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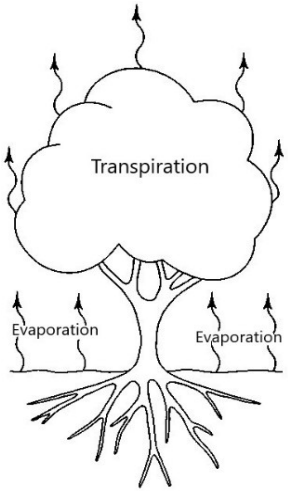
HYPERVIEW™

Satellite-based Applications
Crop Water Consumption (ETc) & Crop Vigor (NDVI)

WHAT IS CROP ETc

Crop Evapotranspiration (or ETc) is a measure of the water that evaporates from the soil and transpires from the plants in a field of crops over a certain time period. It is also known as "consumptive water use."



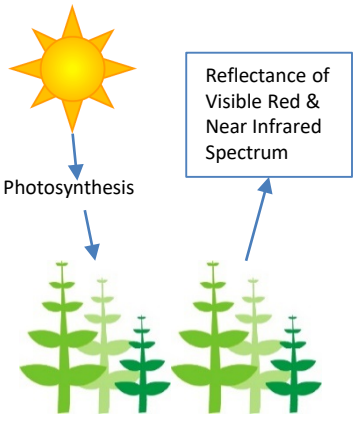
ETc observes the response of a plant (or an aggregate set of plants / trees on a field) to both the weather and the stage of growth. E.g., in a hotter, drier climate, both the evaporation and transpiration get accelerated and as the plant progresses through its phenological cycle, the ETc changes for its various growth and reproductive needs.

Most Common Uses & Benefits of ETc

- Determine irrigation needed to replenish water used by the plant and lost from evaporation.
- Improves the precision of quantity and timeliness of irrigation needed throughout the season.
- Irrigating to actual ETc is proven to optimize yields and reduce water use and associated costs.
- ETc uniformity maps clearly identify areas within the field where crops are under stress due to insufficient water, pest pressure or nutrient deficiencies.
- Studies have shown a direct correlation of ETc uniformity to crop yield uniformity.

WHAT IS CROP VIGOR (NDVI)

NDVI (Normalized Difference Vegetation Index) is an indicator of photosynthetically active biomass. It is also known as a calculation of vegetation health or crop vigor. Satellites have been observing NDVI since the 1970s.

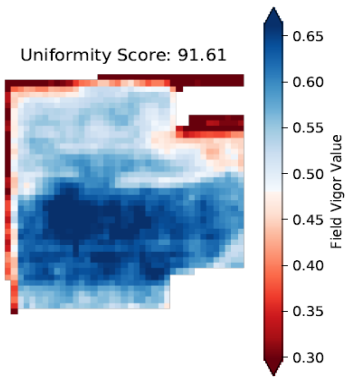


NDVI = (NIR – Red)/(NIR + Red). It basically works by mathematically comparing the amount of red and near-infrared (NIR) light signals reflected to differentiate plants from non-plant objects and healthy plants from unhealthy plants.

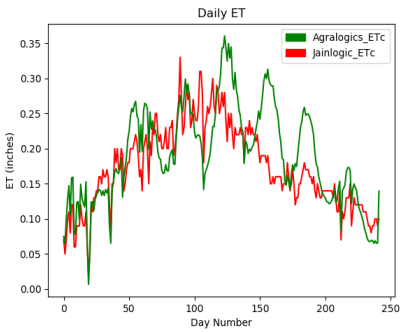
Most Common Uses & Benefits of Crop Vigor (NDVI)

- Because it is normalized, NDVI is the best tool to compare the health of your crops over time – week-to-week, month-to-month and season-to-season to improve overall yields.
- NDVI is known to have a strong correlation with crop yield.
- Give clear identification of irrigation uniformity problems, pests, diseases, fungus and soil problems in the field before damage is done.
- Identifies these areas faster to focus water, nutrients and pesticides more effectively to minimize or even avoid losses altogether in many instances.

Example NDVI image showing an almond field with significant vigor differences caused by insufficient irrigation in the north block.



A full season of data from an Alfalfa field shows satellite-based ETc "sees" the cuttings and regrowth cycles, but weather station (Eto x Kc) based ETc does not.



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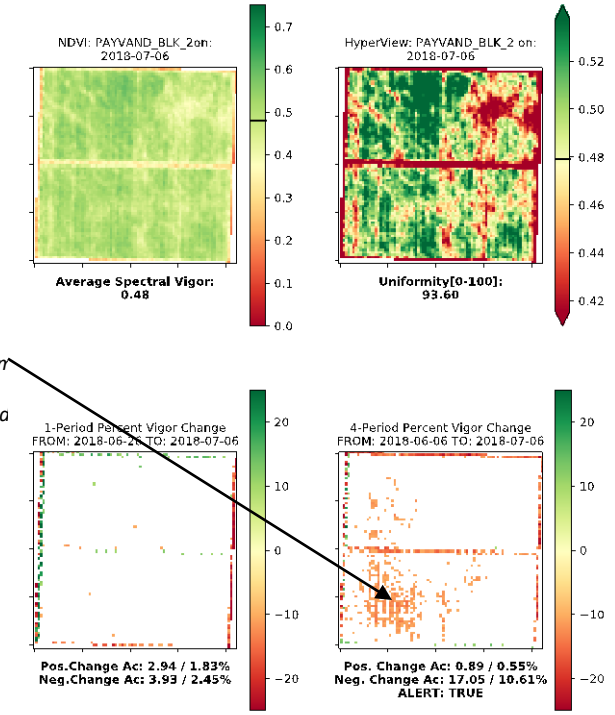
JAIN Monitoring & Control

Products & Service Overview

HyperView™

- The most cost-effective and efficient way to see crop vigor at the field level.
- NDVI report of crop vigor updated and emailed every 4-6 days for each block/field for each ranch.
- Ranch Managers, Crop Advisors, PCAs, and irrigators can all receive the report emails.
- Quick assessment of potential problem areas and rapid, precise deployment solutions.
- Field Uniformity and Affected Acres (# of sub-performing acres) are included.
- Vigor Difference image statistically compares the vigor of every pixel from the prior image to the current image allowing for immediate identification of areas in the field that got better or worse from image-to-image (4-6 days).

This Vigor Difference image shows the percentage change in every pixel (10m x 10m) throughout the field from June 26th to July 6th. 17.05 acres (10.61%) had a negative change in vigor prompting an "Alert".



Simple Email Notification – no logon

HyperView is delivered to your email inbox automatically with color-coded alerts to warn you of changes to your field from the previous week and from the last month. Active hyperlinks within the email easily connect you to detailed imagery and analytics with no user names or passwords to remember.

This easy-to-read and actionable information is delivered to allow you to quickly assess your fields and focus on where there might be a vigor problem or "issue" needing attention. Perhaps a drip line needs to be flushed out. Maybe the start of a pest infestation. No matter the cause, you can be sure to catch the earliest signs of vigor degradation before it is too late.

Location	Vigor	Unif %	URL Link	1-Wk ALERT	1-Mo ALERT	Wk Dates	Wkly Neg% Chg	Mo Dates	Mntly Neg% Chg
CANTUA NORTH	0.35	90.91	HyperView Report	ALERT		2019-07-06 TO: 2019-07-11	24.34	2019-06-26 TO: 2019-07-11	2.13
CANTUA SOUTH	0.32	87.8	HyperView Report			2019-07-06 TO: 2019-07-11	4.87	2019-06-26 TO: 2019-07-11	1.9
CANTUA_CANTUA	0.55	89.03	HyperView Report		ALERT	2019-07-06 TO: 2019-07-11	9.34	2019-06-26 TO: 2019-07-11	22.67
CANTUA_MANNING	0.41	88.57	HyperView Report		ALERT	2019-07-06 TO: 2019-07-11	9.29	2019-06-26 TO: 2019-07-11	66.31
FLINT_FLINTRANCH86AC	0.6	93.59	HyperView Report			2019-07-06 TO: 2019-07-11	3.32	2019-06-26 TO: 2019-07-11	4.63
HURON_AIRWAYS	0.58	91.93	HyperView Report			2019-07-06 TO: 2019-07-11	7.99	2019-06-26 TO: 2019-07-11	9.11
HURON_CRAVEN	0.4	44.64	HyperView Report	ALERT	ALERT	2019-07-06 TO: 2019-07-11	18.28	2019-06-26 TO: 2019-07-11	24.4

Benefits – peace of mind, time savings, yield loss prevention

Since satellites are continuously tracking every area of your field, any change in vigor can be accurately and precisely calculated. Instead of burdening the grower with this massive amount of data, the HyperView system carefully analyses the data for you and only alerts when the negative change is above a certain threshold (nominally 10%). Compared to drones and airplanes, satellite analytics are highly regular (requiring no human intervention to analyze). This ensures low cost and high reliability to the grower.

HyperView allows for time savings compared to the status-quo, especially since this change is detected even before a human eye can perceive it. This ability for proactive and detailed monitoring saves time and money.

HyperView is **delivered to your email inbox automatically with color-coded alerts**. It monitors your fields for you, so you can focus your precious time on actionable intelligence instead of just data gathering.