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**HARVESTING
DATA TO
MAXIMIZE CROP
YIELD AND
VIGOR**

POLLEN SYSTEMS

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CEO, and Founder

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HARVESTING DATA TO MAXIMIZE CROP YIELD AND VIGOR

By Kenneth Thomas

Today, the global agriculture market has evolved into a highly diverse sector, with operations that range from small sustenance farms to large multinational holdings. According to a survey by OECD, agricultural lands occupy nearly 40 percent of the earth's surface, far more than any other economic activity. The myriad of challenges presented by the ever-increasing and urbanized world population, deteriorating natural resources, climate change, the spread of transboundary pests and diseases of plants threaten the livelihoods of millions of farmers across the globe. Technological innovation is one lever that is critical to shift the world's agriculture to a more productive, efficient, and sustainable path. However, the adoption of technological solutions in agriculture is influenced by several interrelated components within the environment in which farmers operate, making it challenging for innovations to succeed and scale. For instance, the gap between developing and developed countries, limited access to data collection and information analysis systems, farm size, insufficient

human capital, tenure arrangements, a chaotic supply of complementary inputs, and inappropriate transportation infrastructure are vital constraints. Furthermore, not all factors are significantly equal for each farmer.

To this end, as farmers constantly juggle between a set of variables to make agricultural decisions—Data Analytics can be used as a vector across the value chain to improve operations. The Agronomic data gathered from different sources such as crop monitoring technology, historical weather data, soil conditions, moisture content, growing degree days, crop phenology, pest and disease patterns and many more factors can be continually assessed to make necessary changes for sustainable growth. “To us, Pollen is a metaphor for crop data that needs to be harvested and acted upon before it blows away. We focus on delivering a unique 360 degree view of the farm and deliver actionable insights that generate positive results,” begins CEO and Founder of Pollen Systems, Keith McCall. Pollen Systems Corporation is turning corners in the agriculture



The company's technicians scheduled visits to the site for a flyover, operating highly customized drones to take detailed NDRE, NDVI, and RGB pictures. Analyzing these images enables us to have a 360-degree view of the crop conditions



sector by helping farmers leverage data analytics to maximize crop yield, and to optimize vigor and variability of a wide variety of crops. With over 20 years of experience in utilizing data analytics to solve complex business problems in the e-commerce, email and the parcel management space, McCall saw an opportunity to apply those same concepts to help farmers grow superior crops. The Bellevue, WA based firm was founded to aid farms in the collection and interpretation of real-time data using state-of-the-art technologies and to provide them with actionable insights that significantly improve the quality and quantity of their cash crops.

AN EXTENSION OF THE MODERN-DAY FARM

In the past, farm growers have spent a lot of time and labor on the collection of specific localized data to forecast crop growth and identify parts of their farm where they need consistent and constant attention. “We work with farmers throughout the growing season, from the time that the crop is starting to grow through the time that the crop is harvested,” states McCall. Pollen Systems acts as an extension of the farm that aims to equip farmers with applicable insights into specific needs of the crop at any given point in time of the growing season. The company focuses on increasing the bottom line and top line profits of customers that cultivate high-value crops such as grapes, hops, cannabis, mandarins, blueberries, apples, cherries, avocados, and much more by helping them produce superior quality and quantity.

“Using data, we maintain a consultative and collaborative relationship with our customers throughout the entire growing season,” describes McCall. Pollen Systems assists farm managers in detecting property areas suffering from issues such as poor or inconsistent irrigation, crop vigor and yield estimation, irregular growth, pests, and diseases by using drones, fixed-wing aircraft, and satellites leveraging visual, infrared and thermal cameras.

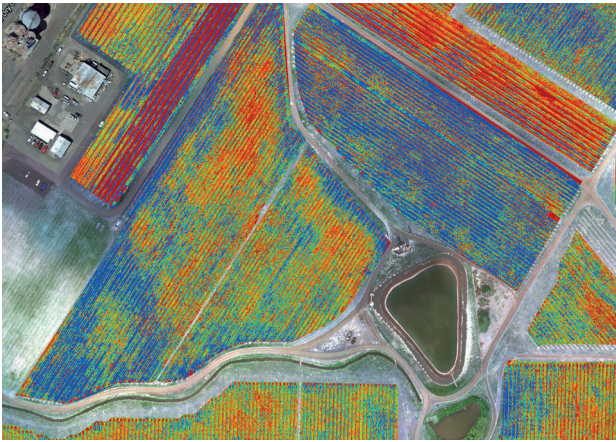
“The company’s technicians schedule visits to the site for a flyover, operating highly customized aircraft to take detailed NDRE, NDVI, Thermal and RGB pictures. Analyzing these images and integrating that detail with on-the-ground sensors and manual measurements enables us to have a 360-degree view of the crop conditions,” explains McCall. The images taken during each capture help farmers collect data on soil conditions, crop health, pests, and other factors that can enable them to streamline agricultural activities, save resources and improve harvest yield and productivity. All documented property scans and flyover data are stored in the Pollen PrecisionView™ Cloud and are accessible to clients from any device at any-time, anywhere. The collective field data is analyzed by Pollen Agriculture Technicians using the company’s patented agricultural analysis software and methodologies. The patented solution maps out individual plots to provide exact locations on areas of improvement and to send alerts of potential issues. Data analysts at Pollen Systems can suggest customized solutions for each farm site’s requirements and enable farmers to streamline agricultural activities to mitigate crop failure.

A HOLISTIC AND MULTI-LAYERED APPROACH

As there are many variable factors like varieties of crops, locations and seasons, access to resources, and more influencing the yield and quality of crops--farming inputs such as fertilizer, water, pesticides, and more need to be applied at different rates across the farm. “It’s no longer sufficient to use one technology like moisture sensors or drones to determine the course of action. You need to combine all that data and be able to holistically analyse based on past trends to deliver the optimal value,” elaborates McCall. One of the most crucial factors that help Pollen Systems offer a comprehensive solution to customers is the company’s partnerships with industry-leading IoT devices from companies like ‘Arable’ and with cloud-based aerial imaging service

provider, 'Terravion'. These collaborations enable Pollen Systems to combine data collected from drones and fixed-wing aircraft with the correlated data accumulated from IoT devices such as moisture sensors and irrigation systems and incorporate that integrated data into its 'PrecisionView™ Platform.' The PrecisionView™ Platform comprises both a PrecisionView™ Manager Portal for desktop access and also its PrecisionView™ mobile phone application, available on the Apple Store and Google Play to allows farmers to synthesize data from multiple different sources and quickly capture valuable insight into improvements in the field.

To illustrate the effectiveness of Pollen Systems solution in variable farming environments, McCall cites two examples from different regions of the world.



Sadie Drury, an estate manager of the prominent 'Seven Hills Vineyard' in the Walla Walla, Washington region, faced a significant challenge to monitor and conserve the use of water in their 140-acre vineyard. Seven Hills was seeking a partner who would assist the farm to maintain the vineyard with consistent vigour and enhance the quality of its crops. Situated in a critical water zone with a lack of visibility across the vast area of the vineyard, the estate manager previously worked with several flyover companies and found that Pollen Systems struck the right chord. Pollen Systems conducted scheduled and systematic flyovers at the same time, every week over the property. Using Pollen System's drone imaging and inspection, she was able to identify stressed areas in her vineyard and take quick decisive actions to streamline irrigation activities to conserve water and sustain optimum quality of yield. "Pollen Systems listened and gave me exactly what I needed with their online platform. They would promptly email images and analysis, which while on a tight schedule I could easily access from my phone," applauds Sadie Drury, estate manager at Seven Hills Vineyards.

Another company Viña Montes, a famous Chilean winemaker, found their hands tied to improve business outcomes. The efforts to find and improve issues in the farm met with a rock wall as inspecting drought-hit 1600 acres from ground-level using ATVs or by foot is a strenuous task to accomplish. Thanks to Pollen Systems' precision agriculture flyovers, the client was able to accurately pinpoint areas,

identify issues, and mitigate those problems. "We were able to save Viña Montes time and labor, and to help them preserve crops in an area where the drought has been impacting Chile for at least seven years," claims McCall.

AT THE FOREFRONT OF PRECISION AGRICULTURE

"Precision Agriculture" is the wave of the future that is coming, and it's needed," points out McCall. In recent years, the advanced farming management system based on observing, measuring and responding to inter and intra-field variability in crops is gaining traction among agriculturists. Due to the increasing need of optimum production with the scarcity of resources such as water and labour, unpredictable weather patterns caused by global warming and climate change and the on-going COVID-19 Pandemic, have necessitated the adoption of advanced technologies to boost farm productivity and crop yield. By applying technologies such as real-time farm monitoring, weather forecasting, optimal field requirements and similar others, precision agriculture enables farmers to optimize crop yield with minimal human efforts and wastage at a cost-effective rate. Moreover, access to real-time information through their smartphones will provide great flexibility and ease of operation. Leading the way to this juncture, Pollen Systems is looking forward to expanding its service to newer regions in the coming 12 to 18 months. The company is focused on diversifying its expertise into over 20 different crops, developing crop profiles and incorporating it into their solution to edge market competition. "At the moment, our main focus is to accelerate our expansion so that we can help more farms on a worldwide basis," concludes McCall. ☺



**Sadie Drury,
Vineyard Manager,
Seven Hills
Vineyard**

Our biggest challenges are water conservation and optimizing water stress and consistent vigor in our wine grapes. The collection and analysis of the types of imaging captured by Pollen Systems, the communication, timeliness and the ability to be out at the same time every week created a customer-service driven solution that met our needs

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*In appreciation of their relentless pursuit of excellence
and innovation in AgTech technology*

A handwritten signature in black ink, reading "Kenneth Thomas".

Kenneth Thomas
Managing Editor