April 2014

ENews bulletin

News for IPF's valued customers

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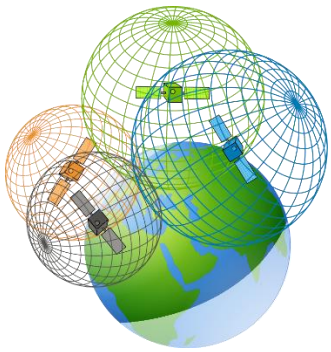
In the next issue

Under the microscope

Satellite imagery is transforming precision farming. We look at how IPF are leading the way with this technology

This year we have changed our eyeCrop service and we now have more farmers using satellite imagery than ever before. With 12 months scanning and the coverage of two different satellite providers our imagery has uses beyond just variable rate nitrogen. We take a closer look at what the satellites can show us and how this information is being used.

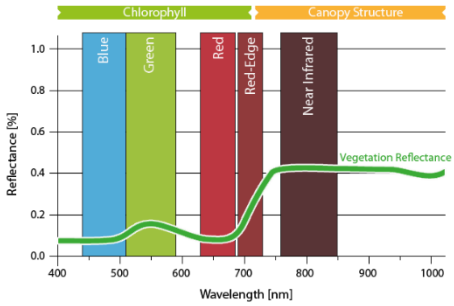


The satellites orbit at an altitude of 630 km, collect data in swaths 77km wide and will scan the whole of the UK every 5½ days.

The satellites capture light reflecting from plants through a multispectral scanner. Bands of different light wavelengths are captured separately allowing them to be used in different vegetation indices such as NDVI or chlorophyll. Each pixel in a satellite image is made up of the reflectance data captured from a 5m^2 area.

What is NDVI?

This graph shows the typical reflectance of a healthy plant. When light hits the surface of a plant the chlorophyll in the leaf strongly absorbs blue and red wavebands but reflects the wavebands of near infrared (NIR) and green - that's why we see the leaves as green.

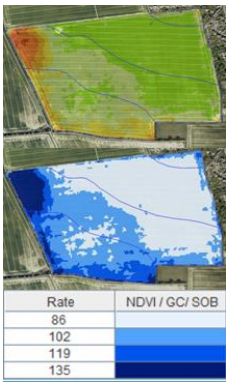


Typical spectral reflectance curve of a healthy plant
Adapted from White Paper: The RapidEye Red Edge Band

NDVI exploits the fact that plants strongly absorb light in the red waveband but strongly reflect light in the NIR waveband using the algorithm below:

NDVI = (NIR – red) / (NIR + red)

NDVI measures plant health, vigour and biomass. Essentially, it is looking at how thick and how green the crop is. Applying nitrogen variably based on NDVI imagery can even the crop up.



NDVI (top) and VRA N plan (below)

Intelligent Precision Farming

The scientific approach that puts you in control

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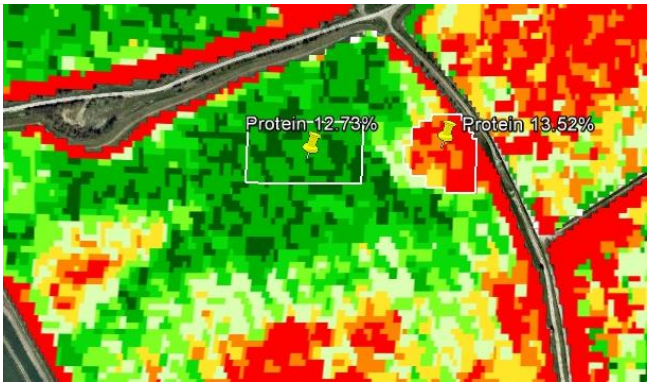
We have two forms of NDVI: 'NDVI-early' is used at the beginning of the growing season and highlights smaller changes early on in the plant's growth. NDVI-early is typically used to vary the first dressing of nitrogen. It is also used to monitor crop establishment, emergence of weed patches and pest damage.

Once plants pass an NDVI index of 4.0 NDVI-early saturates and no longer distinguishes any further variation; we then switch to NDVI.

Chlorophyll imagery

Chlorophyll in the leaf strongly absorbs red light while the leaf cell structure strongly reflects NIR. The point at which reflectance jumps rapidly between the two is called 'red-edge'. The red edge band can therefore provide information on plant nutrition and health as variations in both chlorophyll content and leaf structure influence its reflectance.

Assessment of the N status of the crop is critical for optimum fertiliser management. There is a proven correlation between chlorophyll and plant nitrogen content; therefore the N status of the crop can be assessed through chlorophyll imagery.

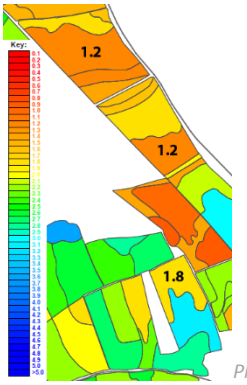


Chlorophyll and grain proteins in WW

Chlorophyll imagery depicts the spatial variation of chlorophyll within a field. Trials work on milling wheat has shown that areas of high chlorophyll can have greater dilution of grain protein. This information can be used to target final N applications on milling wheat to increase grain protein levels.

Chlorophyll imagery can also be used to identify areas of weeds as the red edge band is sensitive to leaf and canopy structure as well as chlorophyll.

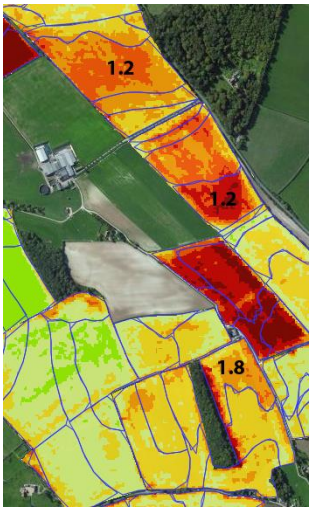
Other uses of eyeCrop



Phosphate index map

eyeCrop imagery can now be loaded onto a smartphone or tablet and used in the field as a crop walking aid.

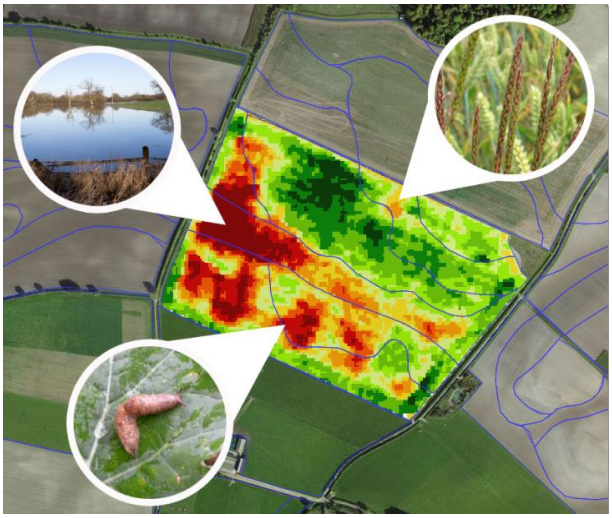
Early season imagery on this farm was able to detect areas of plant stress due to low phosphate levels:



NDVI early – 20th January

NDVI early – 16th March

In the example below areas of flooding, slug damage and blackgrass can all be seen in the same field:



With new satellite providers coming onto the market, IPF are confident that even more imagery will be available next year.