

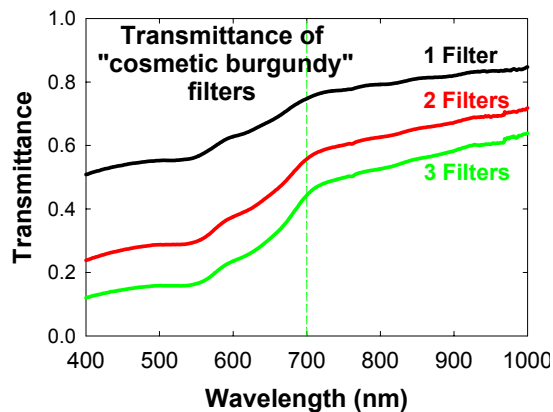


Selective Filters Increase Response of Silicon Diode Spectroradiometers above 700 nm.

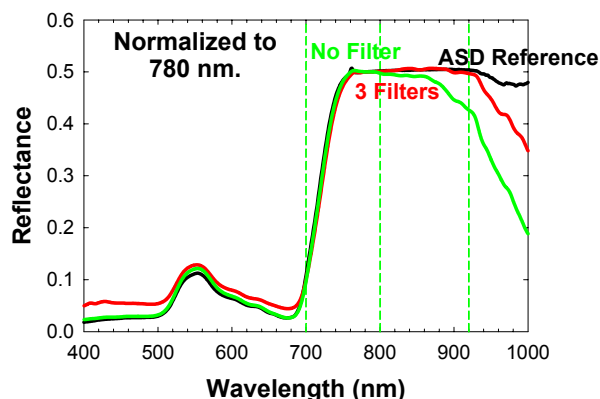
Dan Dallon, Glen Ritchie, and Bruce Bugbee

Introduction

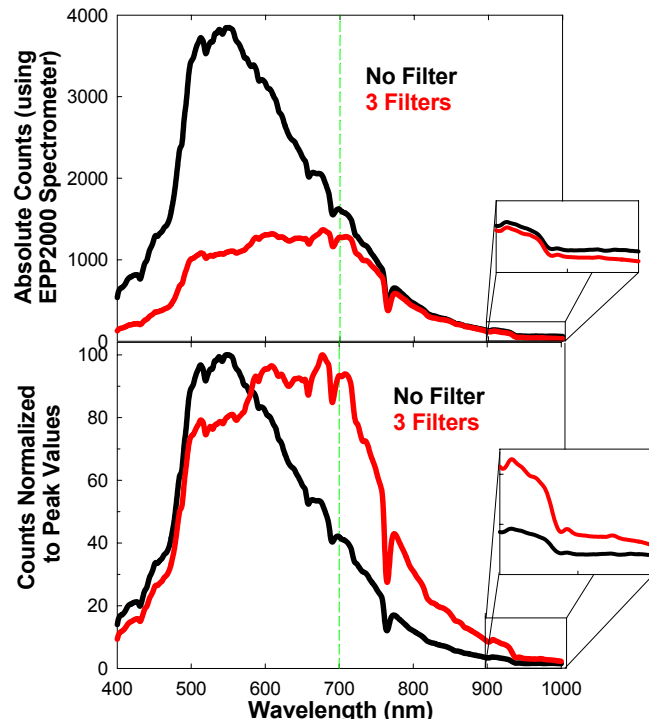
- Reflectance of wavelengths above 600 nm is an important indicator of plant health.
- Silicon diode sensors have high sensitivity to green light (500-600 nm), but low sensitivity above 700 nm.
- The green radiation in sunlight saturates the detectors before significant NIR radiation is absorbed, making NIR measurements less accurate.
- The NIR signal can be increased by using a filter that decreases green radiation without decreasing NIR radiation. This allows increased instrument integration time and higher NIR absorption.



The cosmetic burgundy filter blocks out more radiation below 700 nm than above.



3 layers of filter extend the NIR accuracy of the spectrometer from 800-920 nm.



Filters reduce visible spectral response and allow a relative increase in NIR signal.

Materials and Methods

- The Lee ‘cosmetic burgundy’ filter (Lee Filters, Burbank, CA) has good characteristics for this application. Other filters might also be suitable.
- Scans taken with an ASD FieldSpec Pro JR spectrometer were used as reference.
- The effect of up to six layers of filters was tested with an Apogee/StellarNet EPP2000 spectrometer.

Conclusions

- Three layers of the “cosmetic burgundy” filter extended the accuracy of the spectrum from 800 to 920 nm.
- Three filter layers may decrease the accuracy below 700 nm.