



Assessing canopy nitrogen levels with handheld remote sensors

Key Points

- **Optical handheld sensor devices** will be assessed as potential tools for direct field measurement of the health and nitrogen status of grapevines.
- The research aims to develop a model that relates optical sensor readings with the nitrogen content of vine canopies.
- Optical hand held sensor devices are non-destructive, ground-based, easy-to-use and can also be inexpensive investments.

New ways to determine vine health in the field

In order to maintain and build upon Tasmania's status as a premium wine-producing region, producers need to be able to ensure both quality and profitability when managing their vines. An important aspect of vineyard management is nitrogen fertiliser application. Nitrogen is critical for plant growth and development, and can contribute towards the final yield, productivity and quality of the crop. Under-fertilising can result in a decrease in production whereas over-fertilising can lead to unnecessary input costs and environmental impacts.

Current practices that allow producers to determine the nitrogen status of their vines can be expensive, complicated and time consuming. Therefore, the possibility of using handheld optical sensor devices are being explored to allow for in-field, rapid analysis of canopy health.



Background

A range of optical sensors are available for measuring the 'greenness' or chlorophyll content of leaves. Chlorophyll content is closely related to nitrogen content and can be used as a relative measure of the nitrogen status of leaves. The optical devices work on the principal that chlorophyll **absorbs red light** but **strongly reflects near-infrared light**.

This trial compares three commercially available devices, 'GreenSeeker', 'SPAD meter' and 'Crop Circle' with traditional laboratory analysis of leaf nitrogen content using Pinot Noir and Chardonnay vines at Jansz Parish (south) and Dalrymple (north) vineyards.

GreenSeeker

Trimble Agriculture's 'GreenSeeker' optical sensing device measures normalised difference vegetative index (NDVI).



The GreenSeeker emits red and near infrared light at high intensities. The canopy reflects or absorbs these wavelengths to varying degrees depending on how 'green' the leaves are. The GreenSeeker detects the reflected light waves and applies a mathematical formula that 'normalises' the result to allow easier interpretation. The values range from -1.0 to + 1.0.

No leaves are removed or handled when taking GreenSeeker measurements. The GreenSeeker is simply held at approximately 1 metre from the vine canopy.

Find out more

Paul Smart, Wine Tasmania Technical and Extension Officer, coordinates field days, workshops training and resources for growers. The Wine Tasmania website hosts the Yield Resource page which has great practical information for growers, including technical videos covering the topics of nutrition, how to perform petiole sampling, pruning and cane selection, and measuring fruit set.

SPAD Meter

SPAD meters have the ability to determine the relative chlorophyll content of canopy leaves. As the SPAD value of a leaf increases, the nitrogen content of the leaf also increases.



The SPAD meter sandwiches the leaf between its light emitter on the top surface and the optical sensor on the lower surface. Like the GreenSeeker, the SPAD meter emits red and near infrared wavelengths but instead of measuring what is reflected, it measures what light passes through or is absorbed by the leaf.

The SPAD values which are displayed on a digital screen on the meter.

The leaf can remain on the vine making SPAD meters a very user friendly device for producers.

Crop Circle

The Crop Circle from Holland Scientific is a remote sensor that uses not only red and near infrared light wave measurements, but also red-edge waves. This enables the Crop Circle to perform at higher sensitivity levels to produce more accurate and detailed NDVI and other light sourced data. Data produced by the Crop Circle can also be collected and later downloaded into Excel programs. Like the GreenSeeker, no leaves need to be removed or touched in order to produce a reading.



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