



## Frequently Asked Questions

### **When was Zest Labs founded?**

Zest Labs was originally founded as Intellex Corp. in 2003. Intellex looked to develop amorphous silicon technologies for a variety of applications. One of the most promising applications was for radio frequency identification devices (RFID). The company developed a unique RFID chip implementation that provides superior read range, extended memory and sensor support. This XC3 Technology™ RFID device launched in 2010 and could be used for a range of new applications including cold chain monitoring for the fresh food and pharmaceutical supply chains. At that time, the company began development of Zest Fresh, a solution to manage produce freshness from the farm to the store shelf. In 2013, Intellex was acquired by Ecoark Holdings, Inc., a holding company that had investments in a variety of sustainability-oriented companies. Intellex focused on developing its Zest Fresh solutions solely for the fresh food supply chain for growers, shippers, processors distributors, retailers and restaurants. In October of 2016, Intellex changed its name to Zest Labs. In 2017, Ecoark announced plans to divest of non-strategic assets and focus solely on the Zest Labs' solutions. Ecoark is a publicly traded company (OTCQX: ZEST) and has announced it will be changing its name from Ecoark Holdings to Zest Technologies.

### **Is Zest Fresh the company's only solution?**

[Zest Fresh](#) is our family of solutions for the produce and protein industries. These products offer varying approaches to fresh food management from the source through to restaurant or retailer. The company also offers [Zest Delivery](#) for restaurant and food service delivery, as well as a range of [professional services](#) offerings.

### **Who are typical customers for Zest Fresh?**

Zest Fresh is marketed and sold to fresh foods suppliers, processors, shippers and third-party logistics companies, distributors, retail grocery store companies and restaurants. Zest Fresh supports a variety of fresh food product categories, including produce, meat, seafood, and dairy. Zest Labs currently markets its products to U.S. and Canadian retailers and restaurants and works with growers/suppliers in Central and South America who supply the North American market.

### **Who are current customers of Zest Labs?**

Zest Labs is currently working with a number of growers, distributors and retail grocery companies. Names of the customers are published with their permission and publicly

announced customers can be found in our [press releases](#) on our website. We have also provided [use cases](#) – examples of customer projects.

### **When did the company start marketing Zest Fresh?**

After successfully completing pilots with select beta customers in 2016, Zest Labs began active promotion and marketing for its solutions in 2017.

### **What makes Zest Fresh different from the competition?**

Zest Labs is the first company to offer proactive fresh food supply chain solutions than ensure consistent delivered shelf-life and help prevent retail waste, improving product margin. Zest Fresh proactively manages freshness from the field to the store. Other solutions in the market offer forensic or “after-the-fact” recognition of issues related to freshness, such as trailer temperature monitoring for the transport segment. These types of solutions do little or nothing to prevent waste and only assign blame related to mishandling for a specific supply chain segment. Other types of solutions such as ethylene absorbers or product coatings, can slow food aging but do not provide the information about dynamic shelf-life or freshness of a product, and therefore do not manage the shelf-life variability from a single day of harvest. Learn more about the limitations of [legacy data loggers](#) and [imaging systems](#).

### **How does Zest Fresh work?**

Zest Fresh utilizes a combination of modern technologies, such as predictive analytics, machine learning and autonomous data capture using IoT condition sensors to empower workers to make better decision regarding food distribution. Information about the type of product (e.g. strawberries or lettuce), harvest conditions, temperature and other data is collected by Zest Fresh at the pallet-level beginning at harvest. Using proprietary technology, Zest Fresh can dynamically calculate the actual remaining shelf-life of the product which is called the [Zest Intelligent Pallet Routing Code](#) (ZIPR Code). [Introduced in January 2017](#), with patents pending, the [ZIPR Code](#) is the industry’s first “freshness metric” and provides supply chain participants with information so that they can confidently ensure that each pallet is delivered with sufficient freshness to meet the retailers or restaurant’s needs. For example, a retailer may require five days to ship from a grower to a distribution center across the country, one day for shipping to a store, two days for retail sale and five days for customer consumption. This means that the pallet must have 13 days of shelf-life at the time of shipment to meet the retailer’s needs. Pallets with less than 13 days would spoil before meeting the retailer’s requirement. Zest Fresh ensures that only pallets with 13 days or more of remaining shelf-life will be loaded on the trailer for delivery to that retailer location, thus avoiding shrink and waste. *Read more about the ZIPR Code [here](#).*

### **Why is pallet-level management important?**

Research has shown that shelf-life varies *at the pallet level* and begins in the field at harvest. This is due to the fact that each pallet may have a significantly different handling or processing experience, even when harvested one right after another. If pallets are tracked as groups, this information, and shelf-life impact of each pallet, are not properly tracked and managed.

For instance, when harvesting a field at some distance from the processing site, the grower may want to collect 12 or more pallets on the truck before making the trip to the processing site. As it can take 10 minutes or more for each pallet to be harvested, that means the first pallet was

harvested 120 minutes before the last pallet. This two-hour difference can impact shelf-life by roughly two days if the field temperature is 80°F or higher. Further, the pallets may be separated at the processing site, leading to further differences in handling. Those differences can lead to product harvested from the same field on the same day to have shelf-life that varies by as much as five days. For example, pallet A could have 13 days of shelf-life and pallet B, from the same field, could have only eight. There is no way to ascertain this information visually. Additional variations can occur at the pallet level throughout the supply chain due to a variety of factors, so it is critical to maintain pallet level monitoring through store delivery. Information about this can be found in this shelf-life variability [white paper](#).

### **Why are “Harvest Dates” or “Best By” date labels inadequate for determining the shelf-life of fresh food?**

These methods do not consider the fresh food pallet-level variations that impact shelf-life from harvest through delivery to the retailer. Harvest or Best By dates are merely estimates uniformly applied to a single day’s harvest which do not account for pallet-level variances. The assumption embedded in date labels is that all product harvested on the same day have the same shelf-life, which is just not true. For example, a freshly picked strawberry that is not processed or refrigerated while remain fresh for two or three days. But that same strawberry properly processed and refrigerated for distribution could last 12 days. Less than ideal processing and handling lead to less than ideal shelf-life – somewhere between the two to three-day unprocessed product, and the 12 days of shelf-life ideal. Learn more about the issues and limitations with “best by” or “use by” date labels in the Zest Labs Blog [here](#) and [here](#).

### **Who or what causes waste or shrink?**

Many people believe that waste or shrink is caused by the location where spoilage becomes visible, either at the grocery store or with the consumer. In fact, the primary cause of waste is when the product spoils ahead of expectations, which are often based on the product date labels. Since the date labels do not reflect the impact to shelf-life due to processing and handling the cause of waste begins as soon as a product is harvested. Any processing or handling (maintaining cold temperatures) that are less than ideal will impact the remaining shelf-life and contribute to the product not meeting the expectation implied by the date label. It is the accumulation of these “less than ideal” handling impacts that lead to each pallet of product often having a different shelf-life, and that shelf-life not meeting the date label expectation 30% to 40% of the time. The conditions at time of harvest, and the actual quality of the harvested product, also contribute to the actual shelf-life, but to a lesser degree. Zest Fresh monitors the harvest conditions, and regularly evaluates harvest samples to account for these factors. Therefore, the impact of temperature at every step along the way is what leads to shrink or waste, typically having a greater impact to shelf-life than the in-store handling. Zest Fresh provides dynamic shelf-life and freshness information based on the condition of each pallet from harvest to the retailer. Learn more about proactive shelf-life and freshness management [here](#).

### **Why has no one solved this problem before?**

For decades, the industry has considered waste or shrink a “cost of doing business” and assumed it was being caused at the location that experienced the spoilage. The grocery stores have been told that the date labels are accurate, and that any early spoilage must have been caused by handling issues after it left the grower or processor. This was easy to accept as any review of product shipping from the grower looked very fresh, as impacts of variable handling

are not visible in the first few days. It was also not practical or cost-effective to put in controls to monitor the product at the pallet level, as the technology was too expensive and not sufficiently reliable.

While some academic research was conducted in this area over the past 10 to 15 years, the results did not change the long-held beliefs in the industry of what contributed to early spoilage. Without acceptance of the real causes of early spoilage, there was little motivation to attempt to solve these problems. Overturning these long-held beliefs is one of the challenges Zest Labs is overcoming in gaining adoption of its unique solution.

Products are available to monitor cold supply chain compliance where temperature mishandling was suspected – such as in transit. Existing or legacy solutions, such as data loggers, have been used to document “cold chain integrity” as to whether a product experienced a temperature excursion (i.e. went from 34° F to 60° F) while in transit, which could result in a food safety issue as higher temperatures accelerate the growth of pathogens. When an excursion occurs, it is likely that an entire shipment would be rejected and wasted.

The continued amount of food waste confirms that [these legacy methods for cold chain compliance have not addressed the food waste problem](#). Recently, however, market conditions have changed that have caused growers and retailers to rethink their approach to reduce waste and improve profitability. New grocery competitors, changing consumer buying preferences and increased cost of freight have put significant pressure on grocers to improve product margins. Reducing waste directly and immediately reduces costs and benefits the bottom line.

Zest Labs was [the first company to offer a freshness metric](#) – The [Zest Intelligent Pallet Routing Code](#) (ZIPR Code) – as part of its Zest Fresh solution. This was a revolutionary approach to solving the fresh food waste problem – proactively managing the product freshness rather than just the logistics. Zest Fresh is the industry’s first proactive freshness and shelf-life management solution – a solution that is proven to reduce waste and ensure delivered freshness.

Zest Fresh can improve product margins by six percent or more. [Learn more by reading Margins Matter.](#)

### **Why do so many of Zest Labs projects involve berries?**

Berries of all types are both high-value/margin products and also highly perishable with limited shelf-life or “freshness capacity”. Raspberries, for example, have a maximum shelf-life of five to seven days from the time they are picked assuming ideal conditions for harvesting, processing and handling, and strawberries have about 12-13 days. Growers, shippers and retailers often start with these products as they offer the greatest initial opportunity to reduce waste and improve product margins. They then typically expand to other products such as leafy greens, celery and row crops which are also highly perishable. Products such as apples or citrus have a comparatively longer shelf-life and therefore do not have the high-volumes of waste associated with berries, leafy greens and row crops.

### **Can Zest Fresh be used for all fresh products?**

The company has announced support for [fresh produce](#) and [proteins](#), such as meats, poultry, pork and seafood. The Zest Fresh approach can also be applied to other fresh products such as eggs and dairy.

## **What about other vendor approaches like hyperspectral imaging, produce coatings, modified atmosphere packaging or ethylene absorbers?**

While these types of approaches do offer some benefits, none address the shelf-life variability caused by processing and handling and therefore do not enable accurate shelf-life prediction at the pallet-level to reduce or eliminate waste due to early spoilage. Imaging may tell you the current freshness but, like a snapshot of a race, it can't tell you the speed at which it is aging or when the product will expire. Absorbers and coatings can slow aging but do not provide information on the dynamic shelf-life and remaining freshness. These approaches and technologies could be viewed as a complement to, but not a replacement for, Zest Fresh, as longer shelf-life offers benefits, but alone does not prevent waste. *Learn more about the limitations of other approaches by reading "Not Worth A Thousand Words" [here](#).*

## **Besides improving delivered shelf-life through freshness management which reduces waste, what other benefits does Zest Fresh offer?**

Zest Fresh offers additional benefits related to improving operational efficiencies and process adherence. For example, growers typically have defined procedures for moving a product from the field to the packing house or for precooling (the process of removing field heat from the product). However, without pallet-level monitoring of time and temperature, it's difficult or impossible for a grower to know if their documented processes are being followed. Zest Fresh provides this information and helps identify areas for improvement that can improve daily operational efficiencies and maximize asset utilization – reducing costs for the grower – while improving delivered freshness.

## **Does Zest Fresh help with food safety?**

Zest Fresh promotes food safety by helping to ensure the proper handling and management of product from the field or processor to the retailer, particularly for temperature. Product that is properly handled and processed has a lower likelihood of pathogen growth. Zest Fresh also contains detailed traceability information from the pallet sensors which is augmented with important process safety information such as HACCP test results, safety certifications, as well as other related certifications. By combining freshness data with traceability and process safety data, Zest Fresh offers the most comprehensive view on delivering fresh and safe food.

## **Does Zest Fresh support Blockchain?**

Zest Fresh utilizes a secure, hosted cloud-based data repository and does not require blockchain to be used or implemented. However, [Zest Fresh has integrated Blockchain](#) as an optional data interface to provide added security. Zest Labs has been demonstrating this Blockchain integration since earlier in 2018. Zest Fresh uses an abstraction layer to integrate with multiple types of Blockchain technology. *Learn more about "Blockchain and Achieving True Transparency" [here](#). Learn more about the benefits of a hybrid approach to blockchain in this ChainLink Research "Blockchain's Role in the Produce Supply Chain" whitepaper [here](#).*

## **How does Zest Fresh improve product margins?**

For grocery retailers and restaurants, Zest Fresh improves delivered freshness and visibility, which reduces waste (aka shrink) and can reduce inventory buffers. For growers and processors, Zest Fresh improves operational efficiencies which reduce expenses, as well as reducing product rejection rates which improves delivered yield. Zest Fresh is proven to reduce

waste by 50% or more at the retail level. This equates to margin improvements of six percent or more for retailers and reduced rejection rates for growers. *Learn more by reading the [Margins Matter](#) white paper.*

### **Why is it important for an independent company, such as Zest Labs, to provide freshness and shelf-life management solutions instead of a grower or retailer?**

For all parties to use and benefit from the data and analytics, the data must be shared and trusted. If one party mandates certain data collection without sharing the data or results, it breeds suspicion. Without providing benefit to all parties, comprehensive and consistent data collection are difficult to maintain, and without good data, the analytics that prevent waste have limited effectiveness. In other words, if both the growers and processors don't fully embrace the solution for their own benefit, it is unlikely to provide much benefit to the retailer. Objective data collection and analysis, validated through an independent data company strengthens trust between the growers, suppliers and retailers. It also provides trusted data that each party can use to improve their own operations. Learn more [here](#).

### **How many patents does Zest Labs have?**

Zest Labs has 67 issued US patents and additional patents pending.

### **Does Zest Labs have a mailing list?**

You can subscribe to our mailing list by sending us an [email](#) or completing our [contact us form](#). We send out informational emails from time-to-time and never share or sell your information.

### **How can I contact the company for more information?**

Please send an email to us at [info@zestlabs.com](mailto:info@zestlabs.com) or call us at 408 200 6500.