

Measuring wheat leaves using a hyperspectral radiometer ASD FieldSpec + Leaf-clip to predict leaf nitrogen, leaf thickness, SPAD, Rubisco activity and electron transport rate.

Created by Viri: 17/09/2018

Introduction

What do the ASD + Leaf-clip measure?

R = The ASD measures Hyperspectral leaf reflectance (350-2500 nm). See figures below:

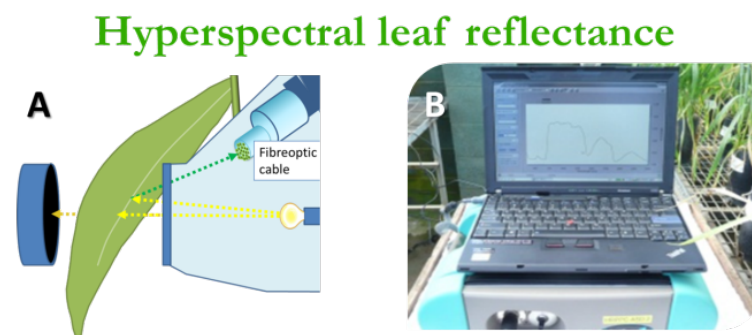


Figure 2. A) Light from the leaf clip is reflected by the leaf into the fibreoptic cable. B) The spectral signal is processed and saved in the hyperspectral radiometer Fieldspec 3 ASD Inc., and laptop.

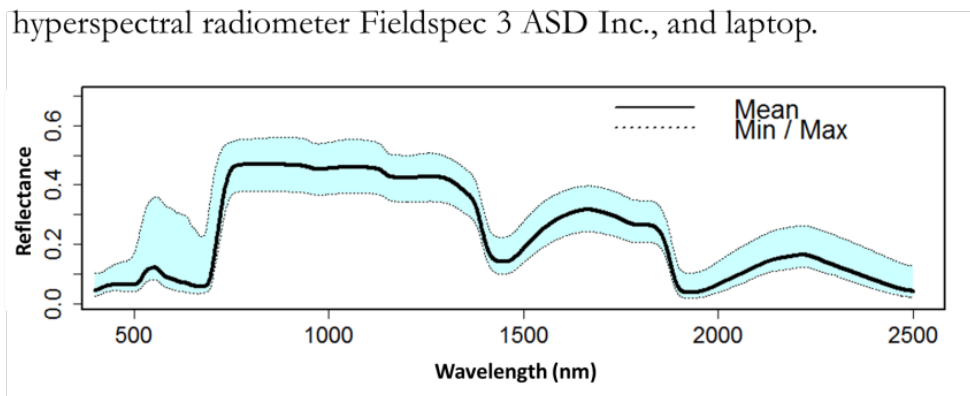
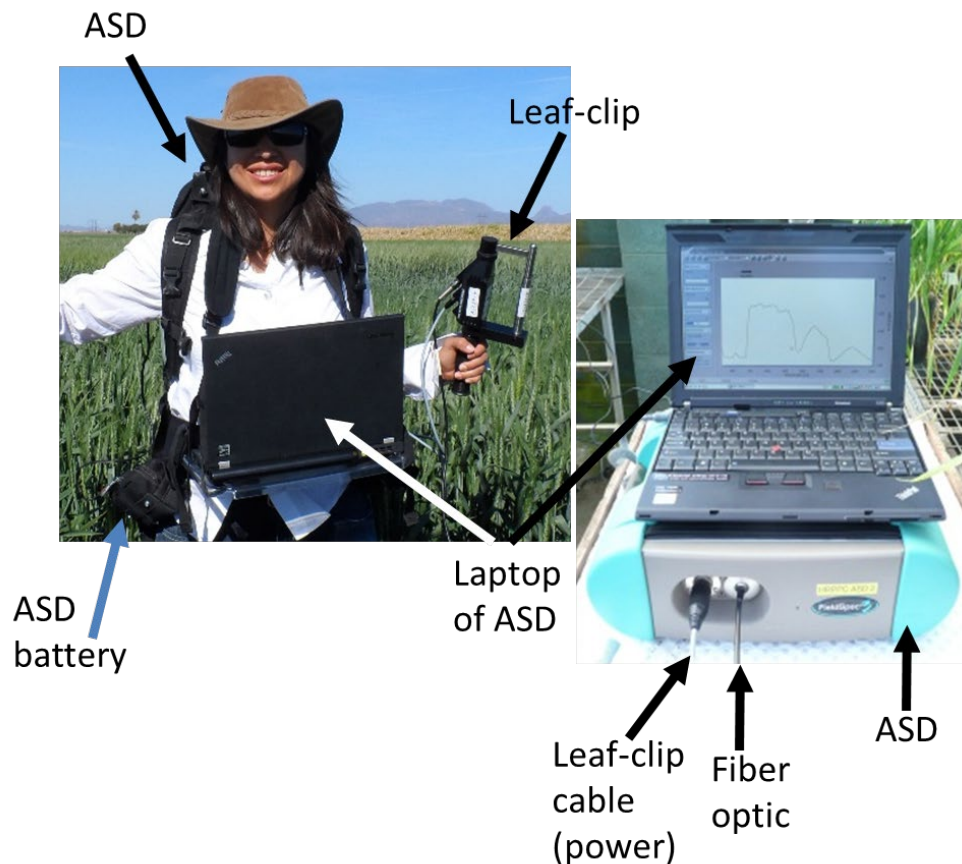


Figure 3. Variation in spectral reflectance. All wavelength

The reflectance is calibrated in wheat to predict: Leaf nitrogen per unit area (N_{area}), leaf dry mass area (LMA), Rubisco activity (V_{cmax25}), electron transport rate (J) and SPAD, so each time that we measure reflectance we can predict these traits which are important for our photosynthesis project.

For more information: Silva-Perez, Viridiana, Gemma Molero, Shawn P. Serbin, Anthony G. Condon, Matthew P. Reynolds, Robert T. Furbank, and John R. Evans. 2018. "Hyperspectral Reflectance as a Tool to Measure Biochemical and Physiological Traits in Wheat." *Journal of Experimental Botany* 69 (3): 483–96.

Parts of ASD



Originally, ASD is the company that produces different optical instruments, it means **Analytical Spectral Devices, Inc**, now it became **Malvern Panalytical**

(<https://www.malvernpanalytical.com/en/products/category/near-infra-red-spectrometers>)

In this document, the FieldSpec is called ASD.

In general the ASD comprises:

- 1) Laptop
- 2) ASD box
- 3) Energy source (cable or battery)
- 4) Leaf-clip (for leaf measurements)
- 5) Bag-pack (to carry ASD in the field)

The ASD box is where the ASD can be turn on/off, where the power for the leaf-clip can be connected and where the fibre optic is. The fibre optic is fragile and very expensive, if it is bend too much it can breaks!!! So be careful!!

Have a look to the check list for detail number of pieces that are need it to make the ASD works.