

# Yield prediction of vegetable crops

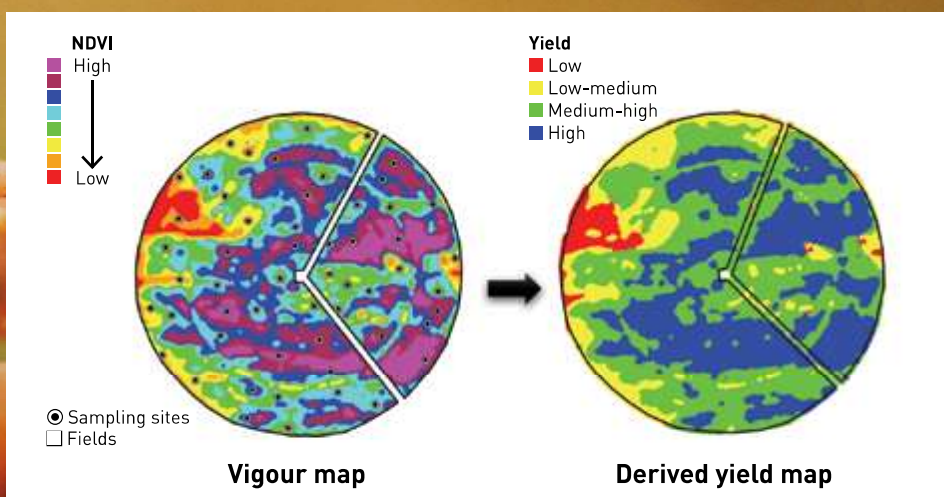
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**U**niversity of New England researchers, from the Precision Agriculture Research Group (PARG), have been working with the Queensland Department of Agriculture and Fisheries to determine the potential for yield prediction from crop sensing imagery in carrots and sweet corn across sites in WA, SA, Tasmania, NSW and QLD.

Yield prediction could be used by the vegetable industry for product yield forecasting and marketing.



**FIGURE 1** A vigour map showing biomass as classified with NDVI, and the sample points which were GPS referenced in the field and where yield samples were taken (left); its associated yield map showing the different levels of yield (tonnes/ha)

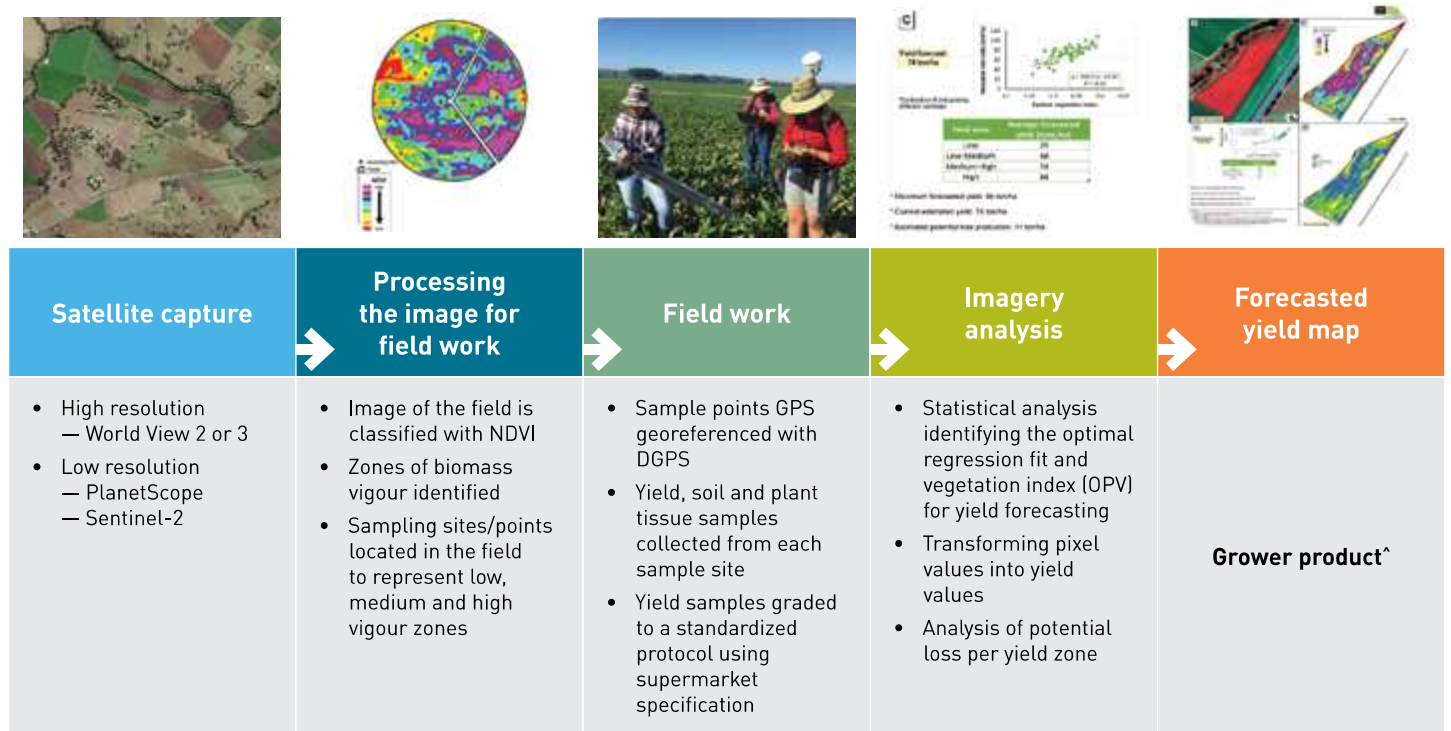
Source: Angelica Suarez Cadavid, UNE (2018)

Yield prediction could be used by the vegetable industry for product yield forecasting and marketing. Predicting yield based on crop biomass could also identify potential areas of variability which could then be investigated further or to generate profit/loss maps.

Figure 1 illustrates a comparison of high resolution satellite imagery and the associated predicted yield map in carrots. The results from these sites have shown good relationships between biomass vigour and total yield (tonnes/ha). Figure 2 depicts the process for generating predicted yield values from satellite imagery.

High resolution satellite imagery at crop harvest was classified into vigour zones based on NDVI values, followed by intensive yield assessments at replicated sample points in each vigour zone.

It is the relationship between these measured yield points and crop reflectance data that is used to generate predicted yield values. This information is then compared alongside the growers pack out data from the corresponding field.



**FIGURE 2** A schematic of the process from satellite capture to creating the forecasted yield maps for the grower

<sup>^</sup> This yield map can be used as an extra data layer alongside any yield monitor or packout data.

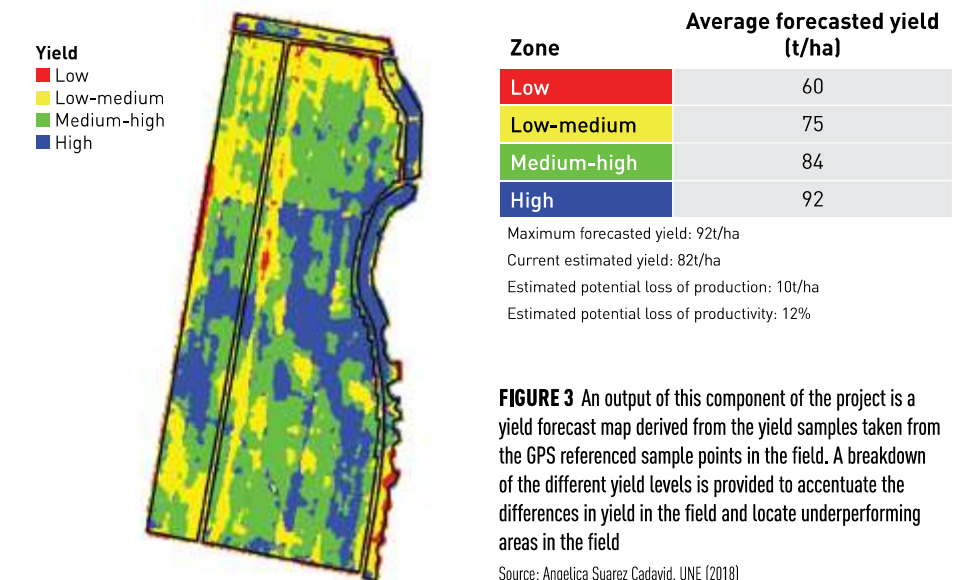
**What is NDVI?**

NDVI is the most robust and widely applied vegetation index. It is a ratio of two spectral bands (Red and near infrared (NIR)) that are highly related to crop biomass:

$$NDVI = \frac{(NIR-Red)}{(NIR+Red)}$$

From this data we can also estimate potential yield ranges and class individual fields into yield zones and quantify and localise underperforming areas (Figure 3).

Over the last 12 months, project staff have been able to demonstrate a good relationship between crop biomass (vigour) and yield as the basis for this yield prediction work. However, yield forecasting will only be beneficial to the vegetable industry if it can be achieved well in advance of harvest. The next phase will be to determine how early a crop imagery can be captured and still be used to predict yield. The first site for earlier season crop sensing will be at Center West, WA in June this year.



**FIGURE 3** An output of this component of the project is a yield forecast map derived from the yield samples taken from the GPS referenced sample points in the field. A breakdown of the different yield levels is provided to accentuate the differences in yield in the field and locate underperforming areas in the field

Source: Angelica Suarez Cadavid, UNE (2018)

This project is working with growers across Australia to implement a range of precision agriculture technologies and assess their potential in vegetable systems including:

- EM38 soil mapping
- Crop sensing imagery for various applications
- Strategic soils and plant sampling
- Yield monitors and
- Variable rate applications.

**MORE INFORMATION ►**

For more information on this project, please contact:

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[www.hortinnovation.com](http://www.hortinnovation.com)