cattle. The dairy industry is a significant producer of greenhouse gas and user of water. Dairy herds also produce substantial amounts of solid waste. Our alfalfa is designed to enable those producers to reduce their footprint in all three areas. We developed an alfalfa that has reduced lignin content in the stem of the plant, enabling it to be more digestible by livestock. Because the alfalfa is more digestible, fewer cows are needed to produce the same quantity of milk, potentially reducing the aggregate amount of water consumed and waste produced. We developed this product in collaboration with S&W Seed (S&W) (NASDAQ: SNSW) and expect it to launch in 2021 following the completion of field trials, testing and any voluntary regulatory consultations. Pursuant to our collaboration agreement, we are negotiating the commercial terms with S&W and expect to receive ongoing royalties from S&W's sales of alfalfa seed.

High Fiber Wheat

Fiber is the indigestible portion of food that is essential for healthy digestion. Research has shown that fiber plays an important role in maintaining bowel health, lowering cholesterol, stabilizing blood glucose levels and controlling weight gain. In recent years, the awareness of the health benefits of high fiber diets has increased. This has translated to a strong growth in demand for high fiber food products, with approximately 35% of grocery shoppers now seeking high fiber foods.

We are developing our high fiber wheat product candidate that could be used to produce white flour with up to three times more dietary fiber than standard white flour while maintaining the same flavor and convenience of use. This product candidate is currently in Phase II of our development process. In March 2018 we received confirmation from USDA that our high fiber wheat is deemed non-regulated pursuant to APHIS's regulatory procedures. We began planting high fiber wheat in field trials in 2018 and continued testing in 2019. During the first quarter of 2020, we were notified that a significant portion of our high fiber wheat plants were damaged in field trials due to improper aerial chemical applications by unaffiliated third parties. While we are continuing to assess the impact of this damage on the overall development process and timeline for this product candidate, we expect to harvest the remaining field trial crop in spring 2020 and continue Phase II development in 2020. Our Phase II development activities in 2020 will include testing the product concept in field conditions, completing food application studies and voluntarily consulting with FDA. Depending on the results of the spring 2020 field trial crop harvest and the success of our other activities in Phase II and Phase III, our high fiber wheat product may launch as early as 2022.

Cold Storable Potato

A portion of potatoes harvested each fall are cold stored to reduce sprouting and extend postharvest shelf life. During cold storage, reducing sugars can accumulate in the potatoes and when cooked at temperatures above 250°F, the reducing sugars interact with free amino acids resulting in brown, bitter-tasting products and elevated levels of acrylamide. The National Toxicology Program and the International Agency for Research on Cancer considers acrylamide a 'probable' human carcinogen.

We have inactivated the enzyme responsible for the degradation of sugars in the tuber, thus reducing both the sweetening of cold-stored potatoes and the creation of acrylamide during frying.

This product candidate is currently in Phase II of our development process. In August 2014 we received confirmation from USDA that our cold storable potato was deemed non-regulated pursuant to APHIS's regulatory procedures. We have previously validated the effectiveness of our cold-storable potatoes in the greenhouse and across multi-location field trials. We are currently seeking a partner to further the commercialization process for this product candidate.

Government Regulation and Product Compliance

Gene editing is a relatively new technology and the regulatory schemes around the world are continuing to evolve in how countries regulate gene edited crops and food products. We currently sell our high oleic soybean products in the United States in an identity-preserved system. We do not currently sell our high oleic soybean products outside of the United States. The United States and the European Union are the two leading jurisdictions, with distinct regulatory regimes applying different rules and requirements.

United States

In the United States, the Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA) are primarily responsible for overseeing agriculture and food regulation and safety. Biotechnology is regulated in the United States under the "Coordinated Framework for Biotechnology".

Biotechnology products are subject to EPA regulatory review if they contain plant-incorporated protectants, which refer to pesticides (such as insecticides) produced in plants. As our product candidates do not contain any plant-incorporated protectors, our product candidates are not subject to regulatory review by the EPA.

Under the Plant Protection Act (PPA), the USDA requires anyone who wishes to import, transport interstate, or plant a regulated article to apply for a permit or notify the Animal and Plant Health Inspection Service (APHIS) that the introduction will be made. Regulated articles are defined in the Code of Federal Regulations (CFR) 7 CFR Part 340.1 as "any organism which has been altered or produced through genetic engineering which USDA determines is a plant pest or has reason to believe is a plant pest." If APHIS determines the product to be regulated, the product may be subject to extensive regulation, including permitting requirements for import, handling, interstate movement, release into the environment, and inspections.

In the last six years, we submitted petitions to APHIS for seven of our product candidates and received confirmation from APHIS that it does not consider any of the seven to be regulated articles under the Plant Protection Act. The seven product candidates include our high oleic soybean, high fiber wheat, improved digestibility alfalfa, and cold storable potato. The remaining three submissions were for product candidates for which we are either pursuing derivatives or no longer pursuing at this time. There can be no guarantee of the timing or success in obtaining nonregulated status from APHIS for our other crops or that the governing regulations will not change.

The FDA has oversight of food safety and security pursuant the Food, Drug, and Cosmetic Act, or FDCA and is primarily carried out by its Center for Food Safety and Applied Nutrition. The 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.

The FDA offers a voluntary consultation process to determine whether foods derived from new plant varieties including genetically modified plant varieties require premarket review and approval. Developers routinely consult with the FDA prior to marketing and, in most cases, foods derived from plant varieties developed with biotechnology are not subjected to premarket review and approval processes.

We have completed voluntary consultation with the FDA for our high oleic soybean. After review, the FDA had no further questions concerning human food ingredients or animal food derived from our high oleic soybean.

European Union

If we want to market and sell our products in the European Union (the EU), we would only do so once they have gained appropriate regulatory clearance. The procedures for evaluation and authorization of GMOs are established by Regulation (EC) 1829/2003 on genetically modified food and feed and Directive 2001/18/EC on the release of GMOs into the environment. An application for authorization must be submitted under Directive 2001/18/EC if a company seeks to release GMOs for experimental purposes (e.g., field tests) and/or to sell GMOs, as such or in products, in the market (e.g., cultivation, importation or processing). In turn, an application for authorization must be submitted under Regulation (EC) 1829/2003 if a company seeks to sell GMOs in the market for food and feed use and/or food and feed products containing or produced from GMOs. At the national level, EU member states can restrict or prohibit GMO cultivation in their territories by invoking grounds such as environmental or agricultural policy objectives, town and country-planning, land use, coexistence, socio-economic impacts or public policy.

In addition, Directive 2001/18/EC, Regulation (EC) 1829/2003 and Regulation (EC) 1830/2003 establish specific labeling and traceability requirements for GMOs and products that contain or are produced from GMOs. Finally, Directives 2002/53/EC and 2002/55/EC require genetically modified varieties to be authorized before they can be included in a Common Catalogue of Varieties, which would permit the seeds of such genetically modified varieties to be marketed in the EU.

A ruling of the European Court of Justice (ECJ) in July 2018 clarified that only mutagenesis techniques which (a) have been used in several applications and (b) have a long safety record, can be exempted from these requirements. EU member states remain free to subject even such exempted organisms to the obligations under Directive 2001/18/EC, or to other obligations. The impact of this ruling on, and the ultimate treatment by the EU of, products produced using other advanced plant breeding techniques is not yet known and the final determination could have a negative impact on our business.

Competition

The market for plant-based technology products is highly competitive, and we face significant direct and indirect competition in several aspects of our business. Competition for improving plant genetics comes from conventional and advanced plant breeding techniques, as well as from the development of genetically modified traits. Other potentially competitive sources of improvement in crop yields include improvements in crop protection chemicals, fertilizer formulations, farm mechanization, other biotechnology, and information management. Programs to improve genetics and chemistry are generally concentrated within a relatively small number of large companies, while non-genetic approaches are underway with a broader set of companies. Additionally, competition for providing more nutritious ingredients for food companies come from chemical-based ingredients, additives and substitutes, which are developed by various companies.

In general, we believe that we face competition from both large agricultural biotechnology, seed and chemical companies, certain of which have been actively involved in new trait discovery, development, and commercialization, and from specialty food ingredient companies, which are generally focused on providing solutions to the food industry through chemical, synthetic or other methods. Many of our competitors—particularly large chemical companies—have substantially larger budgets for research and development (R&D), product commercialization and regulatory process management than we do.

We also face competition from trait research and development companies as well as agricultural research universities and institutions. Given the global importance of agriculture, there are several companies, research universities and institutions that specialize in R&D of agricultural yield and product quality traits. Because these competitors typically focus on a limited number of traits and do not generally have the product development, gene-editing technologies and regulatory infrastructure necessary to bring traits to market, they generally out-license trait technologies to large industry players with in-house development and regulatory capabilities at a relatively early stage of development.

We believe that the primary competitive factors in the food industry are product development, product quality, performance, scale, price, and compliance with food safety standards. We believe that we can compete favorably based on our expertise and the precision, specificity, cost effectiveness and development speed of our proprietary technologies. Nevertheless, many of our current or potential competitors, either alone or with their R&D or collaboration partners, have significantly greater financial resources and expertise in R&D, manufacturing, testing and marketing approved products than we do.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products faster, with lower research costs or with more desirable traits than we can.

Research and Development

Our R&D team has technical expertise in molecular biology, biochemistry, genetics and genetic engineering, plant physiology and plant breeding. Our R&D activities are conducted principally at our Minnesota facility and we also conduct breeding activities through third parties in the United States and its territories and South America. We have made, and will continue to make, substantial investments in R&D. We incurred R&D expenses of $12.2 million in the year ended December 31, 2019, $10.4 million in the year ended December 31, 2018, and $11.5 million in the year ended December 31, 2017.

Employees

As of December 31, 2019, we employed 75 employees, 37 of whom are in R&D. Our multidisciplinary team includes experts in biology, chemistry, plant genetics, agronomy, data science, and other related fields. As pioneers in the field of gene editing for plants, members of our management team have invented TALEN®, one of the premier gene-editing tools. None of our employees are represented by a labor union or covered by a collective bargaining agreement. We consider our relationship with our employees to be good.

Information about Segment and Geographic Revenue

We operate in a single segment and geography. Accordingly, no additional segment or geographic information is being presented.

Corporate Information

We were incorporated in Delaware on January 8, 2010 and our majority stockholder is Cellectis S.A. (société *anonyme*). Our principal executive offices are located at 2800 Mount Ridge Road, Roseville, MN 55113, United States of America, and our telephone number is +1 (651) 683-2807. We also maintain a website at www.calyxt.com. The information contained in, or that can be accessed through, our website is not part of this report.

Available Information

We file or furnish periodic reports and amendments thereto, including our Annual Reports on Form 10-K, our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, proxy statements, and other information with the Securities and Exchange Commission (SEC). On our website located at www.calyxt.com, you can obtain, free of charge, this Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and all our other filings with the SEC as soon as reasonably practicable after we electronically file or furnish such information with the SEC. Information contained on our website is not incorporated into this Annual Report on Form 10-K. In addition, the SEC maintains a website that contains reports, proxy statements and other information regarding issuers that file electronically with the SEC. The website can be accessed at www.sec.gov.

Item 1A. Risk Factors.

This section includes a discussion of what we believe to be the most significant important factors that could affect our business, operating results, financial condition and the trading price of our common stock. The risks described below are not the only risks we face. Additional risks and uncertainties not currently known to us, or that we currently deem to be immaterial, may occur or become material in the future. You should carefully consider these risk factors in connection with Part 2, Item 7, "Management's Discussion and Analysis of Financial Conditions and Results of Operations," the consolidated financials and the other information in this Annual Report.

Risks Related to Our Business and Operations

We have a limited operating history, which makes it difficult to evaluate our current business and prospects and may increase the risk of investment.

We are an early-stage biotechnology company with a limited operating history that to date has been focused primarily on R&D, conducting field trials, pursuing initial commercialization efforts and building our management team. Investment in plant-based technology product development is a highly speculative endeavor. It entails substantial upfront R&D investment and there is significant risk that we will not be able to edit the genes in a particular plant to express a desired trait, or, once edited, we will not be able to replicate that trait across entire crops in order to commercialize the product candidate. Moreover, the regulatory pathway for our product candidates can be uncertain and could add significant additional cost and time to development. Although we achieved commercialization in the first quarter of 2019, we have not yet generated significant revenue from sales of these products.

Our limited operating history may make it difficult to evaluate our current business and our prospects. We have encountered, and will continue to encounter, risks and difficulties frequently experienced by growing companies in rapidly developing and changing industries, such as the plant-based technology industry, including challenges in forecasting accuracy, determining appropriate investments of our limited resources, gaining market acceptance of the products made using our gene-editing platform, managing a complex regulatory landscape and developing new product candidates. We may also face challenges in scaling our supply chain in a cost-effective manner, as we will rely on contracting with seed production companies, seed distributors, farmers, crushers, millers, refiners, and logistics and transportation providers, in order to get our products to market. Our current operating model may require changes for us to scale our operations efficiently. We may not be able to fully implement or execute on our business strategy or realize, in whole or in part within our expected time frames, the anticipated benefits of our growth strategies. You should consider our business and prospects considering the risks and difficulties we face as an early-stage company focused on developing products in the field of plant-based technology industry.

We have incurred significant losses since our inception and anticipate that we will continue to incur significant losses for the next several years.

Our net losses for the years ended December 31 were $39.6 million for 2019, $27.9 million for 2018 and $26.0 million for 2017. As of December 31, 2019, we had an accumulated deficit of $122.1 million. Although we began generating revenue in the first quarter of 2019 from sales of our high oleic soybean products, we expect to continue to incur significant expenses and operating losses for the next several years. The amount of our future losses will depend, in part, on our revenue associated with sales of our high oleic soybean products and expenses associated with our commercial operations, the expense associated with and timing of introduction of additional products from our pipeline of product candidates, expenses associated with acquisition or in-licensing of technologies, and the revenue associated with future products or licensed technologies. We do not expect commercial launches of our improved digestibility alfalfa product candidate before 2021 or our high fiber wheat product candidate before 2022.

The net losses we incur may fluctuate significantly from year-to-year and quarter-to-quarter, such that a period-to-period comparison of our results of operations may not be a good indication of our future performance.

We cannot assure you that we will generate increases in our revenues, successfully commercialize other product candidates or generate revenue from licensing or attain a level of profitable operations. Based on our history of losses, we do not expect that we will be able to fund our longer-term capital and liquidity needs through our cash balances and operating cash flow alone. To fund our longer-term capital and liquidity needs, we expect we will need to secure additional capital. Our business plan and financing needs are subject to change depending on, among other things, the success of our efforts to grow revenue and our efforts to continue to effectively manage expenses.

We face significant competition and many of our competitors have substantially greater financial, technical and other resources than we do.

The market for plant-based technology products is highly competitive, and we face significant direct and indirect competition in several aspects of our business. See “Item 1. Business – Competition.”. Mergers and acquisitions in the plant science, specialty food ingredient and agricultural biotechnology, seed and chemical industries may result in even more resources being concentrated among a smaller number of our competitors. Most of these competitors have substantially greater financial, technical, marketing, sales, distribution and other resources than we do, such as larger R&D staff, more experienced marketing and manufacturing organizations and more well-established sales forces. As a result, we may be unable to compete successfully against our current or future competitors, which may result in price reductions, reduced margins and the inability to achieve market acceptance for our products. We expect to continue to face significant competition in the markets in which we intend to commercialize our products.

Many of our competitors engage in ongoing R&D, and technological developments by our competitors could render our products less competitive or obsolete, resulting in reduced sales compared to our expectations. Our ability to compete effectively and to achieve commercial success depends, in part, on our ability to: control manufacturing and marketing costs; effectively price and market our products; successfully develop an effective marketing program and an efficient supply chain; develop new products with properties attractive to customers; and commercialize our products quickly without incurring major regulatory costs. We may not be successful in achieving these factors and any such failure may adversely affect our business, results of operations and financial condition.

From time to time, certain seed and chemical companies that are potential competitors of ours may seek new traits or trait development technologies and may seek to license our technology. We have, in the past, entered such licensing arrangements and may continue to enter such arrangements in the future. Some of these companies may have significantly greater financial resources and may even compete with our business. In such circumstances, competitors could use our technologies to develop their own products that would compete with our products.

We also anticipate increased competition in the future as new companies enter the market and new technologies become available, particularly in the area of gene editing. Our technology may be rendered obsolete or uneconomical by technological advances or entirely different approaches developed by one or more of our competitors that are more effective or that enable them to develop and commercialize products more quickly or with lower expense than we are able to. At the same time, the expiration of patents covering existing products reduces the barriers to entry for competitors. If for any reason our technology becomes obsolete or uneconomical relative to our competitors’ technologies, this would prevent or limit our ability to generate revenues from the commercialization of our products.

Our business activities are currently conducted at a limited number of locations, which makes us susceptible to damage or business disruptions caused by natural disasters or acts of vandalism.

Our current headquarters and R&D facilities, which include an office, labs, greenhouses, field testing acreage, and a demonstration test kitchen, are in Roseville, Minnesota. Our seed production takes place primarily in the United States and its territories with contra season production also occurring in Argentina. Third party warehousing for seed storage, and our limited number of processing partners (e.g. storage, transportation, crushers and refiners) are all located in the Upper Midwest region of the United States. We take precautions to safeguard our facilities, including insurance, health and safety protocols, and off-site storage of critical research results and computer data. Particularly in the case of insurance, our insurance may not cover certain losses, or our losses may exceed our coverage limits. A natural disaster, such as a hurricane, drought, fire, flood, tornado, earthquake, or other intentional or negligent acts, including acts of vandalism, could damage or destroy our equipment, inventory, development projects, field trials or data, and cause us to incur significant additional expenses to repair or replace the damaged physical facilities, which in the case of seed production may be the result of years of development work that is not easily or quickly reproduced, and increase the development schedule for our pipeline of product candidates.

To compete effectively, we must introduce new products that achieve market acceptance.

In order to remain competitive and increase revenue, we must introduce new products from our pipeline of product candidates. If we fail to anticipate or respond to technological developments, market requirements, or consumer preferences, or if we are significantly delayed in developing and introducing products, our revenues will not increase.

Development of successful agricultural products using gene-editing technologies requires significant levels of investment in R&D, including laboratory, greenhouse and field testing, to demonstrate product effectiveness and can take several years or more. We incurred R&D expenses, including non-cash stock compensation expenses, of $12.2 million in the year ended December 31, 2019, $10.4 million in the year ended December 31, 2018, and $11.5 million in the year ended December 31, 2017. We must commit significant resources and may incur obligations (such as royalty obligations or milestone fees) to develop new products before knowing whether our investments will result in products the market will accept and without knowing the levels of revenue, if any, that may be derived from these products.

Development of new or improved agricultural products involves risks of failure inherent in the development of products based on innovative and complex technologies. These risks include the possibility that:

- our products may not perform as expected in the field;
- our products may not receive necessary regulatory permits and governmental clearances in the markets in which we intend to sell them;
- consumer preferences, which are unpredictable and can vary greatly, may change quickly, making our products no longer desirable;
- our competitors may develop new products that taste better or have other more appealing characteristics than our products;
- our products may be viewed as too expensive by our customers as compared to competitive products;
- our products may be difficult to produce on a large scale or may not be economical to grow;
- intellectual property and other proprietary rights of third parties may prevent us or our collaborators from marketing and selling our products;
- we may be unable to patent or otherwise obtain intellectual property protection for our discoveries in the necessary jurisdictions;
- we or our collaborators may be unable to fully develop or commercialize products in a timely manner or at all; and
- third parties may develop superior or equivalent products.

Accordingly, if we experience any significant delays in the development or introduction of new products or if our new products do not achieve market acceptance, our business, operating results and financial condition would be adversely affected.

Any collaboration arrangements that we may enter in the future may not be successful, which could adversely affect our ability to develop and commercialize our product candidates.

We may seek collaboration arrangements with third parties for the development or commercialization of our product candidates depending on the merits of retaining commercialization rights for ourselves as compared to entering collaboration arrangements. We will face, to the extent that we decide to enter collaboration arrangements, significant competition in seeking appropriate partners. Moreover, collaboration arrangements are complex and time-consuming to negotiate, document, implement and maintain. We may not be successful in our efforts to establish and implement collaboration or other alternative arrangements should we so chose to enter such arrangements. The terms of any collaborations or other arrangements that we may establish may not be favorable to us.

The success of our collaboration arrangements will depend heavily on the efforts and activities of our partners. Collaborations are subject to numerous risks, which may include that:

- partners have significant discretion in determining the efforts and resources that we will apply to R&D partnerships;
- partners may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on trial results, changes in their strategic focus due to the acquisition of competitive products, availability of funding or other external factors, such as a business combination that diverts resources or creates competing priorities;
- partners may delay trials, provide insufficient funding for a trial program, stop a trial, abandon a product candidate, repeat or conduct new trials or require a new formulation of a product candidate for testing;
- partners could independently develop, or develop with third parties, products that compete directly or indirectly with our products or product candidates;

- a partner with marketing, manufacturing and distribution rights to one or more products may not commit enough resources to or otherwise not perform satisfactorily in carrying out these activities;
- we could grant exclusive rights to our partners that would prevent us from collaborating with others;
- 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;
- partnerships may be terminated, and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable current or future products;
- partners may own or co-own intellectual property covering our products that results from our partnering with them, and in such cases, we would not have the exclusive right to develop or commercialize such intellectual property; and
- a partner's sales and marketing activities or other operations may not follow applicable laws resulting in civil or criminal proceedings.

If ongoing or future field trials are unsuccessful, we may be unable to complete the development of product candidates on a timely basis or at all.

We rely on field trials to demonstrate the efficacy of product candidates that we develop and evaluate in greenhouse conditions. Field trials allow us to test product candidates in the field as well as to increase seed production, and to measure performance across multiple geographies and conditions. Successful completion of field trials is critical to the success of our product development efforts. If our ongoing or future field trials are unsuccessful or produce inconsistent results or unanticipated adverse effects on the agronomic performance of our crops, or if the field trials do not produce reliable data, our product development efforts could be delayed, subject to additional regulatory review or abandoned entirely. In addition, in order to support our commercialization efforts, it is necessary to collect data across multiple growing seasons and from different geographies. Even in cases where initial field trials are successful, we cannot be certain that additional field trials conducted on a greater number of acres or in different geographies will also be successful. Many factors that are beyond our control may adversely affect the success of these field trials, including unique geographic conditions, weather and climatic variations, disease or pests, or acts of protest or vandalism. Field trials, which may take up to two to three years, are costly, and any field trial failures that we may experience may not be covered by insurance and, therefore, could result in increased costs, which may negatively impact our business and results of operations. During the first quarter of 2020, we were notified that a significant portion of our high fiber wheat plants were lost in field trials due to improper aerial chemical applications by unaffiliated third parties. While we are continuing to assess the impact of this loss on the overall development process and timeline, we expect to harvest the remaining field trial crop in spring 2020 and continue Phase II development in 2020. Our Phase II development activities in 2020 will include testing the product concept in field conditions, completing food application studies and voluntarily consulting with FDA. Depending on the results of the spring 2020 field trial crop harvest and the success of our other activities in Phase II and Phase III, our high fiber wheat product may launch as early as 2022.

We rely on third parties to conduct, monitor, support, and oversee field trials and other research services for product candidates in development, and any performance issues by third parties, or our inability to engage third parties on acceptable terms, may impact our ability to successfully commercialize such product candidates.

We currently rely on third parties, such as growers, consultants, contractors and universities, to conduct, monitor, support and oversee these field trials. In some cases, these field trials are conducted outside of the United States, making it difficult for us to monitor the work being conducted by the third parties that we engage. Although we provide our third-party contractors with protocols regarding the production and handing of our product candidates, we have limited control over the execution of field trials. Poor field trial execution or data collection, failure to follow required agronomic practices, protocols or regulatory requirements, or mishandling of product candidates by these third parties could impair the success of our field trials. Any such failures may result in delays in the development of our product candidates or the incurrence of additional costs. Even if our third-party contractors adhere to our suggested protocols, field trials may fail to succeed for a variety of other reasons, including weather, disease or pests, improper timing of planting our seeds, or incorrect fertilizer use. Ultimately, we remain responsible for ensuring that each of our field trials is conducted in accordance with the applicable protocol and legal, regulatory and scientific standards, and our reliance on third parties does not relieve us of our responsibilities. Should such third parties fail to comply with these standards, our ability to develop our product candidates could be adversely impacted.

Additionally, if we are unable to maintain or enter into agreements with third-party contractors on acceptable terms, or if engagement is terminated prematurely, we may be unable to conduct or complete our field trials in the manner we anticipate. If our relationship with any of these third-party contractors is terminated, we may be unable to enter arrangements with alternative contractors on commercially reasonable terms, or at all. Switching or adding third-party contractors can involve substantial cost and require extensive management time and focus. In addition, there is a natural transition period when any new third party commences field trial work. As a result, delays may occur, which could materially impact our ability to meet our desired development timelines.

The successful commercialization of our products depends on our ability to produce high-quality plants and seeds cost-effectively on a large scale and to accurately forecast demand for our products, and we may be unable to do so.

The production of commercial-scale quantities of seeds requires the multiplication of the plants or seeds through a succession of plantings and seed harvests. The cost-effective production of high-quality, high-volume quantities of any product candidates we successfully develop depends on our ability to scale our production processes to produce plants and seeds in enough quantity to meet demand. For example, food ingredients such as soybean oil and wheat flour will require optimized production and commercialization of the underlying plant and seed harvests. We cannot assure that our existing or future seed production techniques will enable us to meet our large-scale production goals cost-effectively for the products in our pipeline. Even if we are successful in developing ways to increase yields and enhance quality, we may not be able to do so cost-effectively or on a timely basis, which could adversely affect our ability to achieve profitability. If we are unable to maintain or enhance the quality of our plants and seeds as we increase our production capacity, including through the expected use of third parties, we may experience reductions in customer or farmer demand, higher costs and increased inventory write-offs.

In addition, because of the length of time it takes to produce commercial quantities of marketable seeds, we will need to make seed production decisions well in advance of product sales. Our ability to accurately forecast supply can be adversely affected by several factors outside of our control, including changes in market conditions, environmental factors, such as pests and diseases, and adverse weather conditions. A shortfall in the supply of our products may reduce product revenue, damage our reputation in the market and adversely affect relationships. Any product surplus we have on hand may negatively impact cash flows, reduce the quality of our inventory and ultimately result in write-offs of inventory. Additionally, we will take financial risk in our inventory given that we will have to keep the inventory at its net realizable value on our balance sheet. Fluctuations in the spot price of our crops in inventory could have negative impacts on our consolidated financial statements. Any failure on our part to produce enough inventory, or overproduction of a product, could harm our business, results of operations and financial condition. In addition, our customers may cancel orders, request a decrease in quantity, or make returns, which may lead to a surplus of our products.

While we estimate that the potential size of our target markets for our products is significant, that estimate has not been independently verified and is based on certain assumptions that may not prove to be accurate. Our ability to accurately forecast demand is dependent on the timing of customer decisions, qualification cycles, and other factors outside of our control. As a result, these estimates could differ materially from actual market sizes, which could result in decreased demand for our products and therefore adversely impact our future business prospects, results of operation and financial condition.

Interruptions in the production or transportation of our seeds could adversely affect our operations and profitability.

We rely on contract seed producers to produce seed for our product candidates. Poor execution, failure to follow required agronomic practices, protocols or regulatory requirements, or mishandling of product candidates by these contract seed producers could adversely affect our products. Any such failures may result in delays in our ability to obtain seed for our seed production needs in a timely manner. Such delays could adversely affect our ability to deliver seed to farmers to meet their planting window. Our dependency upon timely seed deliveries means that interruptions or stoppages in such deliveries, or delays or limitations with respect to seed production, could adversely affect our operations until alternative arrangements could be made. Such a delay would adversely affect our reputation and revenues. If we were unable to produce the necessary seed for an extended period for any reason, our business, customer relations, and operating results could suffer.

We may not be able to identify suitable seed producers to meet our production needs or we may not be able to enter into cost effective agreements with suitable seed producers on acceptable terms. If any contract seed producers whom we engage fail to perform their obligations as expected or breach or terminate their agreements with us, or if we are unable to secure the services of such third parties when and as needed, it may adversely affect our business.

The unintended presence of our traits in other products or plants may negatively affect us.

Trace amounts of our traits may unintentionally be found in the products of third parties, which may result in negative publicity and claims of liability brought by such third parties or others against us. Furthermore, in the event of an unintended dissemination of our gene-edited germplasm into the environment, or the presence of unintended trace amounts of our traits in conventional seed, or in the grain or products produced from conventional crops, 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 successful commercialization of our products may face challenges from public perceptions of gene-edited products and ethical, legal, environmental, health and social concerns.

The successful commercialization of our product candidates depends, in part, on public acceptance of gene-edited agricultural products.

Consumers may not understand the nature of our technologies or the scientific distinction between our non-transgenic gene-edited products and transgenic products of competitors. As a result, they may transfer negative perceptions and attitudes regarding transgenic products to our products and product candidates. A lack of understanding of our technologies may also make consumers more susceptible to the influence of negative information provided by opponents of biotechnology. Some opponents of biotechnology actively seek to raise public concern about gene editing, whether transgenic or non-transgenic, by claiming that plant products developed using biotechnology are unsafe for consumption or their use, pose a risk of damage to the environment, or creates legal, social and ethical dilemmas. The commercial success of our products and product candidates may be adversely affected by such claims, even if unsubstantiated. In addition, opponents of biotechnology have vandalized the fields of farmers planting biotech seeds and facilities used by biotechnology companies. Any such acts of vandalism targeting the fields of our farmers, our field-testing sites or our research, production or other facilities, could adversely affect our sales and our costs.

Negative public perceptions about gene editing can also affect the regulatory environment in the jurisdictions in which we are targeting the sale of our products and the commercialization of our product candidates. Any increase in such negative perceptions or any restrictive government regulations in response thereto, could have a negative effect on our business and may delay or impair the sale of our products or the development or commercialization of our product candidates. Even in light of compliance with regulatory protocols or following receipt of confirmation of non-regulated status in a jurisdiction, public pressure may lead to increased regulation of products produced using biotechnology, further legislation regarding novel trait development technologies, or administrative litigation concerning prior regulatory determinations, each of which could adversely affect our ability to sell our product or commercialize our product candidates. In addition, labeling requirements could heighten public concerns and make consumers less likely to purchase food products containing gene-edited ingredients.

Additionally, we are currently exploring product opportunities in hemp, among other crops. Hemp, as defined in the 2018 Farm Bill as *Cannabis sativa* containing a delta-9 tetrahydrocannabinol (THC) concentration of not more than 0.3% on a dry weight basis, has been removed from the Controlled Substances Act and is legally distinct from marijuana/cannabis, which is *Cannabis sativa* containing a THC concentration of more than 0.3% on a dry weight basis. Because the hemp plant and the marijuana plant are both part of the same cannabis sativa species of plant, our activities with legal hemp may be incorrectly perceived as us being involved in federally illegal cannabis/marijuana. Also, despite growing support for the cannabis industry and legalization of cannabis in certain states in the United States, many individuals and businesses remain opposed to the cannabis industry. Any negative press resulting from any incorrect perception that we have entered the cannabis space could result in a loss of current or future business. It could also adversely affect the public's perception of us and lead to reluctance by new parties to do business with us or to own our common stock. Business partners, including but not limited to financial institutions and customers, may attempt to end or limit their relationships with us due to this incorrect perception, which may negatively affect our business, financial condition, and results of operations.

If our products become adulterated, misbranded, or mislabeled, we might need to recall those items and may experience product liability claims if consumers or animals are injured.

We are targeting sale of our high oleic soybean oil as a premium oil in the foodservice, food manufacturing, animal nutrition, and industrial market segments. We sell our high oleic soybean meal into the animal nutrition market segment. We may need to recall our high oleic soybean products if they become adulterated, misbranded, or mislabeled. A widespread product recall could result in significant losses due to the costs of a recall, the destruction of product inventory, and lost sales due to the unavailability of product for a period of time. We could also suffer losses from a significant product liability judgment against us. A significant product recall or product liability case could also result in adverse publicity, damage to our reputation, and a loss of consumer or purchaser confidence in our products, which could have an adverse effect on our business, results of operations and financial condition and the value of our brands.

Products that we develop, and food containing our products, may fail to meet standards established by third-party non-GMO verification organizations, which could reduce the value of our products to customers.

Certain third-party organizations offer verification programs that seek to identify non-GMO products to consumers. These organizations verify the status of products (such as foods, beverages and vitamins) as non-GMO based on independently developed standards, and often authorize the display of specific markers or labels illustrating such status on the verified product's packaging. Standards established by such third-party organizations for the verification of non-GMO status may differ from applicable regulatory legal standards applied by regulators in the United States. As a result, notwithstanding a determination as to the non-regulated status of a product pursuant to APHIS's regulatory procedures (or a similar determination in other jurisdictions), our products, and third-party products that utilize our gene-edited products as ingredients, may fail to meet more restrictive or non-scientific standards imposed by these independent verification organizations.

For example, there are third-party verification organizations that withhold non-GMO certification from products developed using gene editing technology, including a product that does not contain any foreign DNA, such as our high oleic soybean. Such a position means that some non-GMO seals or labels are not available for gene edited products, including our high oleic soybean products. This has limited our ability to demand non-GMO premiums for our high oleic soybean meal.

If we are sued for defective products and if such lawsuits were determined adversely, we could be subject to substantial damages, for which insurance coverage is not available.

We may be held liable if any product we develop, or any product that uses or incorporates any of our technologies, is found unsuitable during marketing, sale or consumption. For example, the detection of an unintended trait in a commercial seed variety or the crops and products produced may result in governmental actions such as mandated crop destruction, product recalls or environmental cleanup or monitoring. Concerns about seed quality could also lead to additional regulations being imposed on our business, such as regulations related to testing procedures, mandatory governmental reviews of biotechnology advances, or additional regulations relating to the integrity of the food supply chain from the farm to the finished product.

We may need to raise additional funding, which may not be available on acceptable terms or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations.

As of December 31, 2019, we had cash and cash equivalents of $58.6 million. We believe our cash and cash equivalents will be enough to fund our operations into mid-2021.

Our business plan is to complete the development and regulatory processes for our product candidates and commercialize additional product candidates. Based on our history of losses, we do not expect that we will be able to fund our longer-term capital and liquidity needs to execute our business plan and pursue our strategic goals through our cash balances and operating cash flow alone. To fund our longer-term capital and liquidity needs, we expect we will need to secure additional capital. Our business plan and financing needs are subject to change depending on, among other things, success of our product development efforts, our revenue and our efforts to continue to effectively manage expenses. If we are ultimately unable to generate sufficient revenue to meet our financial targets, become profitable and have sustainable positive cash flows, we may be required to further reduce expenses, which could have a further negative effect on our ability to generate revenue, or we may be required to raise additional capital more quickly than we expect or we may need more capital than we expect.

We may obtain future additional financing by incurring indebtedness or from an offering of our equity or convertible securities or both. To the extent that we raise additional capital through the sale of additional equity or convertible securities, current ownership interests will be diluted, and new investors may demand rights, preferences or privileges senior to those of existing holders of common stock. Debt financing, if available, would result in increased fixed payment obligations and a portion of our operating cash flows, if any, being dedicated to the payment of principal and interest on such indebtedness. In addition, debt financing may involve agreements that include restrictive covenants that impose operating restrictions, such as restrictions on the incurrence of additional debt, the making of certain capital expenditures or the declaration of dividends. If we raise capital in the future, we cannot assure you that additional capital will be available in the amount or at the time we need it, or that it will be available on acceptable terms or at all. If we are unable to obtain sufficient funding on a timely basis, we may be required to significantly curtail, delay or discontinue one or more of our research or product candidate development programs or the commercialization of any product candidate or be unable to expand our operations or otherwise capitalize on our business opportunities, as desired, which could materially affect our business, operating results and prospects and cause the price of the common stock to decline.

Risks Related to Our Industry

The overall agricultural industry is susceptible to commodity price changes and we are exposed to market risks from changes in commodity prices.

Changes in the prices of commodities products could result in higher overall cost along the agricultural supply chain, which may negatively affect our ability to commercialize our products. We will be susceptible to changes in costs in the agricultural industry as a result of factors beyond our control, such as general economic conditions, seasonal fluctuations, weather conditions, demand, food safety concerns, product recalls and government regulations. As a result, we may not be able to anticipate or react to changing costs by adjusting our practices, which could cause our operating results to deteriorate. While we manage our exposure to changing commodity prices underlying sales contracts and supply agreements for grain and seed production by entering into commodity derivative transactions, those activities may not provide full mitigation of our exposure to changes in commodity prices, and as a result our results of operations and financial condition may be affected. See Item 7A “Quantitative and Qualitative Disclosures About Market Risk”.

Adverse weather conditions, natural disasters, crop disease, pests and other natural conditions can impose significant costs and losses on our business.

A farmer's ability to grow our products is vulnerable to adverse weather conditions, including windstorms, floods, drought and temperature extremes, which are quite common but difficult to predict, the effects of which may be influenced and intensified by ongoing global climate change. Unfavorable growing conditions can reduce both crop size and crop quality. This risk is particularly acute with respect to the Upper Midwest region of the United States in which we currently source our high oleic soybean grain. In extreme cases, entire harvests may be lost in some geographic areas. Such adverse conditions can result in harvesting delays or loss of crops for farmers and cause us to be delayed, or to fail entirely in delivering product to customers, resulting in loss of revenue. Furthermore, significant fluctuations in market prices for agricultural inputs and crops could also have an adverse effect on the prices of our products.

The ability to grow our products is also vulnerable to crop disease and to pests, which may vary in severity and effect, depending on the stage of production at the time of infection or infestation, the type of treatment applied, climatic conditions and the risks associated with ongoing global climate change. The costs to control disease and other infestations vary depending on the severity of the damage and the extent of the plantings affected. Moreover, there can be no assurance that available technologies to control such infestations will continue to be effective. These infestations can also increase costs, decrease revenues and lead to additional charges to earnings, which may have a material adverse effect on our business, financial position and results of operations.

Risks Related to Regulatory and Legal Matters

The regulatory environment in the United States for our current and future products is uncertain and evolving.

Changes in applicable regulatory requirements could result in a substantial increase in the time and costs associated with developing our products and negatively impact our operating results. While the USDA and FDA currently have petition processes that we have successfully completed in the past, these processes and the manner in which the USDA and FDA interpret their own regulations may change in the future, negatively impacting our speed to market and cost to launch product candidates. We cannot predict whether advocacy groups will challenge existing regulations and USDA or FDA determinations or whether the USDA or FDA will alter the manner in which it interprets its own regulations or institutes new regulations, or otherwise modifies regulations in a way that will subject our products to more burdensome standards, thereby substantially increasing the time and costs associated with developing our product candidates.

Additionally, we are currently exploring product opportunities in hemp, among other crops. Hemp is legally distinct from marijuana and recognized as an agricultural crop by the United States government. Federal and state laws and regulations on hemp address production, monitoring, manufacturing, distribution, and laboratory testing to ensure that that the hemp has a THC concentration of not more than 0.3% on a dry weight basis. Federal laws and regulations may also address the transportation or shipment of hemp or hemp products. As we continue to explore hemp as a product candidate, we may become subject to increasing regulation particular to hemp, which could require us to incur additional costs associated with compliance requirements.

The regulatory environment outside the United States varies greatly from jurisdiction to jurisdiction and there is less certainty how our products will be regulated.

The regulatory environment around gene editing in plants for food ingredients is greatly uncertain outside of the United States and varies greatly from jurisdiction to jurisdiction. Each jurisdiction may have its own regulatory framework regarding genetically modified foods, which may include restrictions and regulations on planting and growing genetically modified plants and in the consumption and labeling of genetically modified foods, and which may encapsulate our products. To the extent regulatory frameworks outside of the United States are not receptive to our gene-editing technologies, this may limit our ability to expand into other global markets.

Complying with the regulatory requirements outside the United States will be costly and time-consuming, and there is no guarantee we will be able to commercialize our products outside the United States.

We cannot predict whether or when any jurisdiction will change its regulations with respect to our products. Advocacy groups have engaged in publicity campaigns and filed lawsuits in various countries against companies and regulatory authorities, seeking to halt regulatory approval or clearance activities or influence public opinion against genetically engineered and/or gene-edited products. In addition, governmental reaction to negative publicity concerning our products could result in greater regulation of genetic research and derivative products or regulatory costs that render our products cost prohibitive,

The scale of the commodity food industry may make it difficult to monitor and control the distribution of our products. As a result, our products may be sold inadvertently within jurisdictions where they are not approved for distribution. Such sales may lead to regulatory challenges or lawsuits against us, which could result in significant expenses and management attention.

Government policies and regulations, particularly those affecting the agricultural sector and related industries, could adversely affect our operations and 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 or in other countries may discourage our customers from using our products or encourage the use of products more advantageous to our competitors, which would put us at a commercial disadvantage and could negatively impact our future revenues and results of operations.

We may use biological materials in our business and are subject to numerous environmental, health and safety laws and regulations. Compliance with such laws and regulations and any claims relating to improper handling, storage or disposal of these materials could be time consuming and costly.

We are subject to numerous federal, state, local and foreign environmental, health and safety laws and regulations, including those governing laboratory procedures, the handling, use, storage, treatment, manufacture and disposal of hazardous materials and wastes, discharge of pollutants into the environment and human health and safety matters. Our R&D processes involve the controlled use of hazardous materials, including biological materials. We may be sued for any injury or contamination that results from our use or the use by third parties of these materials, or may otherwise be required to remediate such contamination, and our liability may exceed any insurance coverage and our total assets. Compliance with environmental, health and safety laws and regulations may be expensive and may impair our R&D efforts. If we fail to comply with these requirements, we could incur substantial costs and liabilities, including civil or criminal fines and penalties, clean-up costs or capital expenditures for control equipment or operational changes necessary to achieve and maintain compliance. In addition, we cannot predict the impact on our business of new or amended environmental, health and safety laws or regulations or any changes in the way existing and future laws and regulations are interpreted and enforced. These current or future laws and regulations may impair our research, development or production efforts or result in increased expense of compliance.

Risks Related to Intellectual Property

We license a significant portion of our intellectual property from Cellectis, our majority stockholder, and the University of Minnesota, and principally rely upon Cellectis to prosecute and defend such intellectual property.

Our business relies heavily on the intellectual property we license from Cellectis and the University of Minnesota. If we do not comply with our obligations under the license agreements, we may be subject to damages, which may be significant, and in some cases Cellectis and/or the University of Minnesota may have the right to terminate the license agreement. Any termination of our license agreement with Cellectis or the University of Minnesota would have a material adverse effect on our business and results of operations.

Moreover, any enforcement of the licensed intellectual property could subject it to challenge by third parties and if any such challenge is successful, such intellectual property could be narrowed in scope or held to be invalid or unenforceable, which would materially impair any competitive advantage afforded to us by such intellectual property. There can be no assurance that Cellectis or the University of Minnesota will prosecute and maintain such intellectual property in the best interests of our business or at all, and, if Cellectis or the University of Minnesota fails to properly prosecute and maintain such intellectual property, we could lose our rights to such intellectual property, which would materially impair any competitive advantage afforded to us by such intellectual property. For more information regarding our license agreement with Cellectis or the license agreement between Cellectis and the University of Minnesota, please see “Business—Intellectual Property.”

Patents and patent applications involve highly complex legal and factual questions, which, if determined adversely to us, could negatively impact our competitive position.

The patent positions of biotechnology companies and other actors in our fields of business can be highly uncertain and involve complex scientific, legal and factual analyses. The interpretation and breadth of claims allowed in some patents covering biological compositions may be uncertain and difficult to determine and are often affected materially by the facts and circumstances that pertain to the patented compositions and the related patent claims. The standards of the United States Patent and Trademark Office, or USPTO, and foreign patent offices are sometimes uncertain and could change in the future. Consequently, the issuance and scope of patents cannot be predicted with certainty. Patents, if issued, may be challenged, invalidated, narrowed or circumvented. United States patents and patent applications may also be subject to interference proceedings, and United States patents may be subject to reexamination proceedings, post-grant review, *inter partes* review, or other administrative proceedings in the USPTO. Foreign patents as well may be subject to opposition or comparable proceedings in corresponding foreign patent offices. Challenges to our or our licensors' patents and patent applications, if successful, may result in the denial of our or our licensors' patent applications or the loss or reduction in their scope. In addition, such interference, reexamination, post-grant review, *inter partes* review, opposition proceedings and other administrative proceedings may be costly and involve the diversion of significant management time. Accordingly, rights under any of our or our licensors' patents may not provide us with enough protection against competitive products or processes and any loss, denial or reduction in scope of any of such patents and patent applications may have a material adverse effect on our business.

Even if not challenged, our or our licensors' patents and patent applications may not adequately protect our product candidates or technology or prevent others from designing their products or technology to avoid being covered by our or our licensors' patent claims. If the breadth or strength of protection provided by the patents we own or license with respect to our product candidates is threatened, it could dissuade companies from partnering with us to develop, and could threaten our ability to successfully commercialize, our product candidates. Furthermore, for United States patent applications in which claims are entitled to a priority date before March 16, 2013, an interference proceeding can be provoked by a third party or instituted by the USPTO in order to determine who was the first to invent any of the subject matter covered by such patent claims.

In addition, changes in, or different interpretations of, patent laws in the United States and other countries may permit others to use our discoveries or to develop and commercialize our technology and products without providing any notice or compensation to us, or may limit the scope of patent protection that we or our licensors are able to obtain. The laws of some countries do not protect intellectual property rights to the same extent as United States laws and those countries may lack adequate rules and procedures for defending our intellectual property rights.

If we or our licensors fail to obtain and maintain patent protection and trade secret protection of our product candidates and technology, we could lose our competitive advantage and competition we face would increase, reducing any potential revenues and have a material adverse effect on our business.

We will not seek to protect our intellectual property rights in all jurisdictions throughout the world and we may not be able to adequately enforce our intellectual property rights even in the jurisdictions where we seek protection.

Filing, prosecuting and defending patents on our product candidates in all countries and jurisdictions throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States could be less extensive than those in the United States, assuming that rights are obtained in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions.

Competitors may use our technologies in jurisdictions where we or our licensors do not pursue and obtain patent protection to develop their own products and further, may export otherwise infringing products to territories where we or our licensors have patent protection, but where the ability to enforce our or our licensors' patent rights is not as strong as in the United States. These products may compete with our products and our intellectual property rights and such rights may not be effective or enough to prevent such competition.

The laws of some foreign countries do not protect intellectual property rights to the same extent as the laws of the United States. Patent protection must be sought on a country-by-country basis, which is an expensive and time-consuming process with uncertain outcomes. Accordingly, we and our licensors may choose not to seek patent protection in certain countries, and we will not have the benefit of patent protection in such countries. In addition, the legal systems of some countries, particularly developing countries, do not favor the enforcement of patents and other intellectual property protection, especially those relating to biotechnologies. The requirements for patentability differ from country to country, and the laws of some foreign countries do not protect intellectual property rights, including trade secrets, to the same extent as federal and state laws of the United States. Many companies have encountered significant problems in protecting and defending intellectual property rights in certain foreign jurisdictions. These realities may make it difficult for us to stop the infringement, misappropriation or other violation of our intellectual property rights. Many foreign countries, including the EU countries, have compulsory licensing laws under which a patent owner must grant licenses to third parties. In addition, many countries limit the enforceability of patents against third parties, including government agencies or government contractors. In these countries, patents may provide limited or no benefit. In those countries, we and our licensors may have limited remedies if patents are infringed or if we or our licensors are compelled to grant a license to a third party, which could materially diminish the value of those patents. This could limit our potential revenue opportunities. Accordingly, our and our licensors' efforts to enforce intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we own or license. Similarly, if our trade secrets are disclosed in a foreign jurisdiction, competitors worldwide could have access to our proprietary information, and we may be without satisfactory recourse. Such disclosure could have a material adverse effect on our business. Moreover, our ability to protect and enforce our intellectual property rights may be adversely affected by unforeseen changes in foreign intellectual property laws.

Furthermore, proceedings to enforce our licensors' and our patent rights and other intellectual property rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our or our licensors' patents at risk of being invalidated or interpreted narrowly, could put our or our licensors' patent applications at risk of not issuing and could provoke third parties to assert claims against us or our licensors. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded to us, if any, may not be commercially meaningful, while the damages and other remedies we may be ordered to pay such third parties may be significant. Accordingly, our licensors' and our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Third parties may assert rights to inventions we develop or otherwise regard as our own.

Third parties may in the future make claims challenging the inventorship or ownership of our or our licensors' intellectual property. We have written agreements with R&D partners that provide for the ownership of intellectual property arising from our strategic alliances. These agreements provide that we must negotiate certain commercial rights with such partners with respect to joint inventions or inventions made by our partners that arise from the results of the strategic alliance. In some instances, there may not be adequate written provisions to address clearly the allocation of intellectual property rights that may arise from the respective alliance. If we cannot successfully negotiate sufficient ownership and commercial rights to the inventions that result from our use of a third-party partner's materials when required, or if disputes otherwise arise with respect to the intellectual property developed through the use of a partner's samples, we may be limited in our ability to capitalize on the full market potential of these inventions. In addition, we may face claims by third parties that our agreements with employees, contractors, or consultants obligating them to assign intellectual property to us are ineffective, or are in conflict with prior or competing contractual obligations of assignment, which could result in ownership disputes regarding intellectual property we have developed or will develop and could interfere with our ability to capture the full commercial value of such inventions. Litigation may be necessary to resolve an ownership dispute, and if we are not successful, we may be precluded from using certain intellectual property and associated products and technology or may lose our rights in that intellectual property. Either outcome could have a material adverse effect on our business.

In addition, the research resulting in certain of our in-licensed patent rights and technology was funded in part by the United States government. As a result, the United States government has certain rights to such patent rights and technology, which include march-in rights. When new technologies are developed with government funding, the government generally obtains certain rights in any resulting patents, including a non-exclusive license authorizing the government to use the invention or to have others use the invention on its behalf. The government can exercise its march-in rights if it determines that action is necessary because we fail to achieve practical application of the government-funded technology, or because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to the United States industry. Any exercise by the government of any of the foregoing rights could have a material adverse effect on our business.

Any infringement, misappropriation or other violation by us of intellectual property rights of others may prevent or delay our product development efforts and may prevent or increase the costs of our successfully commercializing our product candidates, if approved.

Our success will depend in part on our ability to operate without infringing, misappropriating or otherwise violating the intellectual property and proprietary rights of third parties. We cannot assure that our business operations, products, product candidates and methods and the business operations, products, product candidates and methods of our partners do not or will not infringe, misappropriate or otherwise violate the patents or other intellectual property rights of third parties.

The biotechnology industry is characterized by extensive litigation regarding patents and other intellectual property rights. Other parties may allege that our products, product candidates or the use of our technologies infringe, misappropriate or otherwise violate patent claims or other intellectual property rights held by them or that we are employing their proprietary technology without authorization. Patent and other types of intellectual property litigation can involve complex factual and legal questions, and their outcome is uncertain. Any claim relating to intellectual property infringement that is successfully asserted against us may require us to pay substantial damages, including treble damages and attorneys' fees if we or our partners are found to be willfully infringing another party's patents, for past use of the asserted intellectual property and royalties and other consideration going forward if we are forced to take a license. Such a license may not be available on commercially reasonable terms, or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same intellectual property rights or technologies licensed to us. In addition, if any such claim were successfully asserted against us and we could not obtain a license, we or our partners may be forced to stop or delay developing, manufacturing, selling or otherwise commercializing our products, product candidates or other infringing technology, or those we develop with our R&D partners.

Even if we are successful in these proceedings, we may incur substantial costs and divert management time and attention pursuing these proceedings, which could have a material adverse effect on us. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. If we are unable to avoid infringing the patent rights of others, we may be required to seek a license, defend an infringement action or challenge the validity of the patents in court, or redesign our products. Patent litigation is costly and time consuming. We may not have enough resources to bring these actions to a successful conclusion. In addition, intellectual property litigation or claims could force us to do one or more of the following:

- cease developing, selling or otherwise commercializing our product candidates;
- pay substantial damages for past use of the asserted intellectual property;
- obtain a license from the holder of the asserted intellectual property, which license may not be available on reasonable terms, if at all; and
- in the case of trademark claims, redesign, or rename trademarks we may own, to avoid infringing the intellectual property rights of third parties, which may not be possible and, even if possible, could be costly and time-consuming.

Any of these risks coming to fruition could have a material adverse effect on our business, results of operations, financial condition and prospects.

We may be unsuccessful in developing, licensing or acquiring intellectual property that may be required to develop and commercialize our product candidates.

Our programs may involve additional product candidates that may require the use of intellectual property or proprietary rights held by third parties; the growth of our business may depend in part on our ability to acquire, in-license or use these intellectual property and proprietary rights. However, we may be unable to acquire or in-license any third-party intellectual property or proprietary rights that may be key to development. Even if we can acquire or in-license such rights, we may be unable to do so on commercially reasonable terms. The licensing and acquisition of third-party intellectual property and proprietary rights is a competitive area, and several more established companies are also pursuing strategies to license or acquire third-party intellectual property and proprietary rights that we may consider attractive or necessary. These established companies may have a competitive advantage over us due to their size, capital resources and agricultural development and commercialization capabilities.

We sometimes partner with academic institutions to accelerate our research or development under written agreements with these institutions. Typically, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the strategic alliance. Regardless of such option, we may be unable to negotiate a license within the specified time frame or under terms that are acceptable to us, and the institution may license such intellectual property rights to third parties, potentially blocking our ability to pursue our development and commercialization plans.

Further, our consulting agreement with Dr. Voytas generally obligates Dr. Voytas to assign to us any intellectual property solely or jointly conceived, developed or reduced to practice by him in the course of the performance of his services to us. However, we do not have any rights, including any assignment or right of first refusal rights, to intellectual property conceived, developed or reduced to practice by Dr. Voytas outside the course of the performance of his services to us, including in connection with his employment at the University of Minnesota.

In addition, companies that perceive us to be a competitor may be unwilling to assign or license intellectual property and proprietary rights to us. We also may be unable to license or acquire third-party intellectual property and proprietary rights on terms that would allow us to make an appropriate return on our investment or at all. If we are unable to successfully acquire or in-license rights to required third-party intellectual property and proprietary rights or maintain the existing intellectual property and proprietary rights we have, we may have to cease development of the relevant program, product or product candidate, which could have a material adverse effect on our business.

Risks Related to Our Organization and Operation

We will need to develop and expand our company, and we may encounter difficulties in managing this development and expansion, which could disrupt our operations.

As of December 31, 2019, we had 75 employees. Effective with the end of the third quarter of 2019, we have internalized nearly all the management services Cellectis previously provided pursuant to our management services agreement with Cellectis. We expect to increase our number of employees and the scope and location of our operations as we continue to internally develop the managerial, operational and financial systems necessary to operate as a standalone company and to recruit and train additional qualified personnel to conduct our commercial operations that began in late February 2019 with the first sales of our high oleic soybean products and to further develop our pipeline of product candidates. Members of our management team may need to divert a disproportionate amount of their attention away from their day-to-day activities and devote a substantial amount of time to managing these development activities. If our management is unable to effectively manage our expected development and expansion, our expenses may increase more than expected, our ability to generate or increase our revenue could be reduced and we may not be able to execute our business strategy. Our future financial performance and our ability to commercialize our product candidates, if approved, and compete effectively will depend, in part, on our ability to effectively manage the future development and expansion of our company.

We depend on key management personnel and attracting and retaining other qualified personnel, and our business could be harmed if we lose key management personnel or cannot attract and retain other qualified personnel.

Our success depends to a significant degree upon the technical skills and continued service of certain members of our management and other key employees. Additionally, Dr. Dan Voytas, our Chief Science Officer, works for us as a consultant pursuant to a consulting agreement under which he is required to work 10 days per month with us. Accordingly, we may, from time to time, compete with Dr. Voytas' other professional activities for his time and attention. The loss of the services of our management or key employees or Dr. Voytas may delay or prevent the timely and successful execution of our business strategies and objectives. Additionally, the majority of our personnel is involved in research, development, and regulatory activities and competition for these highly skilled employees is intense. Our business is therefore dependent on our ability to recruit and maintain a highly skilled and educated workforce with expertise in a range of disciplines, including biology, biochemistry, plant genetics, agronomics, mathematics, agribusiness, and other subjects relevant to our operations. All our current employees are at-will employees, and the failure to retain or hire skilled and highly educated personnel could limit our growth and hinder our research and development efforts. There can be no assurance that we will be successful in attracting or retaining such personnel and the failure to do so could have a material adverse effect on our business, financial condition, and results of operations.

Our business and operations would suffer in the event of computer system failures, cyber-attacks or a deficiency in our cyber-security.

Despite the implementation of security measures, our internal computer systems, and those of third parties on which we rely, and the data transmitted across these systems, are vulnerable to damage from computer viruses, malware, natural disasters, terrorism, war, telecommunication and electrical failures, cyber-attacks or cyber-intrusions over the Internet, attachments to emails, persons inside our organization, or persons with access to systems inside our organization. The risk of data loss or a security breach or disruption, particularly through cyber-attacks or cyber-intrusion, including by computer hackers, foreign governments, and cyber terrorists, has generally increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. If such an event were to occur and cause interruptions in our operations or loss of our data, it could result in a material disruption of our product development programs. For example, the loss of field trial data from completed or ongoing or planned field trials could result in delays in our regulatory clearance and significantly increase our costs to recover or reproduce the data and add additional time to our product development timelines. To the extent that any disruption or security breach was to result in a loss of or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability, damage to our reputation, and the development of our product candidates could be delayed.

Risks Related to Our Relationship with Cellectis

Cellectis controls the direction of our business, and the concentrated ownership of our common stock and certain contractual rights Cellectis has will prevent you and other stockholders from influencing significant decisions.

As of December 31, 2019, Cellectis owned 68.9% of our outstanding shares of common stock. Pursuant to our stockholders' agreement, Cellectis will have certain contractual rights for so long as it beneficially owns at least 50% of the then outstanding shares of our common stock, including:

- to approve any modification to our or any future subsidiary's share capital (e.g., share capital increase or decrease), the creation of any subsidiary, any grant of stock-based compensation, any distributions or public or private offering, merger, spin-off, liquidation, winding up or carve-out transactions;
- to approve the annual business plan and annual budget and any modification thereof;
- to approve any external growth transactions exceeding $500,000 and not included in the approved annual business plan and annual budget;
- to approve any investment and disposition decisions exceeding $500,000 and not included in the approved annual business plan and annual budget (it being understood that this clause excludes the purchase and sale of inventory as a part of the normal course of business);
- to approve any related-party agreement and any agreement or transaction between the executives or stockholders of Calyxt and Calyxt or any of its subsidiaries;
- to approve any decision pertaining to the recruitment, dismissal/removal, or increase of the compensation of executives and corporate officers;
- to approve any material decision relating to a material litigation;
- to approve any decision relating to the opening of a social or restructuring plan or pre-insolvency proceedings;
- to approve any buyback by us of our own shares;
- to approve any new borrowings or debts exceeding $500,000 and early repayment of loans, if any (it being understood that Cellectis will approve the entering into of contracts for revolving loans and other short-term loans and the repayment of such for financing general operating activities, such as revolving loans for inventory or factoring of receivables);
- to approve grants of any pledges on our securities;
- to approve the development of any new activities and businesses not described in the annual business plan and annual budget;
- to approve entry into any material agreement or partnership; and
- to approve any offshore and relocation activities.

In addition, Cellectis will have the following rights for so long as it beneficially owns at least 15% of the then outstanding shares of our common stock, including:

- to nominate the greater of three members of our Board of Directors or a majority of the directors;
- to designate the Chairman of our Board of Directors and one member to each of the audit committee of the Board of Directors, the compensation committee of the Board of Directors and the nominating and corporation governance committee of the Board of Directors;
- to approve any amendments to our amended and restated certificate of incorporation or our amended and restated bylaws that would change the name of our company, its jurisdiction of incorporation, the location of its principal executive offices, the purpose or purposes for which our company is incorporated or the Cellectis approval items set forth in the stockholders' agreement;
- to approve the payment of any regular or special dividends;
- to approve the commencement of any voluntary proceeding for the dissolution, winding up or bankruptcy of Calyxt or a material subsidiary;
- to approve any public or private offering, merger, amalgamation or consolidation of us or the spinoff of a business of ours or any sale, conveyance, transfer or other disposition of our assets; and
- to approve any appointment to, or removal from, our Board of Directors.

As a result, Cellectis controls the direction of our business, and the concentrated ownership of our common stock and the contractual rights described above will prevent stockholders from influencing significant decisions.

If Cellectis sells a controlling interest in our company to a third party, stockholders may not realize any change-of-control premium on shares of our common stock.

Cellectis has the ability, should it choose to do so, to sell some or all its shares of our common stock to a third party, which, if sufficient in size, could result in a change of control of our company. In certain circumstances, a third-party buyer may not be willing to pay a premium over the current market price of our common stock in order to acquire a controlling interest in Calyxt. Our stockholders would not have the right to participate in Cellectis' sale of our common stock to a third party buyer nor would the third party buyer be required to make an offer to acquire shares of our common stock from any stockholder other than Cellectis.

If Cellectis sold a controlling interest to a third party, any change-of-control premium on shares of our common stock would only accrue to Cellectis and not to any of our other stockholders. Additionally, through its ownership of a majority of our common stock and its contractual rights under the stockholders' agreement, Cellectis will also determine whether a change of control of Calyxt occurs and if so, on what terms. In certain circumstances, including in connection with a proposed sale of Calyxt, Cellectis' interests as a stockholder of Calyxt may be different than the interests of other stockholders.

We are a "controlled company" within the meaning of the rules of the NASDAQ and, as a result, rely on exemptions from certain corporate governance requirements. Our stockholders do not have the same protections afforded to stockholders of companies that are subject to such requirements.

Because Cellectis controls a majority of the voting power of our outstanding common stock, we are a "controlled company" within the meaning of the corporate governance standards of the NASDAQ. Under these rules, a listed company of which more than 50% of the voting power is held by an individual, group or another company is a "controlled company" and may elect not to comply with certain corporate governance requirements, including:

- the requirement that a majority of the board of directors consist of independent directors;
- the requirement that we have director nominees selected or recommended for the board's selection by a majority vote of only the independent directors or by a nominating committee composed entirely of independent directors with a written charter addressing the committee's purpose and responsibilities;
- the requirement that our compensation committee be composed entirely of independent directors with a written charter addressing the committee's purpose and responsibilities; and
- the requirement for an annual performance evaluation of our nominating and corporate governance and compensation committees.

We are relying upon and expect to continue to rely upon some of these exemptions from the NASDAQ corporate governance requirements. Accordingly, not all stockholders will have the same protections afforded to stockholders of companies that are subject to all the corporate governance requirements of the NASDAQ.

Cellectis and our directors who have relationships with Cellectis may have conflicts of interest with respect to matters involving our company.

Our certificate of incorporation provides that none of Cellectis, or any of its officers, directors, agents, shareholders, members, partners, subsidiaries (other than Calyxt and any future subsidiaries) and their affiliates will be liable to us or our stockholders for breach of any fiduciary duty by reason of the fact that Cellectis or any such individual directs a corporate opportunity to Cellectis or its affiliates instead of us, or does not communicate information regarding a corporate opportunity to us that such person or affiliate has directed to Cellectis or its affiliates.

Our certificate of incorporation also provides that neither Cellectis nor any of its affiliates or any of our non-employee directors will have any duty to refrain from engaging in a corporate opportunity in the same or similar lines of business in which we or any future subsidiaries now engage or propose to engage or otherwise competing with us or any of our future subsidiaries.

Our license agreement with Cellectis does not restrict Cellectis from competing with us generally. Cellectis could develop and commercialize agricultural and food products that may compete with our current products or products in our pipeline using Cellectis intellectual property or technologies other than the gene-editing technologies Cellectis has licensed to us. Cellectis could also use the licensed gene-editing technologies to develop and commercialize products involving animals and animal cells and these animal-based products may be competitive with our plant-based products in certain circumstances.

One of our directors, Dr. André Choulika, is the Chairman and Chief Executive Officer of Cellectis and under the stockholders' agreement, Cellectis has the right to designate additional directors to serve on the Calyxt board of directors. Dr. Choulika and any other directors designated by Cellectis who have relationships with Cellectis will have fiduciary duties to us and in addition will have duties to Cellectis.

Accordingly, there may be real or apparent conflicts of interest with respect to matters affecting both us and Cellectis, whose interests, in some circumstances, may be different than the interests of other stockholders or our interests.

Risks Related to Ownership of Our Common Stock

The market price of our common stock has been and could remain volatile, which could adversely affect the market price of our common stock.

The market price of our common stock has experienced, and may continue to experience, volatility in response to various factors. Between January 1, 2018 and December 31, 2019, the sales price of our common stock on the NASDAQ Global Market fluctuated from a high of $27.23 per share to a low of $3.55 per share. Some factors that may cause the market price of our common stock to fluctuate include our quarterly operating results, our perceived prospects or the perceptions of the market of our pipeline, our new products or our technologies, changes in securities analysts' recommendations or earnings estimates and our ability to meet such estimates, changes in general conditions in the economy or the financial markets, capital raising activity and other developments affecting us, our competitors or Cellectis.

These and other market and industry factors may cause the market price and demand for our common stock to fluctuate substantially, regardless of our actual operating performance, which may limit or prevent investors from readily selling their common stock at a favorable price or at all and may otherwise negatively affect the liquidity of our common stock.

Our historical financial information is not necessarily representative of the results we would have achieved as a standalone company and may not be a reliable indicator of our future results.

We are a majority-owned subsidiary of Cellectis. As a result, our historical financial information does not reflect the financial condition, results of operations or cash flows we would have achieved as a standalone company and not a subsidiary of Cellectis during the periods presented or those we will achieve in the future. This is primarily the result of the following factors:

- Prior to the fourth quarter of 2019, our historical financial information reflects expense allocations for certain support functions that were provided on a centralized basis within Cellectis, such as expenses for business technology, facilities, legal, finance, human resources and business development that may be higher or lower than the comparable expenses we would have actually incurred, or will incur in the future, as a standalone company;
- significant increases in our cost structure as a result of becoming a public company, including costs related to public company reporting, investor relations and compliance with the Sarbanes-Oxley Act, which expenses may increase at such time as we operate as a standalone company; and
- our direct costs for activities we are performing following their separation from Cellectis, reducing our management fee expense charged by Cellectis.

As a result of these matters, it may be difficult for investors to compare our future results to historical results or to evaluate our relative performance or trends in our business.

Future sales of common stock by Cellectis or others of our common stock, or the perception that such sales may occur, could depress the market price of our common stock.

As of December 31, 2019, Cellectis owned 68.9% of our outstanding shares of common stock. Future sales of these shares in the public market will be subject to the volume and other restrictions of Rule 144 under the Securities Act for so long as Cellectis is deemed to be our affiliate, unless the shares to be sold are registered with the SEC. We are unable to predict with certainty whether or when Cellectis will sell a substantial number of shares of our common stock. The sale by Cellectis of a substantial number of shares, or a perception that such sales could occur, could significantly reduce the market price of our common stock.

The concentration of ownership of our common stock and provisions in our Certificate of Incorporation, Bylaws and Delaware law may prevent or delay an acquisition of us, which could decrease the trading price of our common stock.

The fact that Cellectis owns 68.9% of our common stock and Cellectis' rights under the stockholders' agreement to approve a sale of Calyxt and other changes in our Board of Directors and management will prevent a third party from attempting to acquire control of Calyxt and prevent changes in our Board of Directors or management, even if a sale of Calyxt or the changes would be considered beneficial by many stockholders other than Cellectis. Further, following the first date on which Cellectis no longer beneficially own more than 50% of the outstanding shares of our common stock, certain provisions of our certificate of incorporation, bylaws and other agreements may make it more difficult for a third party to acquire or discourage a third-party from attempting to acquire control of Calyxt, including:

- the provisions of our certificate of incorporation requiring the Board of Directors to be divided into three classes with staggered terms;
- the provisions of our bylaws regarding the business properly brought before our stockholders and the nomination of directors for election at stockholder meetings;

- the right of our Board of Directors to fix the designations, powers, preferences and relative, participating, optional or other rights, of preferred stock without stockholder approval;
- the provisions of our Certificate of Incorporating limiting the right of stockholders to remove directors; and
- the provisions of our agreements provide for severance payments to our executive officers in the event of certain terminations following a "change in control"

Following the first date on which Cellectis no longer beneficially own more than 50% of the outstanding shares of our common stock, these provisions could make it more difficult for a third party to acquire us, even if the third party's offer may be considered beneficial by many stockholders, including transactions in which our stockholders might otherwise receive a premium for their shares of our common stock. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, possibly depressing the market price of our common stock. As a result, stockholders may be limited in their ability to obtain a premium for their shares both while ownership of our common stock is concentrated with Cellectis and after.

We are an "emerging growth company" and have reduced disclosure requirements that may make our common stock less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act, and take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth companies" including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and not being required to submit certain executive compensation matters to stockholder advisory votes, such as "say-on-pay," "say-on-frequency" and "say-on-golden parachutes". If investors may find our common stock less attractive because of our reliance on these exemptions and, as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

We lease a 40,000 square-foot corporate headquarters facility in Roseville, Minnesota under a lease dated September 6, 2017. The facility includes office, research laboratory space, a demonstration test kitchen and outdoor growing plots, including greenhouses. The lease has an initial term that began in May 2018 and expires on the last day of May 2028, with monthly base rent of $111,333 in lease years 1 to 5 [what happens in year 6-15 and how did this big insert get in here / why is it necessary?] increasing to monthly base rent of $138,309 in lease years 16 to 20. We have the option to extend the term of the lease for four successive additional renewal terms of five years each commencing at the expiration date of the initial term, with monthly base rent set for each of these renewal terms. Cellectis has guaranteed all our obligations under the lease.

Prior to June 2018 we leased office space in New Brighton, Minnesota.

Item 3. Legal Proceedings

We are not a party to any material pending legal proceeding as of December 31, 2019. From time to time, we may be involved in legal proceedings arising in the ordinary course of business.

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

Our common stock has traded on the NASDAQ Global Market under the ticker symbol of CLXT since our initial public offering on July 25, 2017. Prior to that time, there was no established public trading market for our common stock.

Holders of Common Stock

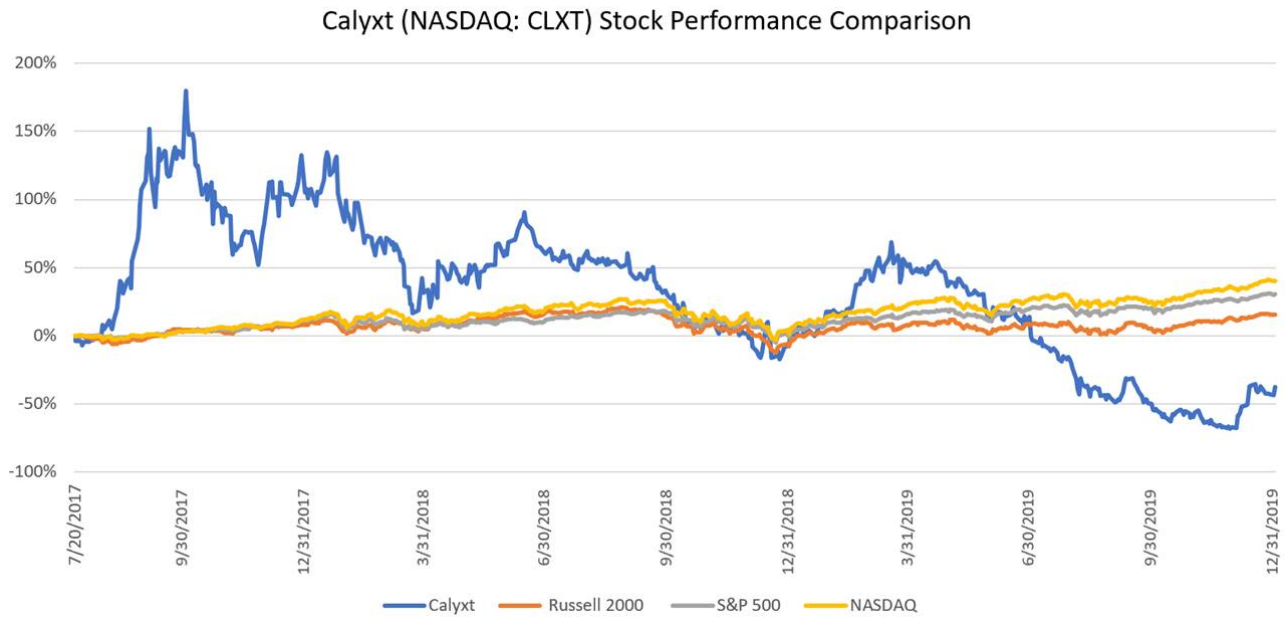
As of March 4, 2020, there were 4 holders of record of 32,990,647 outstanding shares of our common stock. The number of holders of record of our common stock does not reflect the number of beneficial holders whose shares are held by banks, depositaries, brokers or other nominees.

Dividends

We have not paid dividends on our common stock and do not currently plan to pay any cash dividends in the foreseeable future.

Stock Performance Graph

The following graph shows a comparison from July 20, 2017 (the date our common stock commenced trading on The NASDAQ Global Market) through December 31, 2019 of the cumulative total return for our common stock, the Russell 2000 Index, the Standard & Poor's 500 Stock Index (S&P 500 Index) and the NASDAQ Composite Index (NASDAQ Composite). The graph assumes that $100 was invested at the close of the market on July 20, 2017 in our common stock, the S&P 500 Index and the NASDAQ Composite, and data for the S&P 500 Index and the NASDAQ Composite assumes reinvestments of dividends. The stock price performance of the following graph is not necessarily indicative of future stock price performance.



This performance graph shall not be deemed soliciting material or to be filed with the SEC for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act or the Exchange Act.

Securities Authorized for Issuance under Equity Compensation Plans

The following table sets forth, as of December 31, 2019, certain information related to our compensation plans under which shares of our common stock are authorized for issuance:

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weight-average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders[1]	4,481,359	$ 11.83[2]	2,544,107[3]
Equity compensation plans not approved by security holders	—	—	—
Total	4,481,359	$ 11.83	2,544,107

(1) Includes the Initial Plan and the Omnibus Plan.
(2) Represents the weighted average exercise price of options outstanding under the Initial Plan and the Omnibus Plan. The weighted average exercise price does not take restricted stock units into account.
(3) Of these shares, no shares are available for future issuance under out Initial Plan and 2,544,107 remain available for future issuance under out Omnibus Plan. All of these shares are available for issuance other than upon the exercise of options, warrants or rights.

Purchases of Equity Securities by the Issuer or Affiliated Purchasers

Period	Total number of shares purchased	Average price paid per share	Total number of shares purchased as part of publicly announced programs	Maximum dollar value of shares that may yet be purchased under the programs
January 1, 2019 – January 31, 2019	—	$ —	—	$ —
February 1, 2019 – February 28, 2019	—	$ —	—	$ —
March 1, 2019 – March 31, 2019	—	$ —	—	$ —
April 1, 2019 – April 30, 2019	—	$ —	—	$ —
May 1, 2019 – May 31, 2019	—	$ —	—	$ —
June 1, 2019 – June 30, 2019	43,363	$ 12.90	—	$ —
July 1, 2019 – July 31, 2019	—	$ —	—	$ —
August 1, 2019 – August 31, 2019	—	$ —	—	$ —
September 1, 2019 – September 30, 2019	—	$ —	—	$ —
October 1, 2019 – October 31, 2019	23,461	$ 5.64	—	$ —
November 1, 2019 – November 30, 2019	—	$ —	—	$ —
December 1, 2019 – December 31, 2019	—	$ —	—	$ —
Total	66,824	$	—	$

ITEM 6. SELECTED FINANCIAL DATA.

The following sets forth selected financial data for each of the fiscal years in the four-year period ended December 31, 2019. This selected financial data should be read in conjunction with “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and related notes included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of the results that may be expected in the future.

	As of and for the year ended December 31,				
In Thousands, Except for Share and Per Share Data	**2019**	**2018**	**2017**	**2016**	**2015**
Operating data:					
Revenue	**$ 7,296**	$ 236	$ 508	$ 399	$ 1,272
Cost of goods sold	**$ 9,280**	$ —	$ —	$ —	$ —
Research and development expenses	**$ 12,213**	$ 10,358	$ 11,508	$ 5,457	$ 2,766
Selling and supply chain expenses	**$ 5,172**	$ 2,352	$ 1,241	$ 468	$ —
General and administrative expenses	**$ 18,966**	$ 13,356	$ 11,580	$ 3,233	$ 1,685
Management fees	**$ 1,338**	$ 2,285	$ 1,968	$ 3,150	$ 1,884
Net loss	**$ (39,612)**	$ (27,897)	$ (25,980)	$ (12,086)	$ (5,889)
Basic and diluted loss per share	**$ (1.21)**	$ (0.91)	$ (1.12)	$ (0.62)	$ 0.88
Weighted average shares outstanding - basic and diluted	**32,805,684**	30,683,421	23,153,661	19,600,000	6,725,740
Anti-dilutive stock awards	**5,606,552**	4,253,301	5,257,365	1,930,600	339,937
Balance sheet data:					
Cash and cash equivalents	**$ 58,610**	$ 93,794	$ 56,664	$ 5,026	$ 24,687
Land, buildings and equipment	**$ 23,212**	$ 21,850	$ 14,353	$ 10,994	$ 915
Total assets	**$ 88,098**	$ 118,791	$ 72,167	$ 16,623	$ 25,995
Financing lease obligations, excluding current portion	**$ 18,244**	$ 18,227	$ 10,148	$ —	$ —
Cash flow data:					
Net cash used by operating activities	**$ (31,951)**	$ (20,252)	$ (12,785)	$ (9,237)	$ (6,691)
Capital expenditures	**$ (2,969)**	$ (1,847)	$ (779)	$ (10,424)	$ 665

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

EXECUTIVE OVERVIEW

We are a technology company focused on delivering plant-based solutions that are healthy and sustainable. We intend to bring these products to market one of two ways. First, through an integrated business model where we leverage third party assets in the agricultural supply chain to process grains and sell the resulting products. Second, through collaboration arrangements or license agreements with third parties to jointly develop products. In a collaboration arrangement we expect to receive payments for the use of our innovations, upon the achievement of development milestones, and from royalties upon commercial sale of products. We also have an option to monetize our technology platform by strategically licensing our innovations to others. We expect to use the integrated business model in soybeans and wheat and collaborate or license in all other crops. We may also choose to collaborate in wheat and soybeans to increase margins and reduce our need for working capital. We are currently exploring product opportunities in alfalfa, canola, hemp, oats, peanuts, peas, potato, soybeans, wheat, and other crops.

We are an early-stage company and have incurred net losses since our inception. As of December 31, 2019, we had an accumulated deficit of $122.1 million. Our net loss was $39.6 million for the year ended December 31, 2019.

We expect to continue to incur operating losses for the next several years. Those losses may fluctuate significantly from quarter-to-quarter and year-to-year. We expect that our losses will be driven by our:

- costs to commercialize products in our integrated business model;
- conducting breeding and field trials for our current and future products, including any impact from the damage to our high fiber wheat trials;
- continuing to advance the R&D of our current and future products;
- seeking to identify and validate additional products;
- acquiring or in-licensing other products, technologies, germplasm or other biological material;
- seeking regulatory and marketing approvals for our products;
- making royalty and other payments under any in-license agreements;
- maintaining, protecting, expanding and defending our intellectual property portfolio;
- seeking to attract and retain new and existing skilled personnel;
- investing in our infrastructure to support the scale-up of the business; and
- experiencing any delays or encounter issues with any of the above.

OUR RELATIONSHIP WITH CELLECTIS AND COMPARABILITY OF OUR RESULTS

We are a majority-owned subsidiary of Cellectis. As of December 31, 2019, Cellectis owned 68.9% of our outstanding common stock.

Our historical financial information reflects expense allocations for certain support functions that were provided on a centralized basis pursuant to a management services agreement. As a result, such historical financial information may not reflect the financial condition, results of operations or cash flows we would have achieved as a stand-alone company and not a subsidiary of Cellectis during such historical periods. Effective with the end of the third quarter of 2019, we have internalized nearly all the services Cellectis previously provided. Cellectis has also guaranteed the lease of our headquarters facility.

Cellectis has certain contractual rights as well as rights pursuant to our certificate of incorporation and bylaws, in each case, as long as it maintains threshold beneficial ownership levels in our shares.

We hold an exclusive license from Cellectis that broadly covers the use of engineered nucleases for plant gene editing. This intellectual property covers methods to edit plant genes using "chimeric restriction endonucleases," which include TALEN®, CRISPR/Cas9, zinc finger nucleases, and some types of meganucleases.

FINANCIAL OPERATIONS OVERVIEW

Revenue

Revenues are recognized as described in our Accounting Policies in the Notes to Consolidated Financial Statements. For the year ended December 31, 2019, we recognized revenue from the sales of high oleic soybean oil and meal. We do not recognize revenue from seed transactions because of the grower's commitment to sell their crop to us. We benefit from the cash upon payment and defer the net profit on the seed to inventory and recognize that benefit when the grower delivers grain to us. We are also exploring additional revenue-generating opportunities including collaborations, R&D activities and other value capture models for our technology platform.

Cost of Goods Sold and Inventory

Prior to 2019, our cost of goods sold represented immaterial costs associated with our out-licensing activities. Costs we incurred associated with the purchasing, storing, transporting and processing grain, net of proceeds of seed sales (Grain Costs), were expensed as R&D. Beginning in the first quarter of 2019, we began to capitalize all Grain Costs into inventory. For the year ended December 31, 2018, we incurred $3.3 million of Grain Costs that were expensed as R&D. These amounts affect the year-over-year comparability of costs of goods sold and R&D expenses.

Cost of goods sold also includes crush and refining losses that are expensed as incurred since they do not add to the value of the finished products. All other grain and risk management costs, net of the benefit from our seed activity, are capitalized to inventory and relieved to cost of goods sold as the high oleic soybean oil and meal is sold. Any valuation adjustments to inventory are recognized as incurred.

Research and Development Expense

R&D expenses consist of the costs of performing activities to discover and develop products and advance our intellectual property. We recognize R&D expenses as they are incurred. Prior to commercialization of our high oleic soybean products in early 2019, we also reported Grain Costs as R&D expenses.

Excluding the Grain Costs mentioned above, our R&D expenses consist primarily of employee-related costs for our R&D personnel, fees for contractors who support product development and breeding activities, expenses for trait validation, purchasing material and supplies for our laboratories, licensing, facilities and other costs associated with owning and operating our own laboratories. R&D expenses also include costs to write and support the research for filing patents.

Our R&D efforts are central to our business and account for a significant portion of our operating expenses. We expect that our R&D expenses will increase as we expand our product development efforts, access and develop additional technologies and hire additional personnel.

Selling and Supply Chain Expense

Selling and Supply Chain (S&SC) expenses consist primarily of employee-related expenses for selling our products, acreage acquisition, managing the supply chain and business development, as well as costs to market our products and an allocation of facility and information technology expenses.

We expect that our S&SC expenses will increase as we continue to invest in sales, quality and food safety for those products that we commercialize on our own.

General and Administrative Expense

General and administrative (G&A) expenses consist primarily of employee-related expenses for our executive, legal, intellectual property, information technology, finance and human resources functions. Other G&A expenses include facility and information technology expenses not otherwise allocated to R&D or S&SC expenses, professional fees for auditing, tax and legal services, expenses associated with maintaining patents, consulting costs and other costs of our information systems.

We expect growth in our G&A cash expenses to moderate going forward as we believe we have the necessary foundation to grow and scale up our business.

RESULTS OF OPERATIONS FOR YEAR ENDED DECEMBER 31, 2019 COMPARED TO THE YEAR ENDED DECEMBER 31, 2018

Following the commercialization of our high oleic soybean products in the first quarter of 2019, we achieved record revenues in the year ended December 31, 2019. We crushed all the grain harvested from the crop years of 2016 to 2018 and sold the resulting soybean oil and soybean meal. Our inventory at the end of 2019 consists primarily of grain delivered to us at harvest in 2019. We expect to crush this grain and convert it to cash through product sales in the first half of 2020. We will purchase the remainder of the 2019 harvest between January 1, 2020 and August 31, 2020. We expect to crush and sell that grain by December 31, 2020. Our cost of goods sold and gross margins for 2019 do not include $3.3 million of Grain Costs we expensed as R&D in 2018. Our 2019 cost of goods sold also include $869,000 of inventory reserves we recorded to reflect expected margins in 2020 at this early stage of commercialization of our high oleic soybean products.

We are currently exploring product opportunities in alfalfa, canola, hemp, oats, peanuts, peas, potato, soybeans, wheat, and other crops. As of December 31, 2019, we had a total of 15 products or product candidates, comprised of one commercial product, three product candidates in Phase 2, and eleven product candidates in Phase I or Discovery. We continue to evaluate additional product concepts as part of our development process and innovation efforts. As of December 31, 2018, we had six product candidates in our development funnel. We identify product concepts from our own research and inbound interest from potential collaborators. We expect to launch at least six product candidates from now through 2024, including our hemp product candidate in 2020, our alfalfa product in 2021 through our collaboration with S&W, our high fiber wheat product candidate as early as 2022, and three additional product candidates either via our integrated business model or in collaboration with third parties.

We separated our functional support activities from Cellectis in the year ended December 31, 2019, reducing the amount of management fees we incur. We continued to invest in our information technology infrastructure and other elements of our laboratory infrastructure to support increased product development activity going forward. We also transitioned our corporate leadership team to enable the launch of our high oleic soybean products and the development of collaborations and other revenue streams.

A summary of our results of operations for the years ended December 31, 2019 and 2018 follows:

	Year Ended December 31,			
	2019	**2018**	**$ Change**	**% Change**
	(In thousands, except percentage values)			
Revenue	**$ 7,296**	$ 236	$ 7,060	2,991.5%
Costs of goods sold	**9,280**	—	9,280	100.0%
Gross margin	**(1,984)**	236	(2,220)	(12,719)
Research and development expense	**12,213**	10,358	1,855	17.9%
Selling and supply chain expense	**5,172**	2,352	2,820	119.9%
General and administrative expense	**18,966**	13,356	5,610	42.0%
Management fees	**1,338**	2,285	(947)	(41.4)%
Interest, net	**110**	264	(154)	(58.3)%
Other income and expense	**(49)**	(46)	(3)	6.5%
Net loss	**$ (39,612)**	$ (27,897)	$ (11,715)	42.0%
Adjusted EBITDA	**$ (29,840)**	$ (18,856)	$ (10,984)	58.3%

Revenue

Revenue increased $7.1 million entirely from increased sales volumes of our high oleic soybean oil and soybean meal following the commercialization of these products in early 2019. During 2019, we generated $1.7 million of high oleic soybean oil revenue. We sold all our high oleic soybean meal production in the year, totaling $5.6 million in revenue.

Costs of Goods Sold

Cost of goods sold increased $9.3 million reflecting the cost of product sold in the period and an $869,000 valuation reserve against our inventories.

Gross Margin

Gross margin as reported decreased $2.2 million reflecting the higher costs we have experienced at this early stage of commercialization of our high oleic soybean products. Gross margin, as adjusted, a non-GAAP measure, was negative $4.5 million, or 61 percent, as compared to negative $2.0 million, or 27 percent, as reported under GAAP.

See below under the heading “Use of Non-GAAP Financial Information” for a discussion of gross margin, as adjusted, and a reconciliation of gross margin, the most comparable GAAP measure, to gross margin, as adjusted.

Research and Development Expense

R&D expenses increased $1.9 million driven by $1.6 million of higher non-cash stock compensation expenses, $1.4 million of additional personnel costs, $689,000 of incremental lab supplies and outsourcing costs and $588,000 from the reversal of payroll tax benefits that are no longer realizable. These increases were partially offset by a $3.3 million decrease in Grain Costs expensed as R&D in 2018.

Selling and Supply Chain Expense

S&SC expenses increased $2.8 million driven by $1.2 million of additional personnel costs, $879,000 incremental allocated expenses for facilities and information technology expenses, and $359,000 of higher non-cash stock compensation expenses, all the result of our commercialization and acreage expansion in 2019 and 2020.

General and Administrative Expense

G&A expenses increased $5.6 million driven by $2.9 million of higher non-cash stock compensation expenses, $2.6 million of additional personnel costs, and $1.0 million of incremental professional services expenses. The increases in personnel costs and professional services expenses are partially offset by the benefit of internalizing certain services previously provided by Cellectis.

Management Fees

Management fees declined by $947,000 million as we internalized certain services previously provided by Cellectis including investor relations, information technology, human resources, legal, and communications.

Interest, net

Interest, net is the result of interest income resulting from investments of cash and cash equivalents, partially offset by interest expense on our financing lease obligations. It is also driven by balances, yields, and timing of our follow-on offering in 2018 and financing activities.

Interest, net decreased by $154,000 driven by lower yields on investments, less cash to invest, and higher financing lease obligation balances.

Net Loss

Net loss increased by $11.7 million driven by $5.2 million of additional personnel costs, $4.9 million of higher non-cash stock compensation expenses and a $2.2 million negative change in gross margins following the launch of our soybean products, reflecting the early stage of commercialization of our business.

Adjusted Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA)

Adjusted EBITDA, a non-GAAP measure, decreased by $11.0 million driven by the changes in R&D, S&SC and G&A expenses, and the increases in negative gross margins described above.

See below under the heading “Use of Non-GAAP Financial Information” for a discussion of adjusted EBITDA and a reconciliation of such measure to net loss the most comparable measure calculated under United States GAAP.

RESULTS OF OPERATIONS FOR YEAR ENDED DECEMBER 31, 2018 COMPARED TO THE YEAR ENDED DECEMBER 31, 2017

	Year Ended December 31,			
	2018	2017	$ Change	% Change
	(In thousands, except percentage values)			
Revenue	**$ 236**	$ 508	$ (272)	(53.5)%
Costs of goods sold	—	—	—	—%
Gross margin	**236**	508	(272)	—
Research and development expense	**10,358**	11,508	(1,150)	(10.0)%
Selling and supply chain expense	**2,352**	1,241	1,111	89.5%
General and administrative expense	**13,356**	11,580	1,776	15.3%
Management fees	**2,285**	1,968	317	(16.1)%
Interest, net	**264**	(1)	265	(26,500)%
Other income and expense	**(46)**	(190)	144	(75.8)%
Net loss	**$ (27,897)**	$ (25,980)	$ (1,917)	7.4%
Adjusted EBITDA	**$ (18,856)**	$ (13,387)	$ (5,469)	40.9%

Revenue

In 2017, we made a strategic decision to focus on in-house development of product candidates and to reduce the amount of subcontracted R&D that we were performing for third parties. As a result of the termination of certain agreements, all remaining deferred revenue was recognized in 2017, thus driving a decline in 2018 as no new material agreements were entered.

Research and Development Expense

R&D expenses decreased $1.2 million driven by a $5.4 million decline in non-cash stock compensation expenses, partially offset by $3.3 million higher Grain Costs expensed as R&D and $1.4 million of additional personnel costs.

Selling and Supply Chain Expense

S&SC expenses increased $1.1 million driven by $544,000 of additional personnel costs and $225,000 incremental allocated facilities and information technology expenses.

General and Administrative Expense

G&A expenses increased $1.8 million driven by additional expenses of $1.3 million for professional services, $1.0 million for personnel, and $700,000 for Section 16 officer transitions, partially offset by a $2.1 million decline in non-cash stock compensation expenses.

Management Fees

Management fees increased by $317,000 as a result of an increase in management fees charged by Cellectis.

Interest, net

Interest, net is the result of interest income resulting from investments of cash and cash equivalents, partially offset by interest expense on our financing lease obligations. It is also driven by balances, yields, and timing of our initial public offering and follow-on offering and financing activities.

Interest, net decreased by $265,000 driven by higher yields on investments and a larger cash balance to invest.

Net Loss

Net loss increased by $1.9 million driven by additional expenses of $3.0 million for professional services, $2.9 million for personnel, and $2.8 million of Grain Costs expensed as R&D, partially offset by $7.7 million of higher non-cash stock compensation expenses.

Adjusted EBITDA

Adjusted EBITDA, a non-GAAP measure, decreased by $5.5 million driven by the increases in R&D, S&SC and G&A expenses described above.

See below under the heading “Use of Non-GAAP Financial Information” for a discussion of adjusted EBITDA and a reconciliation of such measure to net loss, the most comparable measure calculated under United States GAAP.

LIQUIDITY AND CAPITAL RESOURCES

Liquidity

On July 25, 2017, we completed our IPO of common stock. In the aggregate, we received net proceeds from the IPO of $58.0 million.

On May 22, 2018, we completed a follow-on offering of our common stock. In the aggregate, we received net proceeds from the follow-on offering of $57.0 million.

As of December 31, 2019, we had cash, cash equivalents and restricted cash of $60.0 million. All these amounts are convertible to cash within 90 days except for $1.4 million of restricted cash associated with our financing leases. Current liabilities were $7.2 million at December 31, 2019. Accordingly, we have cash and cash equivalents sufficient to fund all short-term obligations as of that date.

We incurred losses from operations of $39.6 million for the year ended December 31, 2019, $27.9 million for the year ended December 31, 2018, and $26.0 million for the year ended December 31, 2017. As of December 31, 2019, we had an accumulated deficit of $122.1 million and expect to incur losses for the foreseeable future.

Cash Flows from Operating Activities

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Net loss	**$ (39,612)**	$ (27,897)	$ (25,980)
Depreciation and amortization expenses	**1,607**	1,081	551
Loss on disposal of land, buildings and equipment	**—**	23	—
Stock-based compensation	**9,175**	4,385	12,092
Unrealized foreign exchange gain	**—**	(12)	(34)
Changes in operating assets and liabilities	**(3,121)**	2,168	586
Net cash used by operating activities	**$ (31,951)**	$ (20,252)	$ (12,785)

Net cash used by operating activities increased by $11.7 million in 2019 driven by the increase in our net loss of $11.7 million and a net decrease in cash flows provided by operating assets and liabilities of $5.3 million, primarily from higher inventories and accounts receivable following the commercialization of our high oleic soybean products earlier in 2019, and $1.6 million of cash payments made in 2019 to suppliers for services provided to us in 2018. These uses of cash were partially offset by additional non-cash stock compensation expenses of $4.6 million.

Net cash used by operating activities increased by $7.5 million in 2018 driven by a $7.7 million reduction in non-cash stock compensation expenses. The increase in our net loss was offset by $1.6 million of cash payments made in 2019 to suppliers for services provided to us in 2018. We expect future changes in operating cash flows to be driven primarily by changes in our net losses and working capital as result of the commercialization of our high oleic soybean products and additional products.

Cash Flows from Investing Activities

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Purchases of land, buildings and equipment	**$ (2,969)**	$ (1,847)	$ (779)
Other	**—**	50	—
Net cash used by investing activities	**$ (2,969)**	$ (1,797)	$ (779)

Net cash used by investing activities increased by $1.2 million in 2019 driven by purchases of laboratory equipment following the build out of our new headquarters facility that was completed in 2018 as well as for equipment to support the expansion of our R&D pipeline.

Net cash used by investing activities increased by $1.0 million in 2018 driven by an increase in purchases of fixtures and equipment, site improvements and architect fees for our new headquarters facility.

We expect future capital expenditures to be focused on further building out our laboratory facilities and to invest in projects to optimize our supply chain. We expect these expenditures to remain relatively constant over time.

Cash Flows from Financing Activities

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Costs incurred related to the issuance of stock	**$ —**	$ (665)	$ (3,312)
Proceeds from common stock issuance	**—**	57,706	61,292
Repayments of financing lease obligations	**(275)**	—	—
Advances from Cellectis	**—**	—	3,000
Repayment of advances from Cellectis	**—**	—	(3,000)
Proceeds from the exercise of stock options	**344**	2,622	265
Costs incurred related to shares withheld for net settlement	**(813)**	(230)	—
Proceeds from sale and leaseback of land, buildings and equipment	**414**	1,240	6,957
Net cash (used) provided by financing activities	**$ (330)**	$ 60,673	$ 65,202

Net cash provided by financing activities decreased by $61.0 million in 2019 reflecting the proceeds from our follow-on offering in 2018, as well as lower proceeds from stock option exercises of $2.3 million. We also had $826,000 less proceeds from the sale and leaseback of equipment and we also made $583,000 more payments to satisfy statutory income tax withholding requirements relating to the net share settlement upon the vesting of restricted stock units in 2019.

Net cash provided by financing activities decreased by $4.5 million in 2018 due to lower net proceeds from sale and leaseback activity of $5.7 million. We also had $1.0 million less capital raising activity in 2018. These decreases were partially offset by higher proceeds from the exercise of stock options of $2.4 million.

We expect to continue to finance our purchases of capital equipment and will also seek other sources of financing to support our business activities.

CAPITAL RESOURCES

Considering our anticipated cash burn rate, we believe our cash, cash equivalents and restricted cash as of December 31, 2019 will be enough to fund our operations for at least the next twelve months and into mid-2021. The period through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of several factors, including those described in Item 1A of this Annual Report on Form 10-K.

Operating Capital Requirements

For the year ended December 31, 2019, we had generated $7.3 million in revenues from product sales. We anticipate that we will continue to generate losses for the next several years before revenue is enough to support our operating capital requirements.

Until we can generate substantial cash flow, we expect to finance a portion of future cash needs through cash on hand and public or private equity or debt financings, government or other third-party funding and licensing arrangements. However, additional capital may not be available on reasonable terms, if at all. If we are unable to raise additional capital in enough amounts or on terms acceptable to us, we may have to significantly delay, scale back or discontinue the development or commercialization of one or more of our products. Failure to receive additional funding could cause us to cease operations, in part or in full. If we raise additional funds through the issuance of additional debt or equity securities, it could result in dilution to our existing stockholders and increased fixed payment obligations, and these securities may have rights senior to those of our common shares. Any of these events could significantly harm our business, financial condition and prospects.

CONTRACTUAL OBLIGATIONS, COMMITMENTS AND CONTINGENCIES

Forward Purchase Contracts

We enter into seed and grain production agreements (Forward Purchase Contracts) with seed producers and growers. The seed contracts often require us to pay prices for the seed produced at commodity futures market prices plus a premium. The grower contracts are also linked to commodity futures market prices plus a premium. The grower has the option to fix their price with us throughout the term of the agreement. The grower contracts allow for delivery of grain to us at harvest if so specified when the agreement is executed, otherwise delivery occurs on a date that we elect through August 31 of the following year. In all periods prior to January 1, 2019, we considered Forward Purchase Contracts to be derivatives and recorded the contracts at fair market value with changes in value reflected in earnings as R&D expense.

Effective January 1, 2019, we designated all Forward Purchase Contracts as normal purchases and as a result no longer consider these agreements to be derivatives. As of that date any mark-to-market gains or losses associated with those contracts were fixed and were reflected in inventory upon our purchase of the underlying grain. As of December 31, 2019, we had purchased all the underlying grain and all previously recorded gains and losses had been reflected in inventory.

Sale-Leaseback of Headquarters and Lab Facility

In September 2017 we consummated a sale-leaseback transaction with a third party for our corporate headquarters and lab facility.

Our headquarters facility is composed of a 40,000 square-foot office and lab building, with greenhouses and outdoor research plots. We are deemed the owner for accounting purposes. The lease has a term of twenty years, with four options to extend its term for five years, each subject to there being no default under the lease terms beyond any cure period and us occupying the property at the time of extension. In 2017 we received $7.0 million in connection with the sale of the land and uncompleted facility.

The lease commenced in May 2018. Under the lease, we pay an annual base rent of eight percent of the total project cost with scheduled increases in rent of 7.5 percent on the sixth, eleventh and sixteenth anniversaries of the start of the lease commencement as well as on the first day of each renewal term. Currently, we pay an annual base rent of $1.4 million.

We are also responsible for all operating costs and expenses associated with the property. Beginning on the eighteenth month anniversary of the start of the lease, if the landlord decides to sell the property, we have a right of first refusal to purchase the property on the same terms offered to any third party.

Concurrent with entering the lease, Cellectis guaranteed all our obligations under the lease agreement. Cellectis' guarantee of our obligations will terminate at the end of the second consecutive calendar year in which our tangible net worth exceeds $300 million, as determined in accordance with generally accepted accounting principles. At a point when Cellectis owns 50% or less of our outstanding common stock, we have agreed to indemnify Cellectis for any obligations incurred by Cellectis under its guaranty of our obligations under the lease.

Sale-Leaseback of Equipment

We also have an equipment financing arrangement that is considered a financing lease. This arrangement has a term of four years for each draw. We were required to deposit cash into a restricted account in an amount equal to the future rent payments required by the lease. As of December 31, 2019, this restricted cash totaled $1.4 million. We have the option to request the return of excess collateral annually in December.

As of December 31, 2019, we had contractual obligations and commercial commitments as follows:

In Thousands (a)	Total	Less than 1 year	1 - 3 years	4 - 5 years	More than 5 years
Financing leases	**$ 29,970**	$ 1,817	$ 5,246	$ 1,479	$ 21,428
Operating leases	**491**	419	72	—	—
Forward purchase contracts (b)	**50,896**	30,851	20,045	—	—
Total contractual obligations	**$ 81,357**	$ 33,087	$ 25,363	$ 1,479	$ 21,428

(a)The commitment amounts in the table above are associated with contracts that are enforceable and legally binding and that specify all significant terms, including fixed or minimum services to be used, fixed, minimum or variable price provisions, and the approximate timing of the actions under the contracts.
(b)Forward purchase contracts consist of commitments to purchase grain and seed at a future date.

OFF BALANCE SHEET OBLIGATIONS

As of December 31, 2019, we do not have any off-balance sheet arrangements as defined in Item 303(a)(4)(ii) of Regulation S-K.

CRITICAL ACCOUNTING ESTIMATES

The accompanying discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements and the related disclosures, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these consolidated financial statements requires us to make estimates, assumptions and judgments that affect the reported amounts in our consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. We believe the following policies to be the most critical to an understanding of our financial condition and results of operations because they require us to make estimates, assumptions and judgments about matters that are inherently uncertain.

Stock-Based Compensation

The valuation of stock options is a critical accounting estimate that requires us to use judgments and assumptions that are likely to have a material impact on our consolidated financial statements. As awards are granted, we make predictive assumptions regarding future stock price volatility and employee exercise behavior. For more information on these assumptions, please see Note 6 to the Consolidated Financial Statements in Item 8 of this Annual Report on Form 10-K.

The estimated fair values of stock options granted, and the assumptions used for the Black-Scholes option-pricing model were as follows:

	2019	2018	2017
Risk-free interest rate	**1.7% - 2.5%**	2.2% - 3.0%	1.3% - 2.4%
Expected volatility	**52.6% - 78.9%**	40.9% - 57.2%	27.4% - 45.1%
Expected term (in years)	**6.8 - 10**	5.6 - 10.0	1.2 - 10.0

The risk-free interest rate for periods during the expected term of the options is based on the United States Treasury zero-coupon yield curve in effect at the time of grant. A one percentage point increase in the risk-free interest rate, leaving all other assumptions constant, would increase the grant date fair value by one percent. The expected term is determined using the simplified method or lattice method. An increase in the expected term by 1 year, leaving all other assumptions constant, would increase the grant date fair value by five percent. The volatility assumption is determined using the historical volatility of comparable public companies over the expected term of the option. If all other assumptions are held constant, a one percentage point increase in our volatility assumption, leaving all other assumptions constant, would increase the grant date fair value by one percent. We do not nor do we expect to pay dividends.

To the extent that actual outcomes differ from our assumptions, we are not required to true up grant-date fair value-based expense to final intrinsic values. Historical data has a significant bearing on our forward-looking assumptions. Significant variances between actual and predicted experience could lead to prospective revisions in our assumptions, which could then significantly impact the year-over-year comparability of stock-based compensation expense.

Net Realizable Value of Inventories

The determination of the net realizable value of our inventories is a critical accounting estimate that requires us to use judgments and assumptions that may have a material impact on our consolidated financial statements, especially at the early stage of commercialization for our soybean products. At each period end we make assumptions regarding projected selling prices for our products, market prices for the underlying agricultural markets, the age of products, our anticipated costs and other factors that take into consideration our limited operating history, and compare those prices to the current weighted average costs of our inventories. If our costs are higher than the projected selling prices a valuation adjustment is recorded. Changes in our projected selling prices and cost structure will affect the amount of these adjustments over time.

Income Tax Valuation Allowances

We provide deferred taxes for deductible and taxable temporary differences. Deferred tax assets are reduced by a valuation allowance when we believe it is more likely than not that some portion or all the deferred tax assets will not be realized.

RECENTLY ISSUED ACCOUNTING PRONOUNCEMENTS

Effective January 1, 2019, we adopted new accounting requirements for share-based payment transactions for acquiring goods and services from nonemployees. The adoption did not have an impact on our consolidated financial statements as each of the share-based payment awards granted to nonemployees had a measurement date upon grant, and thus no cumulative adjustment to retained earnings was required.

In the first quarter of 2019, we adopted new accounting requirements for recognition of revenue from contracts with customers. We adopted these requirements using the cumulative effect approach. The adoption did not have an impact on our consolidated financial statements.

In the first quarter of 2019, we adopted new hedge accounting requirements that better aligned our risk management activities and financial reporting. The adoption did not have a material impact on our consolidated financial statements.

Effective October 1, 2018, we adopted the new accounting requirements for accounting for internal use software and costs incurred in a cloud computing arrangement that is a service contract. The adoption did not have a material impact on our consolidated financial statements.

In February 2016, the FASB issued new accounting requirements for accounting, presentation and classification of leases. This will result in most leases being capitalized as a right of use asset with a related liability on our balance sheets. The requirements of the new standard are effective for annual reporting periods beginning after December 15, 2020, and interim periods within those annual periods, which for us is the first quarter of 2021 because we are an emerging growth company. We are in the process of analyzing the impact of this standard on our results of operations and financial position.

In June 2016, the FASB issued new accounting requirements on how to account for credit losses on most financial assets and certain other instruments. This will require the estimation of lifetime expected credit losses and corresponding recognition of allowance for losses on trade and other receivables, loans, and other instruments held at amortized cost. The ASU requires certain recurring disclosures and is effective for annual periods, and interim periods within those annual periods, beginning on or after December 15, 2023. We are in the process of analyzing the impact of this standard on our results of operations.

USE OF NON-GAAP FINANCIAL INFORMATION

To supplement our audited financial results prepared in accordance with GAAP, we have prepared certain non-GAAP measures that include or exclude special items. These non-GAAP measures are not meant to be considered in isolation or as a substitute for financial information presented in accordance with GAAP and should be viewed as supplemental and in addition to our financial information presented in accordance with GAAP. Investors are cautioned that there are material limitations associated with the use of non-GAAP financial measures. In addition, other companies may report similarly titled measures, but calculate them differently, which reduces their usefulness as a comparative measure. Management utilizes these non-GAAP metrics as performance measures in evaluating and making operational decisions regarding our business.

We provide in the table below a reconciliation of gross margin, as adjusted, to gross margin, which is the most directly comparable GAAP financial measure. We provide gross margin, as adjusted because we believe that this non-GAAP financial metric provides investors with useful supplemental information at this stage of commercialization as the amounts being adjusted affect the period to period comparability of our gross margins and financial performance.

We do not provide a reconciliation of gross margin, as adjusted, on a forward-looking basis as we are not able to determine this measure without unreasonable effort for future periods. The potential amount of net realizable value adjustments to our inventories at year end 2020 is unknown at this time. We are not able to determine that amount because it involves making assumptions about 2020 ending inventories from 2019 and 2020 plantings, 2021 margin expectations based on future selling prices and product costs and future changes in commodity futures markets prices for soybeans.

The table below presents a reconciliation of gross margin to gross margin, as adjusted:

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Gross margin (GAAP measure)	**$ (1,984)**	$ 236	$ 508
Gross margin percentage	**(27%)**	100%	100%
Adjustments:			
Grain Costs expensed as R&D in a prior period	**(3,349)**	—	—
Net realizable value adjustment to inventories	**869**	—	—
Gross margin, as adjusted	**$ (4,464)**	$ 236	$ 508
Gross margin, as adjusted percentage	**(61%)**	100%	100%

We present adjusted EBITDA and define it as net loss excluding interest, net, income tax expense, depreciation and amortization expenses, stock-based compensation expenses, Section 16 officer transition expenses, research and development payroll tax credits that are no longer realizable, Grain Costs expensed as R&D and net realizable value adjustments to inventories.

We provide in the table below a reconciliation of adjusted EBITDA to net loss, which is the most directly comparable GAAP financial measure. Because adjusted EBITDA excludes non-cash items and discrete or infrequently occurring items, we believe that adjusted EBITDA provides investors with useful supplemental information about the operational performance of our business and facilitates comparison of our financial results between periods where certain items may vary significantly independent of our business performance.

The table below presents a reconciliation of net loss to adjusted EBITDA:

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Net loss (GAAP measure)	**$ (39,612)**	$ (27,897)	$ (25,980)
Non-GAAP adjustments:			
Interest, net	**(110)**	(264)	1
Income tax expense	**—**	—	—
Depreciation and amortization expenses	**1,607**	1,081	551
Stock-based compensation expenses	**9,175**	4,385	12,092
Section 16 officer transition expenses	**1,169**	740	82
Research and development payroll tax credit	**411**	(250)	(160)
Grain Costs expensed as R&D	**(3,349)**	3,349	27
Net realizable value adjustment to inventories	**869**	—	—
Adjusted EBITDA	**$ (29,840)**	$ (18,856)	$ (13,387)

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

Our primary exposure to market risk is commodity price sensitivity. Changes in the prices of certain commodity products could result in higher overall cost along the agricultural supply chain, which may negatively affect our ability to profitably commercialize our products. We will be susceptible to changes in costs in the agricultural industry as a result of factors beyond our control, such as general economic conditions, seasonal fluctuations, weather conditions, size of harvests, demand, food safety concerns, product recalls and government regulations. As a result, we may not be able to anticipate or react to changing costs by adjusting our practices, which could cause our operating results to deteriorate. In the normal course of business, we manage our exposure to these market risks by entering commodity hedges to mitigate these risks. Based on our positions as of December 31, 2019, a 10 percent increase in commodity futures market prices would have a $880,000 decrease in our financial condition, and a 10 percent decrease in commodity futures market prices would have a $727,000 increase in our financial condition.

We are also exposed to interest rate sensitivity on our investments, which are affected by changes in the general level of United States interest rates. However, because of the short-term nature of the duration of our portfolio and the low-risk profile of our investments, we believe an immediate 10 percent change in market interest rates would not have a material impact on the fair market value of our investment portfolio or on our financial condition or results of operations.

We also have foreign exchange exposure from fluctuations in foreign currency exchange rates, primarily as a result of certain receivable and payable balances with Cellectis. The primary currency we have exposure to is the Euro. We believe an immediate 10 percent change in foreign exchange rates would not have a material impact on our financial condition or results of operations.

Item 8. Consolidated Financial Statements and Supplementary Data

The consolidated financial statements and related financial statement schedules required to be filed are listed in the Index to Consolidated Financial Statements on page F-1 hereto and are incorporated herein.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Management's Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that information required to be disclosed in our Exchange Act reports is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission's rules and forms and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

Under the supervision of our principal executive officer and principal financial officer, we evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act) as of December 31, 2019. Based on that evaluation, as of December 31, 2019, our principal executive officer and principal financial officer have concluded that our disclosure controls and procedures were effective.

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 such term is defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act. Our management, including our principal executive officer and principal financial officer, conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework set forth in the "Internal Control—Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on an evaluation under that framework, our management concluded that our internal control over financial reporting was effective as of December 31, 2019.

Inherent Limitations on Controls and Procedures

Our management, including the principal executive officer and principal financial officer, does not expect that our disclosure controls and procedures and our internal control over financial reporting will prevent all error and all fraud. A control system, no matter how well designed and operated, can only provide reasonable assurances that the objectives of the control system are met. The design of a control system reflects resource constraints; the benefits of controls must be considered relative to their costs. Because there are inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, for our company have been or will be detected. As these inherent limitations are known features of the disclosure and financial reporting processes, it is possible to design into the processes safeguards to reduce, though not eliminate, these risks. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns occur because of simple error or mistake. Controls can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the control. The design of any system of controls is based in part upon certain assumptions about the likelihood of future events. While our disclosure controls and procedures and our internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives, there can be no assurance that any design will succeed in achieving its stated goals under all future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with the policies or procedures. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

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 Rules 13a-13(d) and 15d-15(d) of the Exchange Act that occurred during the fourth quarter ended December 31, 2019 that has materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this item concerning our directors, executive officers, and corporate governance matters is incorporated by reference in our 2020 Proxy Statement.

Our Board of Directors has adopted a Code of Business Conduct and Ethics applicable to all officers, directors and employees. Our Code of Business Conduct and Ethics, Corporate Governance Guidelines and the charters of our Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee are available on our website (www.calyxt.com) under “Corporate Governance” in the “Investors” section. We will provide a copy of these documents to any person, without charge, upon request. We intend to make all required disclosures concerning any amendments to, or waivers from, the Code of Business Conduct and Ethics on our website.

Item 11. Executive Compensation

The information required by this item regarding executive compensation is incorporated by reference in our 2020 Proxy Statement.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this item regarding security ownership of certain beneficial owners and management is incorporated by reference in our 2020 Proxy Statement.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this item regarding certain relationships and related transactions is incorporated by reference in our 2020 Proxy Statement.

Item 14. Principal Accounting Fees and Services

The information required by this item regarding principal accounting fees and services is incorporated by reference in our 2020 Proxy Statement.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(1) Consolidated Financial Statements

See “Index to Consolidated Financial Statements” in Item 8, which is incorporated into this Item by reference.

(2) Financial Statement Schedules—Not applicable.

Schedules not filed with this Annual Report on Form 10-K are omitted because of the absence of conditions under which they are required or because the information called for is shown in the consolidated financial statements or related notes.

(a)(3) Exhibits

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 of the Company’s Annual Report on Form 10-K filed with the SEC on March 14, 2018)
3.2	Amended and Restated Bylaws (incorporated by reference to Exhibit 3.2 of the Company’s Quarterly Report on Form 10-Q filed with the SEC on May 7, 2018)
4.1	Description of the Registrant’s Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934
10.1	Management Services Agreement between Cellectis S.A., Cellectis, Inc. and Calyxt, Inc., dated as of January 1, 2016 (incorporated by reference to Exhibit 10.1 of the Company’s Registration Statement on Form S-1 filed with the SEC on June 23, 2017)
10.2	First Amendment to the Management Services Agreement Amendment dated July 25, 2017 between Cellectis S.A. and Calyxt, Inc. (incorporated by reference to Exhibit 10.2 of the Company’s Annual Report on Form 10-K filed with the SEC on March 14, 2018)
10.3	Second Amendment to the Management Services Agreement Amendment dated January 29, 2020 between Cellectis S.A., Cellectis, Inc., Cellectis Biologics, Inc. and Calyxt, Inc.
10.4	Separation Agreement dated July 25, 2017 between Cellectis S.A. and Calyxt, Inc. (incorporated by reference to Exhibit 10.3 of the Company’s Annual Report on Form 10-K filed with the SEC on March 14, 2018)
10.5	Stockholders Agreement dated July 25, 2017 between Cellectis S.A. and Calyxt, Inc. (incorporated by reference to Exhibit 10.4 of the Company’s Annual Report on Form 10-K filed with the SEC on March 14, 2018)
10.6	License Agreement dated July 25, 2017 between Cellectis S.A. and Calyxt, Inc. (incorporated by reference to Exhibit 10.5 of the Company’s Annual Report on Form 10-K filed with the SEC on March 14, 2018)
10.7#	Exclusive Patent License Agreement between Regents of the University of Minnesota and Calyxt Inc. (f.k.a. Cellectis Plant Sciences, Inc.), dated December 15, 2014 (incorporated by reference to Exhibit 10.6 of the Company’s Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.11†	Calyxt, Inc. Equity Incentive Plan (incorporated by reference to Exhibit 10.11 of the Company’s Registration Statement on Form S-1 filed with the SEC on June 23, 2017)
10.12†	Form of Stock Option Agreement pursuant to the Calyxt, Inc. Equity Incentive Plan (incorporated by reference to Exhibit 10.12 of the Company’s Registration Statement on Form S-1 filed with the SEC on June 23, 2017)
10.14†	Consulting Agreement between Calyxt, Inc. (f.k.a. Cellectis Plant Sciences, Inc.) and Daniel Voytas, dated January 1, 2010 (incorporated by reference to Exhibit 10.15 of the Company’s Registration Statement on Form S-1 filed with the SEC on June 23, 2017)
10.15†	Amendment 1 to Consulting Agreement between Calyxt, Inc. (f.k.a. Cellectis Plant Sciences, Inc.) and Daniel Voytas, dated December 21, 2012 (incorporated by reference to Exhibit 10.16 of the Company’s Registration Statement on Form S-1 filed with the SEC on June 23, 2017)

Exhibit Number	Description
10.16†	Calyxt, Inc. 2017 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.20 of the Company's Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.17†	Calyxt, Inc. 2017 Stock Option Sub-Plan for French Employees and Directors (incorporated by reference to Exhibit 10.21 of the Company's Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.18†	Form of Stock Option Agreement pursuant to the Calyxt, Inc. 2017 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.22 of the Company's Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.19†	Form of Restrictive Stock Unit Agreement pursuant to the Calyxt, Inc. 2017 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.23 of the Company's Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.20†	Form of Performance Stock Unit Award Agreement†(incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2020)
10.21†	Calyxt, Inc. 2017 Restricted Stock Unit Sub-Plan for French Employees and Directors (incorporated by reference to Exhibit 10.25 of the Company's Registration Statement on Form S-1/A filed with the SEC on July 3, 2017)
10.22†	Lease Agreement between Calyxt, Inc., as Tenant, and NLD Mount Ridge LLC, as Landlord, dated September 6, 2017 (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed with the SEC on September 7, 2017)
10.23	Form of Indemnification Agreement (incorporated by reference to Exhibit 10.24 of the Company's Annual Report on Form 10-K filed with the SEC on March 14, 2018)
10.24	Amendment No. 1 to Stockholders Agreement dated May 7, 2018 between Cellectis S.A. and Calyxt, Inc. (incorporated by reference to Exhibit 10.1 of the Company's Quarterly Report on Form 10-Q filed with the SEC on May 7, 2018)
10.25†	Employment Agreement between Calyxt, Inc. and Mr. James A. Blome, dated September 17, 2018 (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed with the SEC on September 21, 2018)
10.26†	Employment Agreement between Calyxt, Inc. and Mr. Bill Koschak, dated December 21, 2018 (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed with the SEC on January 3, 2019)
10.27†	Employment Agreement between Calyxt, Inc. and Ms. Debra Frimerman, dated January 21, 2019 (incorporated by reference to Exhibit 10.29 to the Company's Annual Report on Form 10-K for the year ended December 31, 2018)
10.28	Employment Agreement between Calyxt, Inc. and Dr Travis J. Frey, dated May 13, 2019
21.1	Subsidiaries of Registrant
23.1	Consent of Independent Registered Public Accounting Firm
24.1	Power of Attorney (included on signature page to this Form 10-K)
31.1	Certification of the Chief Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) of the Securities Exchange Act
31.2	Certification of the Chief Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) of the Securities Exchange Act
32	Certification of the Chief Executive Officer and Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

Confidential treatment has been granted for certain information contained in this exhibit. These portions have been omitted and filed separately with the United States Securities and Exchange Commission.

† Indicates management contract or compensatory plan.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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.

CALYXT, INC.

Date: March 04, 2020

By: /s/ James A. Blome
Name: James A. Blome
Title: Chief Executive Officer

Pursuant to the requirements of the Securities Exchange 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. Each of the undersigned hereby constitute and appoint James A. Blome, William F. Koschak and Debra Frimerman, and each of them, his or her true and lawful attorneys-in-fact and agents, with full and several power of substitution and resubstitution, for him or her and in his or her name, place and stead in any and all capacities, to sign one or more amendments to this Annual Report on Form 10-K, each in such form as they or any one of them may approve, and to file the same with all exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done so that this Annual Report and any amendments shall comply with the Securities Exchange Act of 1934, as amended, and the applicable rules and regulations adopted or issued pursuant thereto, as fully and to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them or their substitute or resubstitute, may lawfully do or cause to be done by virtue hereof.

Signature	Title	Date
/s/ James A. Blome James A. Blome	Chief Executive Officer (principal executive officer)	March 04, 2020
/s/ William F. Koschak William F. Koschak	Chief Financial Officer (principal financial and accounting officer)	March 04, 2020
/s/ André Choulika André Choulika	Director	March 04, 2020
/s/ Philippe Dumont Philippe Dumont	Director	March 04, 2020
/s/ Anna Ewa Kozicz-Stankiewicz Anna Ewa Kozicz-Stankiewicz	Director	March 04, 2020
/s/ Yves Ribeill Yves Ribeill	Director	March 04, 2020
/s/ Christopher Neugent Christopher Neugent	Director	March 04, 2020
/s/ Jonathan Fassberg Jonathan Fassberg	Director	March 04, 2020
/s/ Kimberly Nelson Kimberly Nelson	Director	March 04, 2020

CALYXT, INC.
INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Calyxt, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Calyxt, Inc. (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

Basis for 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 the 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/ Ernst & Young LLP

We have served as the Company's auditor since 2015.

Minneapolis, Minnesota
March 4, 2020

CALYXT, INC.
CONSOLIDATED BALANCE SHEETS
(In Thousands, Except Par Value and Share Amounts)

	December 31,	
	2019	**2018**
Assets		
Current assets:		
Cash and cash equivalents	**$ 58,610**	$ 93,794
Restricted cash	**388**	381
Trade accounts receivable	**1,122**	—
Due from related parties	**—**	46
Inventory	**2,594**	—
Prepaid expenses and other current assets	**808**	1,301
Total current assets	**63,522**	95,522
Non-current restricted cash	**1,040**	1,113
Land, buildings and equipment	**23,212**	21,850
Other non-current assets	**324**	306
Total assets	**$ 88,098**	$ 118,791
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	**$ 1,077**	$ 818
Accrued expenses	**2,544**	2,007
Accrued compensation and benefits	**2,181**	1,305
Due to related parties	**977**	1,905
Current portion of financing lease obligations	**356**	258
Other current liabilities	**61**	711
Total current liabilities	**7,196**	7,004
Financing lease obligations	**18,244**	18,227
Other non-current liabilities	**150**	163
Total liabilities	**25,590**	25,394
Stockholders' equity:		
Common stock, $0.0001 par value; 275,000,000 shares authorized; 33,033,689 shares issued and 32,951,329 shares outstanding as of December 31, 2019 and 32,664,429 shares issued and 32,648,893 shares outstanding as of December 31, 2018	**3**	3
Additional paid-in capital	**185,588**	176,069
Common stock in treasury, at cost, shares of 82,360 as of December 31, 2019 and 15,536 as of December 31, 2018	**(1,043)**	(230)
Accumulated deficit	**(122,057)**	(82,445)
Accumulated other comprehensive income	**17**	—
Total stockholders' equity	**62,508**	93,397
Total liabilities and stockholders' equity	**$ 88,098**	$ 118,791

See accompanying notes to the Consolidated Financial Statements.

CALYXT, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(In Thousands Except Shares and Per Share Amounts)

	Year Ended December 31,		
	2019	**2018**	**2017**
Revenue	**$ 7,296**	$ 236	$ 508
Costs of goods sold	**9,280**	—	—
Gross margin	**(1,984)**	236	508
Operating expenses:			
Research and development	**12,213**	10,358	11,508
Selling and supply chain	**5,172**	2,352	1,241
General and administrative	**18,966**	13,356	11,580
Management fees	**1,338**	2,285	1,968
Total operating expenses	**37,689**	28,351	26,297
Loss from operations	**(39,673)**	(28,115)	(25,789)
Interest, net	**110**	264	(1)
Foreign currency transaction (loss)	**(49)**	(46)	(190)
Loss before income taxes	**(39,612)**	(27,897)	(25,980)
Income taxes	**—**	—	—
Net loss	**$ (39,612)**	$ (27,897)	$ (25,980)
Basic and diluted loss per share	**$ (1.21)**	$ (0.91)	$ (1.12)
Weighted average shares outstanding - basic and diluted	**32,805,684**	30,683,421	23,153,661

See accompanying notes to the Consolidated Financial Statements.

CALYXT, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In Thousands Except Shares Outstanding)

	Shares Outstanding	Common Stock	Additional Paid-In Capital	Shares in Treasury	Accumulated Deficit	Accumulated Other Comprehensive Income	Total Stockholders' Equity
Balances at January 1, 2017	19,600,000	$ 2	$ 41,685	$ —	$ (28,568)	$ —	$ 13,119
Net loss	—	—	—	—	(25,980)	—	(25,980)
Issuance of common stock	8,050,000	1	57,979	—	—	—	57,980
Stock-based compensation	68,780	—	12,357	—	—	—	12,357
Balances at December 31, 2017	27,718,780	3	112,021	—	(54,548)	—	57,476
Net loss	—	—	—	—	(27,897)	—	(27,897)
Stock-based compensation	888,149	—	7,007	—	—	—	7,007
Issuance of common stock	4,057,500	—	57,041	—	—	—	57,041
Shares withheld for net share settlement	(15,536)	—	—	(230)	—	—	(230)
Balances at December 31, 2018	32,648,893	3	176,069	(230)	(82,445)	—	93,397
Net loss		—		—	(39,612)	—	(39,612)
Stock-based compensation	369,260	—	9,175	—	—	—	9,175
Issuance of common stock		—	344	—	—	—	344
Shares withheld for net share settlement	(66,824)	—	—	(813)	—	—	(813)
Other comprehensive income	—	—	—	—	—	17	17
Balances at December 31, 2019	**32,951,329**	**$ 3**	**$ 185,588**	**$ (1,043)**	**$ (122,057)**	**$ 17**	**$ 62,508**

See accompanying notes to the Consolidated Financial Statements.

CALYXT, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In Thousands)

	Year Ended December 31,		
	2019	**2018**	**2017**
Operating activities			
Net loss	**$ (39,612)**	$ (27,897)	$ (25,980)
Adjustments to reconcile net loss to net cash used by operating activities:			
Depreciation and amortization expenses	**1,607**	1,081	551
Loss on disposal of land, buildings and equipment	**—**	23	—
Stock-based compensation	**9,175**	4,385	12,092
Unrealized foreign exchange loss	**—**	(12)	(34)
Changes in operating assets and liabilities:			
Trade accounts receivable	**(1,122)**	—	110
Due to/from related parties	**(882)**	676	(448)
Inventory	**(2,594)**	—	—
Prepaid expenses and other assets	**493**	(726)	(537)
Accounts payable	**259**	(118)	665
Accrued expenses	**537**	985	86
Accrued compensation and benefits	**876**	360	613
Other accrued liabilities	**(670)**	940	97
Other non-current assets	**(18)**	51	
Net cash used by operating activities	**(31,951)**	(20,252)	(12,785)
Investing activities			
Purchases of land, buildings and equipment	**(2,969)**	(1,847)	(779)
Other	—	50	—
Net cash used by investing activities	**(2,969)**	(1,797)	(779)
Financing activities			
Costs incurred related to the issuance of stock	**—**	(665)	(3,312)
Proceeds from common stock issuance	**—**	57,706	61,292
Repayments of financing lease obligations	**(275)**	**—**	**—**
Advances from Cellectis	**—**	—	3,000
Repayment of advances from Cellectis	**—**	—	(3,000)
Proceeds from the exercise of stock options	**344**	2,622	265
Costs incurred related to shares withheld for net settlement	**(813)**	(230)	—
Proceeds from sale and leaseback of land, buildings and equipment	**414**	1,240	6,957
Net cash (used) provided by financing activities	**(330)**	60,673	65,202
Net (decrease) increase in cash, cash equivalents and restricted cash	**(35,250)**	38,624	51,638
Cash, cash equivalents and restricted cash - beginning of period	**95,288**	56,664	5,026
Cash, cash equivalents and restricted cash - end of period	**$ 60,038**	$ 95,288	$ 56,664

See accompanying notes to the Consolidated Financial Statements.

CALYXT, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Overview

Calyxt, Inc., formerly known as Cellectis Plant Sciences, Inc. (the "Company" or "Calyxt"), was founded in 2010 and incorporated in Delaware. We are headquartered in Roseville, Minnesota. We are a technology company focused on delivering plant-based solutions that are healthy and sustainable. Prior to our initial public offering (IPO) on July 25, 2017, we were a wholly owned subsidiary of Cellectis S.A. ("Cellectis"). As of December 31, 2019, Cellectis owned 68.9% of our outstanding common stock. Certain prior year amounts have been reclassified to conform to current year presentation.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires us to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes, including those related to revenue recognition, forward purchase contracts, stock-based compensation and valuation allowances on deferred tax assets. Actual results could differ from those estimates.

Cash, Cash Equivalents and Restricted Cash

We consider all investments purchased with an original maturity of three months or less to be cash equivalents. Restricted cash, which we hold for the benefit of our counterparty on an equipment lease facility, is also invested in cash equivalents.

Accounts Receivable

Accounts receivable are unsecured and are recorded at net realizable value. We make judgments as to our ability to collect outstanding receivables based upon patterns of collectability, historical experience, and our evaluation of specific accounts and will provide an allowance for credit losses when collection becomes doubtful. We perform credit evaluations of our customers' financial condition on an as-needed basis. Payment is generally due fifteen or thirty days from the invoice date depending upon the product, and accounts past 30 days are individually analyzed for collectability. When all collection efforts have been exhausted, the account is written off.

Forward Purchase Contracts

We enter into seed and grain production agreements (Forward Purchase Contracts) with seed producers and growers. The seed contracts often require us to pay prices for the seed produced at commodity futures market prices plus a premium. The grower contracts are also linked to commodity futures market prices plus a premium. The grower has the option to fix their price with us throughout the term of the agreement. The grower contracts allow for delivery of grain to us at harvest if so specified when the agreement is executed, otherwise delivery occurs on a date that we elect through August 31 of the following year. In all periods prior to January 1, 2019, we considered Forward Purchase Contracts to be derivatives and recorded the contracts at fair market value with changes in value reflected in earnings as R&D expense.

Effective January 1, 2019, we designated all Forward Purchase Contracts as normal purchases and as a result no longer consider these agreements to be derivatives. As of that date any mark-to-market gains or losses associated with those contracts were fixed and were reflected in upon our purchase of the underlying grain. As of December 31, 2019, we had purchased all the underlying grain and all previously recorded gains and losses had been reflected in inventory.

Inventory

Inventories are recorded at the lower of cost or net realizable value and include all costs of seed production and grain we purchase as well as costs to store, transport and process the grain into finished products. Consideration we receive from growers when they purchase seed is recorded as a reduction of inventory.

We evaluate inventory balances for obsolescence on a regular basis based on the age of the inventory and our sales forecasts. We also determine the net realizable value of our inventory balances using projected selling prices for our products, market prices for the underlying agricultural markets, the age of products our anticipated costs and other factors that take into consideration our limited operating history, and compare those prices to the current weighted average costs of our inventories. If our costs are higher than the projected selling prices a valuation adjustment is recorded.

Prior to our commercialization of high oleic soybean products, all Grain Costs were expensed as R&D.

Fair Value of Financial Instruments

We record financial instruments at fair value with changes in those values reported in our results of operations each period. We determine values using readily available market prices, instruments with similar terms and underlying inputs that are quoted on exchanges, or other valuation techniques if no observable inputs are available.

Land, Buildings and Equipment

Land, buildings and equipment are stated at cost less accumulated depreciation. Assets under capital lease are stated at the lesser of their net present value of future lease payments or fair market value. Depreciation is computed based upon the estimated useful lives of the respective assets. Leasehold improvements are amortized using the straight-line method over the shorter of the lease term or the estimated useful life of the assets. Repairs and maintenance costs are expensed as incurred. The cost and accumulated depreciation of property and equipment retired, or otherwise disposed of, are removed from the related accounts, and any residual values are charged to expense. Depreciation expense has been calculated using the following estimated useful lives:

Buildings and other improvements	10–20 years
Leasehold improvements	15 years
Office furniture and equipment	7 years
Assets under capital lease	4–20 years
Computer equipment and software	3–5 years
Vehicles	3–6 years

We review our long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. If the impairment tests indicate that the carrying value of the asset, or asset group is greater than the expected undiscounted cash flows to be generated by such asset or asset group, further analysis is performed to determine the fair value of the asset or asset group. To the extent the fair value of the asset or asset group is less than its carrying value, an impairment loss is recognized equal to the amount the carrying value exceeds the fair value of the asset or asset group. Assets to be disposed of are carried at the lower of their carrying value or fair value less costs to sell. Fair value is measured using a discounted cash flow model or independent appraisals, as appropriate. We have not recognized any impairment losses in these consolidated financial statements.

Revenue Recognition – Product Sales

We recognize sales revenue at the point in time that title transfers to the customer, which is based on shipping terms. Sales include shipping and handling charges if billed to the customer and are reported net of trade promotion and other costs, including estimated allowances for returns, unsalable product and prompt pay discounts. Sales, use, value-added and other excise taxes are not recognized in revenue. Trade promotions are recorded based on estimated participation and performance levels for offered programs at the time of sale. We generally do not allow a right of return.

Revenue Recognition – Out-licensing of Technology

We recognize revenue from license agreements, which may consist of nonrefundable up-front payments, milestone payments, royalties and services. In addition, we may license our technology to third parties.

Nonrefundable up-front payments are deferred and recognized as revenue over the term of the license agreement. If a license agreement is terminated before the original term of the agreement is fulfilled, all remaining deferred revenue is recognized at termination.

Milestone payments represent amounts received from our licensees, the receipt of which is dependent upon the achievement of certain scientific, regulatory or commercial milestones. We recognize milestone payments when the triggering event has occurred, there are no further contingencies or services to be provided with respect to that event, and the counterparty has no right to refund of the payment.

Advertising Costs

We expense advertising costs as incurred.

Research and Development (R&D)

We recognize R&D expenses as incurred. These expenses consist of direct costs for R&D and R&D-related allocations of overhead costs such as facilities and information technology costs. Costs incurred in connection with collaborator-funded activities are expensed as incurred. Costs to acquire technologies that are utilized in R&D that have no alternative future use are expensed as incurred. Prior to the commercialization of a product, Grain Costs are expensed as R&D.

Patents

We expense patent costs, including related legal costs, as incurred. Costs to maintain, in-license, and defend patents are recorded as G&A expenses in the statements of operations. Costs to write and support the research for filing patents are recorded as R&D expenses in the statements of operations.

Stock-Based Compensation

We generally measure employee and nonemployee stock-based awards at grant-date fair value and record compensation expense over the vesting period of the award. Prior to our adoption of new accounting rules on January 1, 2019, stock-based awards issued to nonemployees were remeasured until the award vests. We use the Black-Scholes option pricing model to value our stock option awards.

The expected term of stock options is estimated using the average of the vesting tranches and the contractual life of each grant for employee options as we have limited historical information to develop reasonable expectations about future exercise patterns and post-vesting employment termination behavior for our stock option grants. For options granted to nonemployees, we use the remaining contractual life. For stock price volatility, we use comparable public companies as a basis for its expected volatility to calculate the fair value of option grants. The risk-free interest rate is based on United States Treasury notes with a term approximating the expected term of the option. We assume no dividend yield because dividends are not expected to be paid.

We generally measure compensation expense for grants of restricted stock units using the value of a share of our stock on the date of grant. Prior to our adoption of new accounting rules on January 1, 2019, compensation expense for grants of stock awards to non-employees were initially measured using the share price on date of grant and remeasured quarterly.

If an award is forfeited prior to vesting the associated reduction in expense is reflected net in stock-based compensation expense in that period. Stock-based compensation expense is recorded in R&D, selling and supply chain, or G&A expenses in our consolidated statements of operations.

Income Taxes

Current income taxes are recorded based on statutory obligations for the current operating period for the jurisdictions in which we have operations.

Deferred taxes are provided on an asset and liability method, whereby deferred tax assets are recognized for deductible temporary differences and deferred tax liabilities are recognized for taxable temporary differences. Temporary differences are the differences between the reported amounts of assets and liabilities and their tax basis. Deferred tax assets are reduced by a valuation allowance when we believe it is more likely than not that some portion or all the deferred tax assets will not be realized. Deferred tax assets and liabilities are adjusted for the effects of changes in tax laws and rates on the date of enactment.

Foreign Currency Transactions

Transactions in foreign currencies are translated at the exchange rates effective on the transaction dates. Assets and liabilities denominated in foreign currencies are translated at the period-end exchange rate. Foreign currency gains and losses are recognized in G&A expenses in the consolidated statements of operations.

Recently Adopted Accounting Pronouncements

Effective January 1, 2019, we adopted new accounting requirements for share-based payment transactions for acquiring goods and services from nonemployees. The adoption did not have an impact on our consolidated financial statements as each of the share-based payment awards granted to nonemployees had a measurement date upon grant, and thus no cumulative adjustment to retained earnings was required.

Effective January 1, 2019, we adopted new accounting requirements for recognition of revenue from contracts with customers. We adopted these requirements using the cumulative effect approach. The adoption did not have an impact on our consolidated financial statements.

In the first quarter of 2019, we adopted new hedge accounting requirements that better aligned our risk management activities and financial reporting. The adoption did not have a material impact on our consolidated financial statements.

2. FINANCIAL INSTRUMENTS, FAIR VALUE, AND CONCENTRATIONS OF CREDIT RISK

The carrying values of cash and cash equivalents, restricted cash, due from related parties, accounts payable, due to related parties, and all other current liabilities approximate fair value. The fair value of our financing lease obligations, including the current portion, are $15.7 million as of December 31, 2019, and $15.8 million as of December 31, 2018. The carrying amounts of our financing lease obligations, including the current portion, were $18.6 million as of December 31, 2019 and $18.5 million as of December 31, 2018. The fair value of our financing lease obligations was determined using discounted cash flow analysis based on market rates for similar types of borrowings. Financing lease obligations are a Level 2 liability in the fair value hierarchy.

Fair Value Measurements and Financial Statement Presentation

The fair values of our assets, liabilities, and derivative positions recorded at fair value and their respective levels in the fair value hierarchy as of December 31, 2019 and December 31, 2018, were as follows:

	December 31, 2019				December 31, 2019			
	Fair Values of Assets				Fair Values of Liabilities			
In Thousands	**Level 1**	**Level 2**	**Level 3**	**Total**	**Level 1**	**Level 2**	**Level 3**	**Total**
Other items reported at fair value:								
Commodity futures and options	$ 62	$ —	$ —	$ 62	$ —	$ —	$ —	$ —
Total	**$ 62**	**$ —**	**$ —**	**$ 62**	**$ —**	**$ —**	**$ —**	**$ —**

	December 31, 2018				December 31, 2018			
	Fair Values of Assets				Fair Values of Liabilities			
In Thousands	**Level 1**	**Level 2**	**Level 3**	**Total**	**Level 1**	**Level 2**	**Level 3**	**Total**
Other items reported at fair value:								
Forward Purchase Contracts (a)	$ —	$ 1	$ —	$ 1	$ —	$ 248	$ —	$ 248
Total	**$ —**	**$ 1**	**$ —**	**$ 1**	**$ —**	**$ 248**	**$ —**	**$ 248**

(a) The fair value for forward purchase contracts is estimated based on commodity market future prices.

Commodity Price Risk

We enter Forward Purchase Contracts for grain with settlement values based on commodity futures market prices. These Forward Purchase Contracts allow our counterparty to fix their sale prices to us at various times as defined in the contract. We may enter hedging arrangements to either fix variable exposures or convert fixed prices to floating prices using commodity derivative contracts. As of December 31, 2019, we held commodity contracts with a notional amount of $4.8 million.

We have designated all our commodity derivative contracts as cash flow hedges. As a result, all gains or losses associated with recording commodity derivative contracts at fair value are recorded as a component of accumulated other comprehensive gain (loss) (AOCI). We reclassify amounts from AOCI to cost of goods sold when we sell the underlying products to which those hedges relate. As of December 31, 2019, we expect the entire AOCI balance to be reclassified into earnings within the next six months.

Certain amounts related to our hedging activities are as follows:

In thousands	Amount of Gain (Loss) Recognized in AOCI December 31, 2019	December 31, 2018	December 31, 2017	Amount of Gain (Loss) Reclassified to Earnings Year ended December 31, 2019	December 31, 2018	December 31, 2017
Cash flow hedges:						
Commodity contracts	$ 17	$ —	$ —	$ (81)	$ —	$ —
Total	**$ 17**	$ —	$ —	**$ (81)**	$ —	$ —

Foreign Exchange Risk

Foreign currency fluctuations affect our foreign currency cash flows related primarily to payments to Cellectis. Our principal foreign currency exposure is to the euro. We do not hedge these exposures, and we do not believe that the current level of foreign currency risk is significant to our operations.

Concentrations of Credit Risk

We invest our cash, cash equivalents and restricted cash in short-term investments and hold deposits at financial institutions that may exceed insured limits. We evaluate the creditworthiness of these institutions in determining the risk associated with these deposits. We have not experienced any losses on these deposits.

3. RELATED-PARTY TRANSACTIONS

We have several agreements that govern our relationship with Cellectis, some of which require us to make payments to Cellectis. Pursuant to our management services agreement with Cellectis, we incurred management fee expenses of $1.3 million in 2019, $2.3 million in 2018 and $2.0 million in 2017.

Cellectis has also guaranteed the lease agreement for our headquarters. Cellectis' guarantee of our obligations under the lease will terminate at the end of the second consecutive calendar year in which our tangible net worth exceeds $300 million.

During the year ended December 31, 2018, Cellectis purchased 550,000 shares of common stock in our follow-on offering at the public offering price of $15.00 per share. In addition, in connection with the vesting on June 14, 2018, of restricted stock units for certain of our and Cellectis' employees and nonemployees, Cellectis purchased 63,175 shares of our common stock at a price of $19.49 per share (the closing price reported on the NASDAQ Global Market on June 14, 2018) directly from such employees and nonemployees in private transactions pursuant to share purchase agreements dated June 13, 2018.

TALEN® is our primary gene-editing technology, and it is the foundation of our technology platform. TALEN® technology was invented by researchers at the University of Minnesota and Iowa State University and exclusively licensed to Cellectis. We obtained an exclusive license for the TALEN® technology for commercial use in plants from Cellectis. We also license other technology from Cellectis. We owe Cellectis royalties on any revenue we generate from sales of products less certain amounts as defined in the license agreement, as well as a percentage of any sublicense revenues. We have incurred $328,000 of license and royalty fees for the year ended December 31, 2019 and nominal license and royalty fees for the years ended December 31, 2018 and 2017.

4. STOCKHOLDERS' EQUITY

Preferred stock of 50.0 million shares, with a $0.0001 par value, is authorized but unissued.

Initial Public Offering

On July 25, 2017, we completed an IPO of our common stock, in which we sold an aggregate of 8,050,000 shares of our common stock at a price of $8.00 per share, including 1,050,000 shares of common stock pursuant to the exercise of the underwriters' option to purchase additional shares. In the aggregate, we received net proceeds from the IPO and exercise of the overallotment of $58.0 million, after deducting underwriting discounts and commissions of $3.1 million and offering expenses totaling $3.3 million. As part of the IPO, Cellectis purchased 2,500,000 shares of our common stock for a value of $20.0 million, which is included in the net proceeds of $58.0 million. We used $5.7 million of the proceeds from Cellectis to pay a portion of our outstanding obligations to Cellectis.

Follow-on Public Offering

On May 22, 2018, we completed a follow-on offering of our common stock. We sold an aggregate of 4,057,500 shares of common stock at a price of $15.00 per share, including 457,500 shares of common stock pursuant to the exercise of the underwriters' option to purchase additional shares. In the aggregate, we received net proceeds from the follow-on offering and exercise of the overallotment option of $57.0 million, after deducting underwriting discounts and commissions of $3.2 million and offering expenses totaling$0.7 million. As part of the follow-on offering, Cellectis purchased 550,000 shares of common stock for a value of $8.3 million, the proceeds of which are included in the net proceeds of $57.0 million.

Stock Splits

On June 14, 2017, we effected a stock split of our common stock at a ratio of 100-for-1 and increased the number of shares of common stock authorized for issuance to 30,000,000 by filing a Certificate of Amendment with the Secretary of State of the State of Delaware.

On July 25, 2017, we increased our authorized capital stock to 325,000,000 shares of which 275,000,000 shares are designated common stock, par value $0.0001, and 50,000,000 shares are designated preferred stock, par value $0.0001.

On July 25, 2017, concurrently with the closing of the IPO, we effected a stock split of our common stock at a ratio of 2.45-for-1. As a result of the stock split, each share of issued and outstanding common stock was converted into 2.45 shares of issued and outstanding common stock without changing the par value per share.

Since the par value of the common stock remained at $0.0001 per share subsequent to each stock split, the value of common stock recorded to our balance sheets has been retroactively increased to reflect the par value of the increased number of outstanding shares, with a corresponding decrease to additional paid-in capital. All share and per share data for periods occurring prior to the stock split that are included in the consolidated financial statements and related notes have been retroactively restated to reflect the stock splits.

We repurchased $813,000 of common stock in 2019 and $230,000 in 2018.

5. NET LOSS PER SHARE

Basic and diluted loss per share were calculated using the following:

	Year ended December 31,		
In Thousands, Except Share Data and Per Share Amounts	**2019**	**2018**	**2017**
Net loss	**$ (39,612)**	$ (27,897)	$ (25,980)
Weighted average shares outstanding - basic and diluted	**32,805,684**	30,683,421	23,153,661
Basic and diluted loss per share	**$ (1.21)**	$ (0.91)	$ (1.12)

	Year ended December 31,		
	2019	**2018**	**2017**
Anti-dilutive stock options, restricted stock units and performance stock units	**5,606,552**	4,253,301	5,257,365

All outstanding stock options and restricted stock units are excluded from the calculation since they are anti-dilutive.

We have not used the treasury method in determining the number of anti-dilutive stock options and restricted stock units in the table above.

6. STOCK-BASED COMPENSATION

We use broad-based stock plans to attract and retain highly qualified officers and employees and to help ensure that management's interests are aligned with those of our shareholders. We have also granted equity-based awards to directors, nonemployees and certain employees of Cellectis.

In December 2014, we adopted the Calyxt, Inc. Equity Incentive Plan (2014 Plan), which allowed for the grant of stock options, and in June 2017, we adopted the 2017 Omnibus Plan (2017 Plan), which allowed for the grant of stock options, performance shares and other types of equity awards.

As of December 31, 2019, 1,977,594 shares were registered and available for grant under approved registration statements, while 2,544,107 shares were available for grant in the form of stock options, restricted stock, restricted stock units and performance stock units under the 2017 Plan. Stock-based awards now outstanding also include some granted under the 2014 Plan, under which no further awards will be granted.

Stock Options

The estimated fair values of stock options granted and the assumptions used for the Black-Scholes option pricing model were as follows:

	2019	2018	2017
Estimated fair values of stock options granted	**$ 10.18**	$ 9.09	$ 2.42
Assumptions:			
Risk-free interest rate	**1.7% - 2.5%**	2.2% - 3.0%	1.3% - 2.4%
Expected volatility	**52.6% - 78.9%**	40.9% - 57.2%	27.4% - 45.1%
Expected term (in years)	**6.8 - 10**	5.6 - 10	1.2 - 10

We estimate the fair value of each option on the grant date or other measurement dates if applicable using a Black-Scholes option-pricing model, which requires us to make predictive assumptions regarding future stock price volatility, employee exercise behavior and dividend yield. The risk-free interest rate for periods during the expected term of the options is based on the United States Treasury zero-coupon yield curve in effect at the date of grant. We estimate our future stock price volatility using the historical volatility of comparable public companies over the expected term of the option. Our expected term represents the period that options granted are expected to be outstanding determined using the simplified method. We have not paid dividends on our common stock and we do not currently plan to pay any cash dividends in the foreseeable future.

Options may be priced at 100 percent or more of the fair market value on the date of grant and generally vest over six years after the date of grant. Options generally expire within 10 years after the date of grant.

Information on stock option activity follows:

	Options Exercisable	Weighted-Average Exercise Price Per Share	Options Outstanding	Weighted-Average Exercise Price Per Share
Balance as of December 31, 2018	1,278,038	$ 7.45	3,201,887	$ 10.67
Granted			1,590,000	13.80
Exercised			(95,327)	3.61
Forfeited or expired			(227,696)	14.68
Other activity			12,495	13.29
Balance as of December 31, 2019	**1,789,567**	**$ 8.73**	**4,481,359**	**$ 11.73**

Stock-based compensation expense related to stock option awards was as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Stock-based compensation expenses	**$ 6,035**	$ 3,609	$ 9,291

The aggregate intrinsic value of options exercisable at December 31, 2019 was $3.3 million and the weighted average remaining contractual term was 6.8 years as of that date.

Net cash proceeds from the exercise of stock options less shares used for minimum withholding taxes and the intrinsic value of options exercised were as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Net cash proceeds	**$ 344**	$ 2,622	$ 265
Intrinsic value of options exercised	**$ 905**	$ 7,569	$ 1,347

As of December 31, 2019, unrecognized compensation expense related to non-vested stock options was $13.1 million. This expense will be recognized over 56 months on average.

Restricted Stock Units

Units settled in stock subject to a restricted period may be granted to key employees under the 2017 Plan. Restricted stock units generally vest and become unrestricted over five years after the date of grant.

Information on restricted stock unit activity follows:

	Number of Restricted Stock Units Outstanding	Weighted-Average Grant Date Fair Value
Unvested balance at December 31, 2018	1,051,414	$ 10.15
Granted	100,000	12.48
Vested	(324,043)	9.69
Cancelled	(13,845)	12.72
Unvested balance at December 31, 2019	**813,526**	**10.31**

The total grant-date fair value of restricted stock unit awards that vested was as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Grant-date fair value	**$ 3,141**	$ 2,691	$ 314

Information on the weighted average grant date fair value of restricted stock units issued was as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Weighted average grant date fair value	**$ 12.48**	16.76	$ 8.00

Stock-based compensation expense related to restricted stock units was as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Stock-based compensation expenses	**$ 2,910**	$ 776	$ 2,429

We treat stock-based compensation awards granted to employees of Cellectis as deemed dividends. We recorded deemed dividends as follows.

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Deemed dividends from grants to Cellectis employees	**$ 1,358**	$ 2,253	$ 3,574

As of December 31, 2019, unrecognized compensation expense related to restricted stock units was $3.0 million. This expense will be recognized over 45 months on average.

Performance Stock Units

In June 2019, we granted 311,667 performance stock units under the 2017 Plan to three executive officers. The performance stock units will vest at 50%, 100% or 120% of the shares under the award at the end of a three-year performance period based upon increases in the value of our common stock from the grant price of $12.48. The performance stock units will be settled in restricted stock upon vesting, with restrictions on transfer lapsing on the second anniversary of the restricted stock issuance date.

The estimated fair values of performance stock units granted and the assumptions used for the Monte Carlo simulation pricing model were as follows:

	Year ended December 31, 2019
Estimated fair values of performance stock units granted	**$ 7.06**
Assumptions:	
Risk-free interest rate	**1.71%**
Expected volatility	**75.0%**
Expected term (in years)	**3.0**

Stock-based compensation expense related to performance stock unit awards was $225,000 for the year ended December 31, 2019.

As of December 31, 2019, unrecognized compensation expense related to performance stock units was $2.0 million and will be recognized over 54 months.

Cellectis Equity Incentive Plan

Prior to 2018, Cellectis granted stock options to our employees. Compensation costs related to these grants have been recognized in the statements of operations with a corresponding credit to stockholders' equity, representing the Cellectis' capital contribution to us. The fair value of each stock option was estimated at the grant date using the Black-Scholes option pricing model.

We recognized stock-based compensation expense related to our Cellectis' grants of $100,000 in 2018 and $400,000 in 2017. Expenses in 2019 were immaterial and as of December 31, 2019, all expenses related to these awards had been recognized.

7. INCOME TAXES

The following table reconciles the United States statutory income tax rate with our effective income tax rate:

	Year ended December 31,		
	2019	**2018**	**2017**
United States statutory rate	**21.0%**	21.0%	34.0%
State Tax, net of Federal Benefit	**1.0%**	0.7%	—%
Stock-based compensation	**(1.6%)**	3.6%	0.6%
Officers compensation	**(1.3%)**	—%	—%
Deferred rate change	**—%**	0.3%	(12.9%)
R&D credit	**1.8%**	0.7%	—%
Other	**0.3%**	0.7%	—%
Change in valuation allowance	**(21.2%)**	(27.0%)	(21.7%)
Effective income tax rate	—%	—%	—%

Deferred assets and liabilities consist of the following:

In Thousands	December 31, 2019	2018	2017
Net operating losses	**$ 24,852**	$ 16,372	$ 9,252
Stock-based compensation expenses	**3,637**	2,747	2,691
Financing lease obligations	**4,640**	4,009	2,131
Tax credit carry forwards	**2,106**	922	735
Compensation and employee benefits	**97**	474	576
Other	**307**	116	8
Gross deferred tax assets	**35,639**	24,640	15,393
Less valuation allowance	**(30,888)**	(20,329)	(12,792)
Net deferred tax assets	**4,751**	4,311	2,601
Fixed assets	**(4,746)**	(4,352)	(2,600)
Other	**(5)**	41	(1)
Gross deferred tax liabilities	**(4,751)**	(4,311)	(2,601)
Net deferred tax asset or liability	**$ —**	$ —	$ —

We provide for a valuation allowance when it is more likely than not that we will not realize a portion of the deferred tax assets. We have established a valuation allowance against our deferred tax assets described above as current evidence does not suggest we will realize enough taxable income of the appropriate character within the carryforward period to allow us to realize these deferred tax benefits.

We have $141.2 million of tax loss carryforwards. Of this amount, $35.2 million is state operating loss carryforwards and $105.9 million is federal operating loss carryforwards. The federal carryforward periods are as follows: $64.0 million do not expire; zero expire in 2019 and 2020; and $41.9 million expire in 2032 and beyond. The state carryforward period is 20 years.

On December 22, 2017, the TCJA was signed into law. The TCJA results in significant revisions to the United States corporate income tax system, including a reduction in the United States corporate income tax rate, implementation of a territorial system, and a one-time deemed repatriation tax on untaxed foreign earnings. The TCJA also results in a United States federal blended statutory rate of 21 percent for us in 2018. We completed the accounting for the income tax effects of the TCJA as of December 31, 2018.

We are subject to federal income taxes in the United States as well as various state and local jurisdictions. Several years may elapse before an uncertain tax position is audited and finally resolved. While it is often difficult to predict the outcome or the timing of resolution of any uncertain tax position, we do not believe that we need to recognize any liabilities for uncertain tax positions as of December 31, 2019.

The number of years with open tax audits varies depending on the tax jurisdiction. Our major taxing jurisdictions are the United States, both federal and state. Various tax examinations by United States state taxing authorities could be conducted for any open tax year, which vary by jurisdiction, but are generally from 3 to 5 years.

8. LEASES, OTHER COMMITMENTS, AND CONTINGENCIES

Litigation and Claims

We are not currently a party to any material pending legal proceeding.

Leases

We lease our headquarters facility, office equipment, and other items. Our headquarters lease involved the sale of land and improvements to a third party who then constructed the facility. This lease is considered a financing lease.

Sale-Leaseback of Headquarters and Lab Facility

Our headquarters facility is composed of a 40,000 square-foot office and lab building, with greenhouses and outdoor research plots. We are deemed the owner for accounting purposes. The lease has a term of twenty years, with four options to extend its term for five years each, subject to there being no default under the lease terms beyond any cure period and us occupying the property at the time of extension. In 2017, we received $7.0 million in connection with the sale of the land and uncompleted facility.

The lease commenced in May 2018. Under the lease, we pay an annual base rent of eight percent of the total project cost with scheduled increases in rent of 7.5 percent on the sixth, eleventh and sixteenth anniversaries of the start of the lease commencement as well as on the first day of each renewal term. Currently, we pay an annual base rent of $1.4 million.

We are also responsible for all operating costs and expenses associated with the property. Beginning on the eighteenth month anniversary of the start of the lease, if the landlord decides to sell the property we have a right of first refusal to purchase the property on the same terms offered to any third party.

Concurrent with entering the lease, Cellectis guaranteed all our obligations under the lease agreement. Cellectis' guarantee of our obligations will terminate at the end of the second consecutive calendar year in which our tangible net worth exceeds $300 million, as determined in accordance with generally accepted accounting principles. At a point when Cellectis owns 50% or less of our outstanding common stock, we have agreed to indemnify Cellectis for any obligations incurred by Cellectis under its guaranty of our obligations under the lease.

Sale-Leaseback of Equipment

We also have an equipment financing arrangement that is considered a financing lease. This arrangement has a term of four years for each draw. We were required to deposit cash into a restricted account in an amount equal to the future rent payments required by the lease. As of December 31, 2019, this restricted cash totaled $1.4 million. We have the option to request the return of excess collateral annually in December. The equipment financing arrangement allows for a six-month renewal option or a repurchase option at the end of the lease term.

Operating Leases

As a lessee, we lease office equipment, storage facilities and vehicles under various operating leases.

Rent expense from all operating leases was as follows:

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Rent expense from operating leases	**$ 117**	$ 200	$ 270

Noncancelable future lease commitments are as follows:

In Thousands	**Operating Leases**	**Capital Leases**
2020	$ 419	$ 1,817
2021	59	1,787
2022	13	1,898
2023	—	1,561
2024	—	1,479
After fiscal 2024	—	21,428
Total noncancelable future lease commitments	**$ 491**	**$ 29,970**

Other Commitments

As of December 31, 2019, we have committed to purchase grain from growers and seed from third party producers at dates throughout 2020 and 2021 aggregating $50.9 million based on current commodity futures market prices, other payments to growers and estimated yields per acre. This amount is not recorded in the consolidated financial statements because we have not taken delivery of the grain or seed as of December 31, 2019.

9. EMPLOYEE BENEFIT PLAN

We provide a 401(k) defined contribution plan for all regular full-time employees who have completed three months of service. We match employee contributions up to certain amounts and those matching contributions vest immediately.

	Year ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Employee benefit plan expenses	**$ 228**	$ 136	$ 93

10. SUPPLEMENTAL INFORMATION

Certain balance sheet amounts are as follows:

	December 31,	
In Thousands	**2019**	**2018**
Inventory:		
Raw materials	**$ 2,211**	$ —
Work-in-process	**272**	—
Finished goods	**111**	—
Total	**$ 2,594**	$ —

	December 31,	
In Thousands	**2019**	**2018**
Land, buildings and equipment:		
Land under capital lease	**$ 5,690**	$ 5,690
Buildings	**650**	642
Buildings under capital lease	**3,812**	3,812
Leasehold improvements	**130**	52
Leasehold improvements under capital lease	**10,023**	10,023
Office furniture and equipment	**4,174**	1,789
Office furniture and equipment under capital lease	**1,788**	1,374
Computer equipment and software	**8**	2
Construction in progress	**550**	554
Vehicles	**83**	0
Total land, buildings and equipment	**26,908**	23,938
Less accumulated depreciation and amortization	**(3,696)**	(2,088)
Total	**$ 23,212**	$ 21,850

Certain statements of operations amounts are as follows:

	Year Ended December 31,		
In Thousands	**2019**	**2018**	**2017**
Revenue:			
Soybean oil	**$ 1,685**	$ —	$ —
Soybean meal	**5,604**	—	—
Licensing of technology	**7**	236	508
Total	**$ 7,296**	$ 236	$ 508

In Thousands	Year Ended December 31, 2019	2018	2017
Stock-based compensation expense:			
Research and development	**$ 2,190**	$ 629	$ 6,086
Selling and supply chain	**767**	408	529
General and administrative	**6,218**	3,348	5,477
Total	**$ 9,175**	$ 4,385	$ 12,092

In Thousands	Year Ended December 31, 2019	2018	2017
Interest, net:			
Interest expense	**$ (1,490)**	$ (1,257)	$ (261)
Interest income	**1,600**	1,521	260
Total	**$ 110**	$ 264	$ (1)

In Thousands	Year Ended December 31, 2019	2018	2017
Depreciation and amortization expenses	**$ 1,607**	$ 1,081	$ 551

Certain statements of cash flows amounts are as follows:

In Thousands	Year Ended December 31, 2019	2018	2017
Cash, cash equivalents and restricted cash:			
Cash and cash equivalents	**$ 58,610**	$ 93,794	$ 56,664
Restricted cash	**388**	381	—
Non-current restricted cash	**1,040**	1,113	—
Total	**$ 60,038**	$ 95,288	$ 56,664

In Thousands	Year Ended December 31, 2019	2018	2017
Supplemental investing and financing transactions:			
Non-cash additions to land, buildings and equipment	**$ 414**	$ 7,994	$ 3,130
Offering costs in accounts payable and accrued liabilities	**$ —**	$ 443	$ —
Non-cash addition to financing lease obligations	**$ 25**	$ —	$ —
Interest paid	**$ 1,472**	$ 1,086	$ 200

11. QUARTERLY FINANCIAL DATA (UNAUDITED)

The following table sets forth certain unaudited quarterly financial data for the eight quarters ended December 31, 2019. The unaudited information set forth below has been prepared on the same basis as the audited information contained herein and includes all adjustments necessary to present fairly the information set forth. The operating results for any quarter are not indicative of results for any future period. All data is in thousands except per share data.

	2019				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Revenue	**$ 157**	**$ 408**	**$ 2,967**	**$ 3,764**	$ 11	$ 196	$ 27	$ 2
Cost of goods sold	**$ (34)**	**$ (303)**	**$ (3,528)**	**$ (5,415)**	**$ —**	**$ —**	**$ —**	**$ —**
Gross margin	**$ 123**	**$ 105**	**$ (561)**	**$ (1,651)**	$ 11	$ 196	$ 27	$ 2
Operating expenses	**$ (7,646)**	**$ (9,597)**	**$ (10,132)**	**$ (10,314)**	$ (4,307)	$ (7,688)	$ (7,726)	$ (8,630)
Net loss	**$ (7,375)**	**$ (9,403)**	**$ (10,669)**	**$ (12,165)**	$ (4,370)	$ (7,576)	$ (7,483)	$ (8,468)
Net loss per share	**$ (0.23)**	**$ (0.29)**	**$ (0.32)**	**$ (0.37)**	$ (0.16)	$ (0.25)	$ (0.23)	$ (0.27)

EXHIBIT 4.1

DESCRIPTION OF REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

Calyxt, Inc., a Delaware corporation ("Calyxt," "we," "our," "us," the "Company"), has one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"): its common stock, $0.0001 par value per share.

The following description of Calyxt common stock is a summary and does not purport to be complete. It is subject to and qualified in its entirety by reference to Calyxt's Amended and Restated Certificate of Incorporation dated July 25, 2017 (the "Certificate of Incorporation"), Calyxt's Amended and Restated Bylaws as of May 7, 2018 (the "Bylaws") and the Stockholders Agreement dated July 25, 2017 by and among Calxyt, Cellectis S.A. ("Cellectis") and the persons listed therein (the "Stockholders Agreement"), each of which are incorporated by reference as an exhibit to the Annual Report on Form 10-K of which this Exhibit 4.1 is a part. We encourage you to read our Certificate of Incorporation, our Bylaws, the Stockholder Agreement and the applicable provisions of the Delaware General Corporation Law ("DGCL") for additional information.

Authorized Capital

Our authorized capital stock consists of 275,000,000 shares of common stock, par value $0.0001 per share; and 50,000,000 shares of preferred stock, par value $0.0001 per share.

Common Stock

Voting Rights. The holders of our common stock are entitled to one vote per share on all matters to be voted upon by the stockholders. Holders of our common stock do not have cumulative voting rights in the election of directors. Accordingly, the holders of a majority of the voting power of our common stock could, if they so choose, elect all the directors.

Dividend Rights. Holders of common stock are entitled to receive dividends if, as and when declared by our Board of Directors, out of our legally available assets, in cash, property or shares of our capital stock, after payments of dividends required to be paid on outstanding preferred stock, if any.

Distributions in Connection with Mergers or Other Business Combinations. Upon a merger, consolidation or substantially similar transaction, holders of common stock will be entitled to receive equal per share payments or distributions.

Liquidation Rights. Upon our liquidation, dissolution or winding up, any business combination or a sale or disposition of all or substantially all of our assets, the assets legally available for distribution to our stockholders will be distributable ratably among the holders of our common stock, subject to prior satisfaction of all outstanding debts and other liabilities and the preferential rights and payment of liquidation preferences, if any, on any outstanding preferred stock.

Stockholders Agreement. Pursuant to the Stockholders Agreement,

Pursuant to the Stockholders Agreement, Cellectis has certain contractual rights for so long as it beneficially owns at least 50% of the then outstanding shares of our common stock, including:

- to approve any modification to our or any future subsidiary's share capital (e.g., share capital increase or decrease), the creation of any subsidiary, any grant of stock-based compensation, any distributions or initial public offering, merger, spin-off, liquidation, winding up or carve-out transactions;
- to approve the annual business plan and annual budget and any modification thereto;
- to approve any external growth transactions exceeding $500,000 and not included in the approved annual business plan and annual budget;

- to approve any investment and disposition decisions exceeding $500,000 and not included in the approved annual business plan and annual budget (it being understood that this clause excludes the purchase and sale of inventory as a part of the normal course of business);
- to approve any related-party agreement and any agreement or transaction between the executives or stockholders of Calyxt, on the one hand, and Calyxt or any of its subsidiaries, on the other hand;
- to approve any decision pertaining to the recruitment, dismissal/removal, or increase of the compensation of executives and corporate officers;
- to approve any material decision relating to a material litigation;
- to approve any decision relating to the opening of a social or restructuring plan or pre-insolvency proceedings;
- to approve any buyback by us of our own shares;
- to approve any new borrowings or debts exceeding $500,000 and early repayment of loans, if any (it being understood that Cellectis will approve the entering into of contracts for revolving loans and other short-term loans and the repayment of such for financing general operating activities, such as revolving loans for inventory or factoring of receivables);
- to approve grants of any pledges on securities;
- to develop new activities and businesses not described in the annual business plan and annual budget;
- to approve entry into any material agreement or partnership; and
- to approve any offshore and relocation activities.

In addition, Cellectis has the following rights for so long as it beneficially owns at least 15% of the then outstanding shares of our common stock, including:

- to nominate the greater of three members of our Board or a majority of the directors;
- to designate the Chair of our Board and one member to each Board committee;
- to approve any amendments to our Certificate of Incorporation or our Bylaws that would change the name of our company, its jurisdiction of incorporation, the location of its principal executive offices, the purpose or purposes for which our company is incorporated or the Cellectis approval items set forth in the Stockholders Agreement;
- to approve the payment of any regular or special dividends;
- to approve the commencement of any proceeding for the voluntary dissolution, winding up or bankruptcy of Calyxt or a material subsidiary;
- to approve any public or private offering, merger, amalgamation or consolidation of us or the spinoff of a business of ours or any sale, conveyance, transfer or other disposition of our assets; and
- to approve any appointment to, or removal from, our Board to the extent permissible by the laws of the State of Delaware.

In addition, for so long as Cellectis beneficially owns at least 15% of the then outstanding shares of our common stock, (i) Cellectis is entitled to certain information rights, including the right to consult with and advise senior management, to receive quarterly and annual financial statements and to review our books and records and (ii) we are also required to cooperate with Cellectis in connection with certain sales and pledges of our shares or grants of security interests in respect thereof, including in connection with margin loans.

The Stockholders Agreement also provides Cellectis with certain demand and piggyback registration rights, as well as a right to payment of its expense, indemnification and contribution in connection with a registration under the Securities Act of 1933, as amended (the “Securities Act”) of the Calyxt common stock held by Cellectis.

Other Matters. Our Certificate of Incorporation does not entitle holders of our common stock to preemptive rights. No redemption or sinking fund provisions apply to our common stock. The rights, preferences and privileges of holders of our common stock are subject to, and may be adversely affected by, the rights of holders of any series of preferred stock that we may designate in the future.

Preferred Stock

Our Certificate of Incorporation authorizes our Board of Directors, without further action by the stockholders (unless so required by applicable law or Nasdaq listing standards), to issue preferred stock in one or more series, to

increase or decrease the number of shares of any series subsequent to the issuance of that series, but not below the number of shares of such series then outstanding, and to determine the preferences, limitations and rights of any shares of preferred stock that we choose to issue, without vote or action by the stockholders.

The DGCL provides that the holders of preferred stock will have the right to vote separately as a class (or, in some cases, as a series) on an amendment to our Certificate of Incorporation if the amendment would change the par value, the number of authorized shares of the class or the powers, preferences or special rights of the class or series so as to adversely affect the class or series, as the case may be. This right is in addition to any voting rights that may be provided for in the applicable certificate of designation.

Delaware Anti-Takeover Law and Provisions of our Certificate of Incorporation and our Bylaws

The following provisions may make a change in control of our business more difficult and could delay, defer or prevent a tender offer or other takeover attempt that a stockholder might consider to be in its best interest, including takeover attempts that might result in the payment of a premium to stockholders over the market price for their shares. These provisions also may promote the continuity of our management by making it more difficult for a person to remove or change the incumbent members of our Board of Directors.

Authorized but Unissued Shares; Undesignated Preferred Stock. The authorized but unissued shares of our common stock will be available for future issuance without stockholder approval. These additional shares may be used for a variety of corporate purposes, including future public offerings to raise additional capital, acquisitions and employee benefit plans. In addition, our Board of Directors may authorize, without stockholder approval, the issuance of undesignated preferred stock with voting rights or other rights or preferences designated from time to time by our Board of Directors. The existence of authorized but unissued shares of common stock or preferred stock may enable our Board of Directors to render more difficult or to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise.

Election and Removal of Directors. Our Board of Directors consists of not less than five nor more than eleven directors, excluding any directors elected by holders of preferred stock pursuant to provisions of any applicable series of preferred stock entitling the holders thereof to separately elect directors. The exact number of directors will be fixed from time to time by resolution of our Board of Directors.

Pursuant to the Stockholders Agreement, Cellectis has the right to nominate the greater of three directors or a majority of directors to our Board of Directors so long as it continues to own at least 15% of our then-outstanding shares of our common stock.

At any time after Cellectis beneficially owns less than 50% of our then outstanding common stock, our Certificate of Incorporation provides that directors may be removed only for cause and only by the affirmative vote of holders of a majority of our then outstanding stock. Prior to such time, directors may be removed with or without cause.

Classified Board of Directors. Our Board of Directors currently is not classified. However, our Certificate of Incorporation and our Bylaws provide that our Board of Directors will be classified with approximately one-third of the directors elected each year at such time as Cellectis no longer holds at least 50% of our then outstanding common stock. The number of directors will be fixed from time to time by a majority of the total number of directors that we would have at the time such number is fixed if there were no vacancies. The directors will be divided into three classes, designated class I, class II and class III. Each class will consist, as nearly as may be possible, of one-third of the total number of directors constituting the entire Board of Directors. At each annual meeting of stockholders, successors to the class of directors whose term expires at that annual meeting will be elected for a three-year term and until their successors are duly elected and qualified. In addition, if the number of directors is changed, any increase or decrease will be apportioned by our Board of Directors among the classes so as to maintain the number of directors in each class as nearly equal as possible, and any additional director of any class elected to fill a vacancy resulting from an increase in such class or from the removal from office, death, disability, resignation or disqualification of a director or other cause will hold office for a term that will coincide with the remaining term of that class, but in no case will a decrease in the number of directors have the effect of removing or shortening the term of any incumbent director.

Director Vacancies. Our Certificate of Incorporation authorizes only our Board of Directors to fill vacant directorships.

No Cumulative Voting. Our Certificate of Incorporation provides that stockholders do not have the right to cumulate votes in the election of directors.

Special Meetings of Stockholders. At any time after Cellectis beneficially owns less than 50% of our then outstanding common stock, our Bylaws and our Certificate of Incorporation provide that special meetings of our stockholders may only be called by the Board of Directors. Prior to such time, a special meeting may also be called by the secretary of the Company at the request of stockholders holding a majority of the outstanding shares entitled to vote.

Advance Notice Procedures for Director Nominations. Our Bylaws establish advance notice procedures for stockholders seeking to nominate candidates for election as directors at an annual or special meeting of stockholders. Although our Bylaws do not give the Board of Directors the power to approve or disapprove stockholder nominations of candidates to be elected at an annual meeting, our Bylaws may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed or may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect its own slate of directors or otherwise attempting to obtain control of the Company.

Action by Written Consent. At any time after Cellectis beneficially owns less than 50% of our then outstanding common stock, our Bylaws and our Certificate of Incorporation provide that any action required or permitted to be taken by the stockholders must be effected at a duly called annual or special meeting of stockholders and may not be effected by any consent in writing in lieu of a meeting of such stockholders, subject to the rights of the holders of any series of preferred stock. Prior to such time, such actions may be taken without a meeting by written consent.

Amending Our Certificate of Incorporation and Bylaws. At any time after Cellectis beneficially owns less than 50% of our then outstanding common stock, our Certificate of Incorporation and Bylaws may be amended by the affirmative vote of the holders of at least two-thirds of our common stock. Prior to such time, our Certificate of Incorporation and Bylaws may be amended by the affirmative vote of the holders of a majority of the voting power of our common stock.

Exclusive Jurisdiction. Our Certificate of Incorporation provides that, unless we consent to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a claim of breach of fiduciary duty owed by any of our directors, officers, or other employees to us or to our stockholders, any action asserting a claim arising pursuant to the DGCL, or any action asserting a claim governed by the internal affairs doctrine. Notwithstanding the foregoing, because the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce duties or liabilities created by the Exchange Act or the rules and regulations thereunder, the exclusive forum provision does not apply to any action arising under the Exchange Act. Although the exclusive forum provision applies, to the extent permitted by law, to Securities Act claims, the Securities Act creates concurrent federal and state jurisdiction over suits brought to enforce duties or liabilities created by the Securities Act or the rules and regulations thereunder. Accordingly, there is uncertainty as to whether a court would enforce this exclusive forum provision with respect to a Securities Act claim. Neither we nor our stockholders may waive compliance with the federal securities laws or the rules and regulations thereunder.

Business Combinations with Interested Stockholders. Subject to certain exceptions, Section 203 of the DGCL prohibits a public Delaware corporation from engaging in a business combination (as defined in such section) with an “interested stockholder” (defined generally as any person who beneficially owns 15% or more of the outstanding voting stock of such corporation or any person affiliated with such person) for a period of three years following the time that such stockholder became an interested stockholder, unless (i) prior to such time the Board of Directors of such corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder; (ii) upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of such corporation at the time the transaction commenced (excluding for purposes of determining the voting stock of such corporation outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (A) by persons who are directors and also officers of such corporation and (B) by employee stock plans in

which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer); or (iii) at or subsequent to such time the business combination is approved by the Board of Directors of such corporation and authorized at a meeting of stockholders (and not by written consent) by the affirmative vote of at least 66 2/3% of the outstanding voting stock of such corporation not owned by the interested stockholder.

A Delaware corporation may "opt out" of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate of incorporation or bylaws resulting from a stockholders' amendment approved by at least a majority of the outstanding voting shares. We have expressly elected not to be governed by the "business combination" provisions of Section 203 of the DGCL, until after such time as Cellectis no longer beneficially owns at least 50% of our common stock. At that time, such election shall be automatically withdrawn and we will thereafter be governed by the "business combination" provisions of Section 203 of the DGCL.

Conflicts of Interest

Delaware law permits corporations to adopt provisions renouncing any interest or expectancy in certain opportunities that are presented to the corporation or its officers, directors or stockholders. Our Certificate of Incorporation renounces, to the maximum extent permitted from time to time by Delaware law, any interest or expectancy that we have in, or right to be offered an opportunity to participate in, specified business opportunities that are from time to time presented to our officers, directors or stockholders or their respective affiliates, other than those officers, directors, stockholders or affiliates who are our or our subsidiaries' employees. Our Certificate of Incorporation provides that, to the fullest extent permitted by law, none of Cellectis or any of its affiliates or any director who is not employed by us, or his or her affiliates has any duty to refrain from (i) engaging in a corporate opportunity in the same or similar lines of business in which we or our subsidiaries now engage or propose to engage or (ii) otherwise competing with us or our subsidiaries. In addition, to the fullest extent permitted by law, in the event that Cellectis or any non-employee director acquires knowledge of a potential transaction or other business opportunity which may be a corporate opportunity for itself or himself or its or his affiliates or for us or our affiliates, such person has no duty to communicate or offer such transaction or business opportunity to us or any of our affiliates and they may take any such opportunity for themselves or offer it to another person or entity. Our Certificate of Incorporation does not renounce our interest in any business opportunity that is expressly offered to a non-employee director solely in his or her capacity as a director of Calyxt. To the fullest extent permitted by law, no business opportunity will be deemed to be a potential corporate opportunity for us unless we would be permitted to undertake the opportunity under our Certificate of Incorporation, we have sufficient financial resources to undertake the opportunity and the opportunity would be in line with our business.

Listing

Our shares of common stock are listed on the Nasdaq Stock Market under the symbol "CLXT."

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A.

Exhibit 10.3

SECOND AMENDMENT TO THE
MANAGEMENT SERVICES AGREEMENT

This SECOND AMENDMENT TO THE MANAGEMENT SERVICES AGREEMENT (the "**Second Amendment**") is made and entered into effective as of January 29, 2020 by and among Cellectis S.A. ("**CLS**"), Cellectis, Inc. ("**CLI**"), Calyxt, Inc. ("**CLX**"), and Cellectis Biologics, Inc. ("CBL"), each a Party and together the Parties.

WHEREAS, CLS, CLI and CLX entered into that certain Management Services Agreement dated January 1, 2016, as amended by that certain First Amendment to the Management Services Agreement dated July 25, 2017 (the "**Agreement**");

WHEREAS, Cellectis Biologics, Inc. ("CBL"), a company fully owned by CLI, was incorporated in the State of Delaware in January 18, 2019 and as such is a Party to this Agreement.

WHEREAS, the Parties have agreed to further amend the Agreement as set forth in this Second Amendment.

NOW, THEREFORE, in consideration of the agreements and obligations set forth herein and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree that the Agreement is hereby amended as follows:

1. As from July 1, 2019 (i) CBL, CLS, CLI and CLX agree to consider CBL as a Party and Subsidiary to this Agreement and (ii) CBL hereby agrees to be bound by all terms and conditions of this Agreement. The Parties hereby agree that the Services to be provided by CLS, as Provider, to CBL, as Beneficiary, and the Services to be provided by CBL, as Provider, to CLS, as beneficiary, are the Services set forth on Exhibit A attached hereto and incorporated herein.

2. Exhibit 1 of the Agreement is amended to revise the "Basis of Allocation" for "IT- internal support" and "Human Resources" Services provided by CLS to CLX, to CLI and to CBL from "Number of CLX's FTE" to "Time Spent". Such amendment shall be effective as of July 1, 2019.

3. All other provisions of the Agreement not expressly amended herein shall remain in full force and effect.

* * * * *

IN WITNESS WHEREOF, the Parties have caused this Second Amendment to be duly executed by their respective authorized officers as of the date first written above.

CELLECTIS S.A.

By: /s/ David Sourdive
Name: David Sourdive
Title: Deputy Chief Executive Officer

CELLECTIS, INC.

By: /s/ André Choulika
Name: André Choulika
Title: Chief Executive Officer

CALYXT, INC.

By: /s/ James Blome
Name: James Blome
Title: Chief Executive Officer

CELLECTIS BIOLOGICS, INC.

By: /s/ André Choulika
Name: André Choulika
Title: Chief Executive Officer

EXHIBIT A

Services performed by Cellectis SA (CLS) on behalf of Cellectis Biologics, Inc. (CBL):

Types of Services	**Costs and Expenses**	**Basis of Allocation of the Costs and Expenses**	**Mark-up**
Finance	Salaries and social contribution costs	Time spent	4%
	Indirect costs		0%
IT – LIMS use	Salaries and social contribution costs	Number of users of the LIMS	4%
	Indirect costs		0%
IT – internal support	Salaries and social contribution costs	Time spent	4%
	Indirect costs		0%
Human Resources	Salaries and social contribution costs	Time spent	10%
	Indirect costs		0%
Legal	Salaries and social contribution costs	Time spent	10%
	Indirect costs		0%
R&D	Salaries and social contribution costs	Time spent	7%
	Indirect costs		0%

Services performed by Cellectis Biologics, Inc. (CBL) on behalf of Cellectis SA (CLS):

R&D	Salaries and social contribution costs	Time spent	7%
	Indirect costs		0%

Exhibit 10.28

May 13, 2019

Dr. Travis Frey
22609 102nd Ave SE
Woodinville, WA 98077

Dear Dr. Frey,

On behalf of Calyxt, Inc., (the "Company"), I am pleased to offer you a position with the Company as Chief Technology Officer. This offer letter agreement (this "Letter") sets forth the terms of your offer which, if you accept, will govern your employment with the Company.

1. Certain Definitions. Certain words or phrases used in this Letter with initial capital letters will have the meanings set forth in paragraph 12 hereof.

2. Employment. If you accept the terms of this Letter by May 14, 2019, the Company will employ you beginning on May 20, 2019 (the "Effective Date") at the latest, upon the terms and conditions set forth in this Letter, and ending as provided in paragraph 6 hereof. Notwithstanding anything in this Letter to the contrary, you will be an at-will employee of the Company and you or the Company may terminate your employment with the Company for any reason or no reason at any time. The period during which you are employed by the Company is referred to in this Letter as the "Employment Term."

3. Position and Duties. You shall serve as Chief Technology Officer of the Company and shall have the duties, responsibilities and authority consistent with an executive serving in such position, subject to the Company's sole right to expand or reduce such duties, responsibilities and authority, either generally or in specific instances. You shall devote your full-time business time and attention to the performance of your duties under this Letter and will not engage in any other business activities or serve on boards of directors or similar bodies of other organizations without the prior consent of the Company's Board of Directors. Notwithstanding the foregoing, you will be permitted to purchase and own less than five percent (5%) of the publicly-traded securities of any corporation, provided that such ownership represents a passive investment and that you are not a controlling person of, or a member of a group that controls such corporation, and provided further that this ownership does not interfere with the performance of your duties and responsibilities to the Company, including

but not limited to the duties and responsibilities set forth in this Section 3. You will report to the Chief Executive Officer of the Company.

4. Place of Employment and Permanent Residence.

   a. The principal place of your employment will be the Company's office in Roseville, Minnesota, except that you may be required to travel on Company business during your employment.

   b. Given the importance and nature of your position as Chief Technology Officer of Company, and the Company's business need for you to reside near its office in Roseville, Minnesota, you agree to relocate your permanent, full-time domicile to a residence within fifty (50) miles by car of the Company's Headquarters no later than October 15, 2019.The terms related to such relocation are set forth on the attached Exhibit A.

5. Compensation and Benefits.

   a. Salary. The Company shall pay you an annualized salary of $275,000 (the "Base Salary") during the Employment Period in periodic installment in accordance with the Company's payroll practices as may be in effect from time to time, but not less frequently than monthly. Your Base Salary will be subject to review at least annually by the Board and the Board may, but will not be required to, increase your Base Salary during the Employment Term.

   b. Annual Performance Bonus. For each calendar year of the Employment Term, you will be eligible to receive an annual performance bonus ("Annual Performance Bonus") from the Company, with an amount of such bonus equal up to forty five percent (45%) of your Base Salary and a multiplier on Annual Target of 0.7 to 1.5x. You are eligible to earn a prorated Annual Performance Bonus for your individual contribution and the Company's performance between the Effective Date and December 31, 2019. Your Annual Performance Bonus will be based on achievement of individual and/or Company performance goals that are established by the Board in its sole discretion at the beginning of each calendar year. Following the close of each calendar year, the Board shall determine whether you have earned an Annual Performance Bonus, and the amount of any such bonus, based on the goals established at the beginning of the year. Payment of the Annual Performance Bonus is expressly conditioned upon your employment with the Company on the date the Annual Performance Bonus is paid, except as expressly provided in paragraph 7. The Annual Performance Bonus will be paid within seventy-five (75) days after the end of the calendar year to which it relates. Your target

Annual Performance Bonus will be subject to periodic review and adjustment by the Board, in its sole discretion, from time to time.

c. Equity Award. Not later than sixty days after the Effective Date, subject to the Board and majority shareholder approval as may be required, you will be granted a stock option (the "Option") to purchase up to 100,000 shares of the Company's Common Stock, pursuant to the Company's Stock Incentive Plan (the "Plan"). You will be eligible to participate in and receive additional stock option or equity award grants under the Company's equity incentive plan from time to time in the sole discretion of the Board and majority shareholder, as applicable, and in accordance with the terms and conditions of such plans.

d. Executive Benefits Package. You will be entitled during your employment to participate in the Company's Executive Benefits Package. The Company's "Executive Benefits Package" means those benefits (including benefits for which substantially all of the employees of the Company are from time to time generally eligible), as determined from time to time by the Company's Board of Directors (the "Board"). The Company reserves the right to amend or cancel any employee benefit plans, programs, or practices at any time in its sole discretion, subject to the terms of the employee benefit plan and applicable law.

e. Vacation. During the Employment Period, you will be entitled to take paid vacation pursuant to the Company's existing policies regarding paid vacations. You will be entitled to accrue twenty (20) days of paid vacation per calendar year. Beginning on the Effective Date, your vacation time will accrue on a monthly basis at a rate of 1.67 days per month. Vacation time that is not used by you in the calendar year it accrues may be carried over to the next calendar year, but you will cease to accrue additional vacation time beyond your annual accrual (i.e., 20 days) in any calendar year until you have taken vacation and your accrued vacation time has dropped below the maximum annual accrual of 20 days.

6. Termination Events. Your employment with the Company will continue until terminated upon the occurrence of any of the following events:

a. Your death;

b. Your Permanent Disability;

c. Your written notice of your termination of your employment to the CEO;

d. The termination of your employment by the Company at any time Without Cause (as defined in below) with the termination to take effect as determined by the Company; or

e. The termination of your employment by the Company For Cause (as defined in below), with the termination to take effect immediately upon written notice by the Company to the Employee or upon a date determined by the Company.

7. Consequences of Termination.

a. Compensation upon Termination by Company – For Cause. Upon the termination of your employment For Cause, you will cease to have any rights to Base Salary, bonus awards, expense reimbursements, fringe benefits or any other compensation or benefits of any nature, except that you will be entitled to receive any Base Salary that has accrued but is unpaid, any reimbursable expenses that have been incurred but are unpaid as of your Termination Date, which will be paid in accordance with Company's usual payroll procedures (collectively, the "Accrued Amounts").

b. Compensation upon Termination by Company – Not For Cause. Upon the Termination Without Cause of your employment provided for in paragraph 6(d), you will cease to have any rights to Base Salary, bonus awards, expense reimbursements, fringe benefits or any other compensation or benefits of any nature, except that you will be entitled to receive the Accrued Amounts and Annual Performance Bonus on a prorata temporis basis. Upon the Termination Without Cause of your employment provided for in paragraph 6(d), so long as you are complying with the non-compete and other applicable obligations set forth in this Agreement, the Company shall continue to pay you Severance Pay in an amount equal to six (6) months of Base Salary at a rate in effect on the date of termination, reduced by any required federal, state and local taxes and any other applicable withholdings or deductions, with the Company's payment of such salary continuation payable in periodic installments in accordance with the Company payroll practices. You agree and acknowledge that the Company may condition the receipt of any Severance Pay due to you pursuant to this paragraph upon: (i) you entering into a full release of claims in favor of the Company, its affiliates and subsidiaries and their respective officers and directors and separation agreement in such form as to be provided by the Company and (ii) such general release becomes effective within twenty-one (21) business days after the day it is provided to you for execution, and is not thereafter revoked by you, and provided further that you comply with all terms and conditions of such separation agreement, you will receive the benefit to which you are entitled. In the event the Company invokes its non-compete option as provided below, your Severance Pay will

end and the other terms and conditions of said separation agreement will continue.

c. Compensation upon Termination – By You. Upon your voluntary termination of your employment provided for in paragraph 6(c), you will cease to have any rights to Base Salary, bonus awards, expense reimbursements, fringe benefits or any other compensation or benefits of any nature, except that you will be entitled to receive the Accrued Amounts.

d. Compensation Upon Termination – Death or Permanent Disability. In the event your employment is terminated because of death or Permanent Disability, you will cease to have any rights to Base Salary, bonus awards, expense reimbursements, fringe benefits or any other compensation or benefits of any nature, except that you will be entitled to receive the Accrued Amounts. In the event your employment is terminated as a result of your death, your spouse or, if you are not married at the time of your death, your estate will be entitled to the Accrued Amounts.

8. Competitive Activity.

a. Acknowledgements and Agreements. You hereby acknowledge and agree that in the performance of your duties to the Company, you will be brought into frequent contact with existing Customers and Potential Customers of the Company throughout the world. You agree that trade secrets and confidential information of the Company, more fully described below, gained by you during your association with the Company, have been developed by the Company through substantial expenditures of time, effort and money and constitute valuable and unique property of the Company. You further understand and agree that the foregoing makes it necessary for the protection of the Company's Business that you do not compete with the Company during your employment with the Company and that you do not compete with the Company for a reasonable period thereafter, as further provided herein.

b. Competitive Activity. While employed by the Company, and for a period of one (1) year following your Termination Date, you are obligated to provide notice to Company of future activity and responsibilities prior to starting a new position. Upon receipt of such notice, the Company will have a 10-day window to exercise a non-compete for a period not to exceed 12 months from the Termination Date. In such event, and only if your employment terminates pursuant to a Termination Without Cause, the Company will pay you, during the 12-month period, your base salary according to the Company payroll schedule less applicable withholdings, so long as you are not otherwise employed. In the event (i) your employment is termination as a Termination

Without Cause by the Company, (ii) the Company is paying Severance Pay to you, and (iii) the Company invokes its non-compete option, your Severance Pay will end and the non-compete payment will begin for a period not to exceed one year from Termination Date. In the event you breach this clause, you agree to reimburse immediately all severance and non-compete payments you received from the Company. You agree and understand that should the Company exercise its non-compete option under this paragraph, you will be bound by the terms of this Competitive Activity/non-compete provision, even if you are terminated for cause or you voluntary terminate, and thus do not receive the non-compete payments described herein.

c. Direct or Indirect Competition. You will be in violation of this paragraph 8 if you engage in any or all of the activities set forth herein directly as an individual on your own account, or indirectly as a partner, joint venturer, employee, agent, salesperson, consultant, officer and/or director of any firm, association, partnership, corporation or other entity, or as a stockholder of any corporation in which you or your spouse, child or parent owns, directly or indirectly, individually or in the aggregate, more than five percent of the outstanding stock.

d. If it is judicially determined that you have violated this paragraph 8, then the period applicable to each obligation that you have been determined to have violated will automatically be extended from the date of judicial determination by a period of time equal in length to the period during which such violation(s) occurred.

e. For purposes of this paragraph 8, the Company will include any and all direct and indirect subsidiary, parent, affiliated, or related companies of the Company for which you worked or had responsibility at the time of termination of your employment and at any time during the two-year period prior to such termination.

9. Non-Solicitation.

a. Of Customers. You will not, directly or indirectly, at any time during the period of your employment or for a period of twenty-four (24) months following your Termination Date solicit, divert, or take away or supervise any other person, firm, or other entity in soliciting, diverting, or taking away any Customer or Prospective Customer of the Company for the purpose of selling, performing or providing Business Services to that Customer or Prospective Customer.

b. Of Employees. You will not, directly or indirectly, at any time during the period of your employment or for a period of twenty-four (24) months following your

Termination Date solicit, hire, employ, engage, affiliate with for profit, retain (or assist any other person or entity in soliciting, hiring, employing, engaging, affiliating for profit or retaining) any person who was a Company employee or consultant or independent contractor at any time during the one (1)-year period prior to your soliciting, hiring, employing, engaging, affiliating for profit or retaining, whether for your benefit or the benefit of any other person or organization other than the Company, or solicit, induce, or encourage any such person to terminate or leave the Company's employ, engagement, or other remunerative relationship with the Company. You acknowledge that this covenant is necessary to enable the Company to maintain a stable workforce and remain in business.

10. Confidentiality.

a. You will keep in strict confidence, and will not, directly or indirectly, at any time, during or after your employment with the Company, disclose, furnish, disseminate, make available or, except in the course of performing your duties of employment, use any trade secrets or confidential business and technical information of the Company or its Customers, suppliers or vendors, without limitation as to when or how you may have acquired such information. Such confidential information will include, without limitation, all information belonging to the Company, its affiliates, subsidiaries, or any other person or entity that has entrusted information to the Company in confidence, technology, computer programs or programming, systems, software, software codes, designs, data bases, trade secrets, know-how, research, methods, manuals, records, product or service ideas or plans, work-in-progress, results, algorithms, inventions, developments, original works of authorship, discoveries, experimental processes, experimental results, unpublished patent applications, laboratory notebooks, processes, formulas, investigation or research techniques, engineering designs and drawings, hardware configuration information, regulatory information, medical reports, clinical data and analysis reagents, cell lines, biological materials, chemical formulas, financial information including but not limited to price lists, pricing methodologies, cost data, financial forecasts, historical financial data, and budgets, marketing information, including but not limited to market share data, marketing plans, licenses, business plans, lists of the needs and preferences of Customers and Prospective Customers, promotional materials, training courses and other training and instructional materials, vendor and product information, all agreements with third parties and terms of agreements, transactions and potential transactions, negotiations, information relating to employees and consultants of the Company, including names, contact information, and expertise, lists of or information relating to suppliers and

vendors and other business information disclosed by the Company (whether by oral, written, graphic or machine-readable format) which confidential information is designated in writing to be confidential or proprietary, or if given orally, is confirmed in writing as having been disclosed as confidential or proprietary within a reasonable time (not to exceed 30 days after the oral disclosure), or which information would, under the circumstances appear to a reasonable person to be confidential or proprietary.

b. You specifically acknowledge that all such confidential information, whether reduced to writing, maintained on any form of electronic media, or maintained in your mind or memory and whether compiled by the Company, and/or you, derives independent economic value from not being readily known to or ascertainable by proper means by others who can obtain economic value from its disclosure or use, that reasonable efforts have been made by the Company to maintain the secrecy of such information, that such information is the sole property of the Company and that any retention and your use of such information during your employment with the Company (except in the course of performing your duties and obligations to the Company) or after the termination of your employment will constitute a misappropriation of the Company's confidential information and/or trade secrets.

c. The U.S. Defend Trade Secrets Act of 2016 ("***DTSA***") provides that an individual shall not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that (A) is made in confidence to a federal, state or local government official, either directly or indirectly, or to an attorney, and solely for the purpose of reporting or investigating a suspected violation of law; or (B) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. In addition, the DTSA provides that an individual who files a lawsuit for retaliation by an employer for reporting a suspected violation of law may disclose the trade secret to the attorney of the individual and use the trade secret information in the court proceeding, if the individual files any document containing the trade secret under seal and does not disclose the trade secret, except pursuant to court order.

d. You agree that upon termination of your employment with the Company, for any reason, you will return to the Company, in good condition, all property of the Company, including without limitation, the originals and all copies of any documents in whatever form (electronic, hard copy, etc.) or materials which contain, reflect, summarize, describe, analyze or refer or relate to any items of information listed in paragraph 10. You agree that all confidential information, as listed in paragraph 10 is the sole property of the Company and you have

no right, title or interest to this property. In the event that such items are not so returned, the Company will have the right to charge you for all reasonable damages, costs, attorneys' fees and other expenses incurred in searching for, taking, removing and/or recovering such property.

e. Notwithstanding the above, you will have no liability to the Company with regard to any confidential information you can prove was in the public domain at the time it was disclosed or entered the public domain through no fault of yours.

11. Discoveries and Inventions; Work Made for Hire.

a. You agree that upon conception and/or development of any idea, discovery, invention, improvement, software, writing or other material or design that: (A) relates to the business of the Company, or (B) relates to the Company's actual or demonstrably anticipated research or development, or (C) results from any work performed by you for the Company, you will assign to the Company the entire right, title and interest in and to any such idea, discovery, invention, improvement, software, writing or other material or design (together, "Discoveries and Inventions"). Subject to the requirements of applicable state law, if any, you understand that Discoveries and Inventions will not include, and the provisions of this Letter will not apply to any idea, discovery, invention, improvement, software, writing or other material or design that qualifies fully for exclusion under the provisions of applicable state law. You also agree that any idea, discovery, invention, improvement, software, writing or other material or design that relates to the business of the Company or relates to the Company's actual or demonstrably anticipated research or development which is conceived or suggested by you, either solely or jointly with others, within one year following termination of your employment under this Letter or any successor agreements will be presumed to have been so made, conceived or suggested in the course of such employment with the use of the Company's equipment, supplies, facilities, and/or trade secrets.

b. You agree that during your employment, and for one year after termination of your employment under this Letter or any successor agreements, you will disclose immediately and fully to the Company any Discovery and Invention conceived, made or developed by you solely or jointly with others. The Company agrees to keep any such disclosures confidential. You also agree to record descriptions of all work in the manner directed by the Company, agree that all such records and copies, samples and experimental materials will be the exclusive property of the Company, and agree not to remove these records from the Company's place of business except as expressly permitted by Company policy which may, from time to time, be revised at the sole election

of the Company for the purpose of furthering the Company's business. You agree that at the request of and without charge to the Company, but at the Company's expense, you will execute a written assignment of the idea, discovery, invention, improvement, software, writing or other material or design to the Company and will assign to the Company any application for letters patent or for trademark registration made thereon, and to any common-law or statutory copyright therein; and that you will do whatever may be necessary or desirable to enable the Company to secure any patent, trademark, copyright, or other property right therein in the United States and in any foreign country, and any division, renewal, continuation, or continuation in part thereof, or for any reissue of any patent issued thereon. In the event the Company is unable, after reasonable effort, and in any event after ten business days, to secure you signature on a written assignment to the Company of any application for letters patent or to any common-law or statutory copyright or other property right therein, whether because of your physical or mental incapacity or for any other reason whatsoever, you irrevocably designate and appoint the General Counsel of the Company as your attorney-in-fact to act on your behalf to execute and file any such application and to do all other lawfully permitted acts to further the prosecution and issuance of such letters patent, copyright or trademark. Any assignment of the rights to an idea, discovery, invention, improvement, software, writing or other material or design includes all rights of attribution, paternity, integrity, modification, disclosure and withdrawal, any other rights throughout the world that may be known or referred to as "moral rights," "artists rights," "droit moral," or the like. ("Moral Rights") To the extent that Moral Rights cannot be assigned under applicable law, you hereby waive and agree not to enforce any and all Moral Rights, including, without limitation, any limitation on subsequent modification, to the extent permitted under applicable law.

c. You acknowledge that, to the extent permitted by law, all work papers, reports, documentation, drawings, photographs, negatives, tapes and masters therefor, prototypes and other materials (hereinafter, "items"), including without limitation, any and all such items generated and maintained on any form of electronic media, generated by you during your employment with the Company will be considered a "work made for hire" and that ownership of any and all copyrights in any and all such items will belong to the Company. The item will recognize the Company as the copyright owner, will contain all proper copyright notices, e.g., "(creation date), All Rights Reserved," and will be in condition to be registered or otherwise placed in compliance with registration or other statutory requirements throughout the world.

d. Communication of Contents of Letter. While employed by the Company and for one year thereafter, you will communicate the contents of paragraphs 8-12 of this Letter to any person, firm, association, partnership, corporation or other entity that you intend to be employed by, associated with, or represent.

e. Confidentiality Agreements. You agree that you will not disclose to the Company or induce the Company to use any secret or confidential information belonging to your former employers. Except as indicated, you warrant that you are not bound by the terms of a confidentiality agreement or other agreement with a third party that would preclude or limit your right to work for the Company and/or to disclose to the Company any ideas, inventions, discoveries, improvements or designs or other information that may be conceived during employment with the Company. You agree to provide the Company with a copy of any and all agreements with a third party that preclude or limit your right to make disclosures or to engage in any other activities contemplated by your employment with the Company.

f. Relief. You acknowledge and agree that the remedy at law available to the Company for breach of any of your obligations under this Letter would be inadequate. You therefore agree that, in addition to any other rights or remedies that the Company may have at law or in equity, temporary and permanent injunctive relief may be granted in any proceeding which may be brought to enforce any provision contained paragraphs 8-12 of this Letter, without the necessity of proof of actual damage or the need to post a bond.

g. Reasonableness. You acknowledge that your obligations under paragraphs 8-12 are reasonable in the context of the nature of the Company's Business and the competitive injuries likely to be sustained by the Company if you were to violate such obligations. You further acknowledge that this Letter is made in consideration of, and is adequately supported by the agreement of the Company to perform its obligations under this Letter and by other consideration, which you acknowledge constitutes good, valuable and sufficient consideration.

12. Definitions.

a. "Customer" means any client, customer or account, including, but not limited to any person, firm, corporation, association or other business entity of any kind to which the Company has provided or is providing products or services.

b. "Company's Business" means the research, development, and/or commercialization of products and services based on gene-editing technologies in the field of agriculture, food and plant sciences, which is to be

construed to include all research, development, and/or commercialization of products and services as may hereinafter evolve within the gene editing field or is in planning or developmental stages at the Company.

c. "Permanent Disability" means that, because of accident, disability, or physical or mental illness, you are deemed permanently incapable of performing your duties to the Company or any subsidiary, as determined in accordance with the Company's then current disability insurance policy.

d. "Prospective Customer" means any prospective client, customer or account, including, without limitation, any person, firm, corporation, association or other business entity of any kind with which the Company had any negotiations or substantial discussions regarding the possibility of providing products or services within the one (1) year period preceding your Termination Date.

e. "Section 409A" means Section 409A of the Internal Revenue Code of 1986, as amended, and any guidance issued thereunder.

f. "Termination Date" means the effective date of your termination of employment with the Company.

g. "Termination For Cause" means the termination by the Company of your employment with the Company or any subsidiary as a result of (i) your conviction of or plea of guilty or nolo contendere to a crime that constitutes a felony or a crime that constitutes a misdemeanor involving moral turpitude; (ii) your engagement in an act of fraud, dishonesty, or unauthorized disclosure of Confidential Information (as defined in this Letter); (iii) your willful failure or refusal to comply with any valid and legal directive of the Board of Directors or the CEO; (iv) your gross negligence or willful misconduct with respect to the Company or any subsidiary or affiliate of the Company; (v) your failure or refusal to perform your duties and responsibilities as Chief Technology Officer, (other than such failure resulting from incapacity due to physical or mental illness or temporary or permanent disability) which is not cured within five (5) days after written notice thereof to you; (vi) your material failure to comply with the Company's written policies or rules, as they may be in effect from time to time during your employment, which is not cured within five (5) days after written notice thereof to you; (vii) your willful misconduct which has, or can reasonably expected to have, a direct and material adverse monetary effect on the Company or (viii) your material breach of this Letter or any other agreement with the Company, which is not cured within thirty (30) days after written notice thereof to you.

h. "Termination Without Cause" means the termination by the Company of your employment with the Company for any reason other than a termination for Permanent Disability, death, or a Termination for Cause.

13. Section 409(A).

a. General Compliance. This Letter is intended to comply with Section 409(A) or an exemption thereunder and will be construed and administered in accordance with Section 409(A). Notwithstanding any other provision of this Letter, payments provided under this Letter may only be made upon an event and in a manner that complies with Section 409(A) or an applicable exemption. Any payments under this Letter that may be excluded from Section 409(a) either as separation pay provided due to an involuntary separation from service or as a short-term deferral will be excluded from Section 409(A) to the maximum extent possible. For purposes of Section 409(A), each installment payment provided under this Letter will be treated as a separate payment. Any payments to be made under this Letter upon a termination of employment will only be made upon a "separation from service" under Section 409A. Notwithstanding the foregoing, the Company makes no representations that the payments and benefits provided under this Letter comply with Section 409A and in no event will the Company be liable for all or any portion of any taxes, penalties, interest or other expenses that may be incurred by you on account of non-compliance with Section 409A.

b. Specified Employees. Notwithstanding any other provision of this Letter, if any payment or benefit provided to you in connection with your termination of employment is determined to constitute "non-qualified deferred compensation" within the meaning of Section 409A and you are determined to be a "specified employee" at that time as defined in Section 409A(a)(2)(b)(i), then such payment or benefit will not be paid until the first payroll date to occur following the six-month anniversary of the Termination Date (the "Specified Employee Payment Date") or, if earlier, on your death. The aggregate of any payments that would otherwise have been paid before the Specified Employee Payment Date (and interest on such amounts calculated based on the applicable federal rate published by the Internal Revenue Service for the month in which your separation from service occurs shall be paid to the you in lump sum on the specified Employee Payment date and thereafter, any remaining payments will be paid without delay in accordance with their original schedule.

14. Representations. As of the Effective Date, you represent and warrant to the Company that:

a. Your acceptance of employment with the Company and your performance of the duties and responsibilities under this Letter will not conflict with or result in a violation of, a breach of, or a default under any contract, agreement or understanding to which he is a party or otherwise bound.

b. Your acceptance of employment with the Company and the performance of your duties and responsibilities under this Letter will not violate any non-solicitation, non-competition or other similar covenant or agreement of a prior employer.

15. Survival. Upon the termination of this Letter, the respective rights and obligations of the parties hereto will survive this termination to the extent necessary to carry out the intention of the parties to this Letter.

16. Taxes. The Company may withhold from any amounts payable under this Letter all federal, state, city or other taxes as the Company is required to withhold pursuant to any applicable law, regulation or ruling. Notwithstanding any other provision of this Letter, the Company will not be obligated to guarantee any particular tax result for you with respect to any payment provided to you hereunder, and you will be responsible for any taxes imposed on you with respect to any such payment.

17. Notices. Any notice provided for in this Letter will be in writing, with a copy to respective individual email addresses, and will be either personally delivered, sent by reputable overnight carrier or mailed by first class mail, return receipt requested, to the recipient at the address below indicated:

Notices to You:
Dr. Travis Frey
22609 102nd Ave SE
Woodinville, WA 98077

Notices to the Company:
Mr. Jim Blome, CEO
Calyxt, Inc.
2800 Mount Ridge Road
Roseville, MN 55113

or such other address or to the attention of such other person as the recipient party will have specified by prior written notice to the sending party. Any notice under this Letter will be deemed to have been given when so delivered.

18. Severability. Whenever possible, each provision of this Letter will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of

this Letter is held to be invalid or unenforceable in any respect under any applicable law, such invalidity or unenforceability will not affect any other provision, but this Letter will be reformed, construed and enforced as if such invalid or unenforceable provision had never been contained herein. Should a determination be made by a court of competent jurisdiction that the character, duration, or geographical scope of restrictive covenant of the Letter is unreasonable in light of the circumstances as they then exist, then it is the intention and the agreement of the parties to the Letter that the provision be construed by the Court in such a manner as to impose only those restrictions on the parties that are reasonable in light of the circumstances as they then exist and as are necessary to assure the parties of the intended benefit of the Letter. If, in any judicial proceeding, the Court refuses to enforce all of the separate provisions included in the Letter because, taken together, they are more extensive than necessary to assure the parties of the intended benefit of the Letter, those provisions which, if eliminated, would permit the remaining separate provisions to be enforced in such proceeding, will, for the purpose of such proceeding, be deemed eliminated from the Letter.

19. Complete Agreement. This Letter embodies the complete agreement and understanding between the parties with respect to the subject matter hereof and effective as of its date supersedes and preempts any prior understandings, agreements or representations by or between the parties, written or oral, which may have related to the subject matter hereof in any way.

20. Counterparts. This Letter may be executed in separate counterparts, each of which will be deemed to be an original and both of which taken together will constitute one and the same agreement.

21. Successors and Assigns. This Letter will bind and inure to the benefit of and be enforceable by you, the Company and your and the Company's respective heirs, executors, personal representatives, successors and assigns, except that neither party may assign any rights or delegate any obligations hereunder without the prior written consent of the other party. You hereby consent to the assignment by the Company of all of its rights and obligations hereunder to any successor to the Company by merger or consolidation or purchase of all or substantially all of the Company's assets, provided such transferee or successor assumes the liabilities of the Company hereunder.

22. Governing Law. This Letter will be governed by, and construed in accordance with, the internal, substantive laws of the State of Minnesota. You agree that the state and federal courts located in the State of Minnesota, without regard to or application of conflict of laws principles, will have jurisdiction in any action, suit or proceeding against you based on or arising out of this Letter and you hereby: (a) submit to the personal jurisdiction of such courts; (b) consent to service of process in connection

with any action, suit or proceeding against you; and (c) waive any other requirement (whether imposed by statute, rule of court or otherwise) with respect to personal jurisdiction, venue or service of process.

23. Amendment and Waiver. The provisions of this Letter may be amended or waived only with the prior written consent of you and the Company, and no course of conduct or failure or delay in enforcing the provisions of this Letter will affect the validity, binding effect or enforceability of this Letter.

24. Acknowledgement of Full Understanding. I acknowledge and agree that I have fully read and understand this Letter, and I have had the opportunity to ask questions and consult with an attorney of my choice before signing this Letter.

If these terms are acceptable to you, please sign and date this Letter in the appropriate space below and return it to me as soon as possible. We look forward to you becoming a part of our team.

Please call me with any questions.

Sincerely,

/s/ James A. Blome
Jim BLOME, CEO

Date: 5/13/2019

Agreed and Accepted:

/s/ Dr. Travis J. Frey
Travis Frey

Date: 5/13/2019

EXHIBIT A

If you relocated your primary residence to within fifty (50) miles of the Company's headquarters, on or before November 15, 2019, the Company will provide the following relocation reimbursement expenses described below, upon satisfaction of the additional conditions described in paragraphs (c) and (d) below and compliance with all other terms set forth in this Letter.

(a) Reimbursement of Relocation Expenses. The Company will reimburse to you up to a maximum of ninety thousand dollars ($90,000) for documented reasonable and customary expenses incurred by you in relocating pursuant to this paragraph.

1. Home Sale Assistance: The expenses incurred in disposing of your current residence, including the legal fees, document preparation fees, re-conveyance or recording fees, real estate transfer taxes, realtor fees and commissions (up to 6% of home sale price), title policy, mortgage prepayment penalties and other closing costs. Reimbursement will not be provided for loss of value on sale of the home, fixing up and repair costs, prorated taxes after its sale, principal on any mortgage or costs normally paid by buyer.

2. House Hunting Trip. The expenses incurred for you for up to seven (7) days of travel to Roseville Area to locate a new residence which will include air or ground transportation, mileage, meals, lodging, and use of a rental car for you and spouse.

3. Temporary living and transition expenses. During the six (6) month period following initiation of Employment Term, the Company shall reimburse you for expenses incurred during any such month within either of the following categories of expenses: the use of a rental car until you make permanent transportation arrangements and lease or rental payment for a two-bedroom unit in a temporary long-term stay facility near the Company office, duplicate housing costs to include mortgage interest, property taxes, and home insurance (up to $2,500 per month) for your current Washington residence if you have purchased home or executed a long-term lease on residence in reasonable daily commuting distance from Roseville offices. The Company shall reimburse you for expenses of travel (airfare, parking, and mileage expense to/from your current residence) for four (4) trips per month prior to such relocation.

4. Home Purchase Closing Costs. Closing costs related to the acquisition of a residence. Eligible costs would include survey and appraisal fees, legal fees and normal closing costs (such as certification of title fee, loan origination fees and expenses, costs of inspections, filing fees, credit report) and any other typical

residential acquisition transaction costs excluding actual mortgage costs or purchase price.

5. Movement of Household Goods. The actual cost of preparation, packing, loading, transport, and unloading of household goods for relocation to a new residence. Reimbursable costs include storage costs for your household goods and personal effects either at the destination or point of departure (not both) until a new permanent residence is available, for up to sixty (60) days, travel costs to move you to the new residence, and actual expenses for temporary lodging and meals (for up to three (3) days) for you while and after household goods are being and have been moved.

(b) Payment of Miscellaneous expenses allowance and tax assistance: In addition you will receive (a) a lump-sum payment of $10,000 (not included in the gross-up) to cover miscellaneous expenses such as hook-ups etc. with a payment made within 30 days after movement of household goods to new residence near Roseville, MN and (b) a tax assistance up to $20,000 as a gross-up to substantially cover federal and state taxes related to relocation program upon submittal of requisite documentation with a payment made no later than April 1st of the year in which taxes are due.

(c) Reimbursement of Relocation Expenses: You agree that should your employment terminate pursuant to Section 6(c) or 6(e) within thirty (36) months of the Effective Date, you will be required to repay relocation costs on a pro-rata basis.

(d) Relocation timeline. You must relocate your permanent residence to Roseville area by November 15, 2019. If you have not substantially completed relocation of your full-time residence to within no less fifty (50) miles of the Company headquarters in Roseville, MN on or before October 15, 2019, then you will repay above payments. This payment shall be made to Calyxt, Inc. in a single sum on or before December 1, 2019.

EXHIBIT 21.1

SUBSIDIARIES OF CALYXT, INC.

As of December 31, 2019

Entity Name	**State or Other Jurisdiction of Incorporation**
Ridge Road, LLC	Delaware

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statement (Form S-8 No. 333-219382) pertaining to the Calyxt, Inc. 2017 Omnibus Incentive Plan and the Calyxt, Inc. Equity Incentive Plan of Calyxt, Inc. of our report dated March 4, 2020, with respect to the financial statements of Calyxt, Inc. included in this Annual Report (Form 10-K) for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Minneapolis, Minnesota
March 4, 2020

Exhibit 31.1

CERTIFICATION PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT, AS AMENDED

I, James A. Blome, certify that:

1. I have reviewed this Annual Report on Form 10-K of Calyxt, 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 4, 2020

/s/ James A. Blome

James A. Blome
Chief Executive Officer

Exhibit 31.2

CERTIFICATION PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT, AS AMENDED

I, William F. Koschak, certify that:

1. I have reviewed this Annual Report on Form 10-K of Calyxt, 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 4, 2020

/s/ William F. Koschak
Chief Financial Officer

Exhibit 32

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 of Calyxt, Inc. (the "Company") on Form 10-K for the period ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned hereby certifies, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to his knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

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

Date: March 4, 2020

/s/ James A. Blome

James A. Blome
Chief Executive Officer
(Principal Executive Officer)

/s/ William F. Koschak

William F. Koschak
Chief Financial Officer
(Principal Financial Officer)