Monitoring the N release from organic amendments using proximal sensing

Daniele De Rosa, David Rowlings, Johannes Biala, Clemens Scheer, Bruno Basso, Massimiliano De Antoni Migliorati, Peter R. Grace

Optimal Organic amendments (OAs) management

Provide sufficient N to maximize yield

Minimising N losses

N release = high grade temporal variability

The In season assessment crop N status

PROXIMAL SENSING
AIM

Compare the three main Vis currently in use (NDVI, NDRE and CCCI) to monitor the N content of a vegetable crop to assess the efficiency of an optimized organic amendments application strategy.

Methodology

SITE
Gatton - South-East Queensland (Vertosol)

TREATMENTS
Two seasons of Lettuce (Lactuca sativa) 2014-2015

First season:
Raw feedlot manure (Ma) @ 100% and reduced (100% - N_{\text{min org amend}} + \text{Opt})
mineral N-fertilizer based on standard farm practices (CONV).
Second season:
Only Ma and Ma+Opt

MONITORING

1. Soil plant available N
2. Plant reflectance at RED, RE and NIR (670, 730, and 780 nm)
RapidSCAN CS-45
Results and conclusions

| Vegetation index and reflectance vs. crop N content |
|-----------------|--------|--------|--------|--------|
|                | NDVI   | NDRE   | CCCI   | RE     |
| $R^2$ significance | 0.60   | 0.67   | 0.61   | 0.23   |
| RMSE            | 0.67   | 0.61   | 0.66   | 0.93   |
| Model           | Linear | Linear | Linear | Linear |
| $P<0.001$       |        |        |        |        |

- The NDRE best index
- The temporal trend of NDRE allowed to:
  - early detect the **surplus** of soil plant available N in the +CONV treatment in the 2014 season
  - crop N **deficiency** in the Ma treatment during the 2015 season

NDRE during the mid/late stage of Lettuce development, with the inclusions of non-limiting N plot, has the capability to assess whether the crop is receiving sufficient N under an optimized organic amendments strategy.