**AV** | **DRONES AND DATA ANALYTICS**
AeroVironment™ | COMMERCIAL INFORMATION SOLUTIONS

# Putting aerial drone data analytics to work

## HOW ONE WALNUT GROWER REALIZED HIGHER YIELDS

A walnut grower in Modesto, California had consistently received lower yields from the northern part of his field due to its sandy soil profile. Insights gained from drone data analytics allowed him to target inputs for increased canopy and yield.

As an agronomist and crop consultant as well as a grower, Bill Brush knew that the sand streak running through the northern part of his field was impacting yields, but was not aware of the total extent to which the soil profile was affecting potential revenue. Bill partnered with AeroVironment to take aerial surveys of his fields using drone technology and data analytics via the AeroVironment Decision Support System™ (AV DSS). The analytics enabled Bill to better understand the health of his trees and address anomalies in the field.

> "Without these aerial images I probably would have not done anything to this orchard."
>
> **BILL BRUSH**
> WALNUT GROWER

**AV** AeroVironment™ | PROCEED WITH CERTAINTY

## METHODOLOGY & OBSERVATIONS

AeroVironment and Bill began the two-year study of the walnut orchard in the spring of 2016. The imagery was collected and analyzed over two seasons on a 40-acre field to determine if analytics from drone imagery can help pinpoint areas of stress and support a different management strategy.

Imagery was collected using true color and multispectral sensors, and subsequently processed using AV DSS for deeper insights. The initial analytics from the 2016 season revealed that the northern half of the field had less-dense canopy coverage and appeared more stressed than the southern half of the field.

## IMPLEMENTING CHANGE

Once Bill was able to assess the initial analytics, he knew he would need to change his management strategy to boost yields on the sandy portion of his acreage. His first step in the 2017 season was to optimize irrigation practices to allow underperforming trees to get increased water to stimulate more uniform growth. This was accomplished by swapping out sprinkler heads on the northern end of the field with larger heads that could deliver more inputs within the same timeframe.

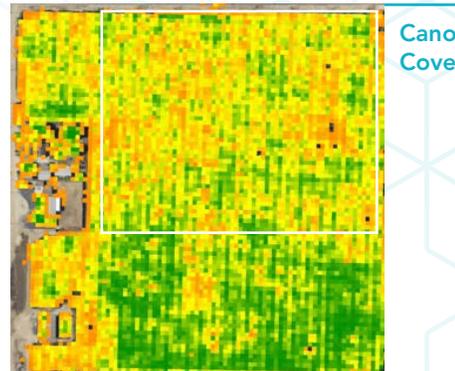Bill also used the top-dress method for applying nitrogen to his entire field rather than applying it

**2016**



RGB
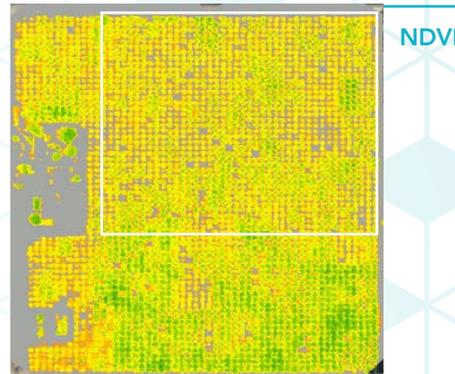


NDVI



Canopy Coverage

## COLOR INDEX OF CANOPY COVERAGE

| | | 2016 | 2017 | % CHANGE |
|---|---|---|---|---|
| Dark Green | 72–Full Canopy Coverage | 781 | 1522 | 94.8% |
| Light Green | 50–72% Canopy Coverage | 1515 | 1248 | -17.62% |
| Yellow | 31–50% Canopy Coverage | 531 | 252 | -52.54% |
| Light Orange | 12–31% Canopy Coverage | 59 | 46 | -22.03% |
| Dark Orange | <12% Canopy Coverage | 33 | 9 | -72.73% |

AeroVironment™

PROCEED WITH CERTAINTY

via sprinklers. This allowed him to avoid over-application in the northern part of the field and avoid increasing nitrates in the groundwater table. By more efficiently allocating the water and nitrogen to targeted areas, the undernourished trees could finally perform to their full potential.

## GETTING TO RESULTS

Once Bill's original irrigation system was altered to best fit the needs of the orchard, additional aerial imagery was collected to see if his new management strategy showed any improvement in canopy density. The outcomes are highly visible in side-by-side comparisons from before and after changes in irrigation were made.

Compared to 2016, the 2017 analytics revealed trees with improved canopy and less stress throughout the entire field. With balanced water and nitrogen applications, the orchard achieved healthier trees and larger canopy. Overall, Bill saw his yields increased by 21% which resulted in a profit increase of $51,960 across the 40-acre field.

2017 ANALYTICS
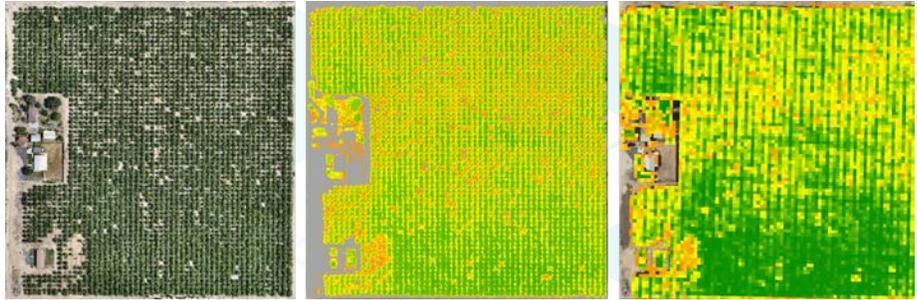
2016 ANALYTICS
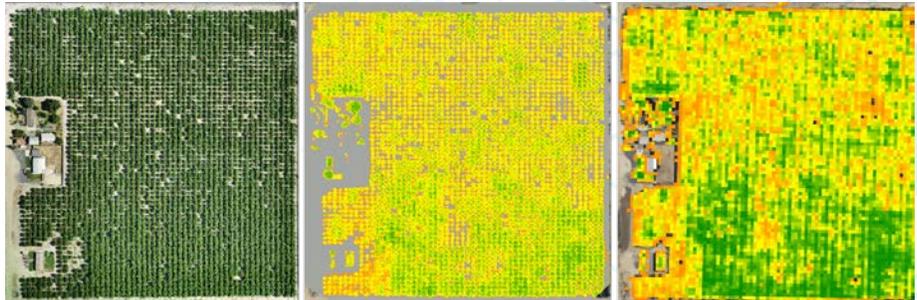


*"What we're doing is taking valuable resources, water and nitrogen, and using these more efficiently."*

INSTANT INSIGHTS

AV-DSS

ONLINE ANALYTICS SOLUTIONS CENTER

## ABOUT AEROVIRONMENT, INC. (AV)

AeroVironment (NASDAQ: AVAV) provides customers with more actionable intelligence so they can proceed with certainty. Based in California, AeroVironment is a global leader in unmanned aircraft systems, tactical missile systems and electric vehicle charging and test systems, and serves militaries, government agencies, businesses and consumers.

For more information visit **www.avdroneanalytics.com**.

AeroVironment™

PROCEED WITH CERTAINTY