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A Testing Environment for Airborne Optical Sensors

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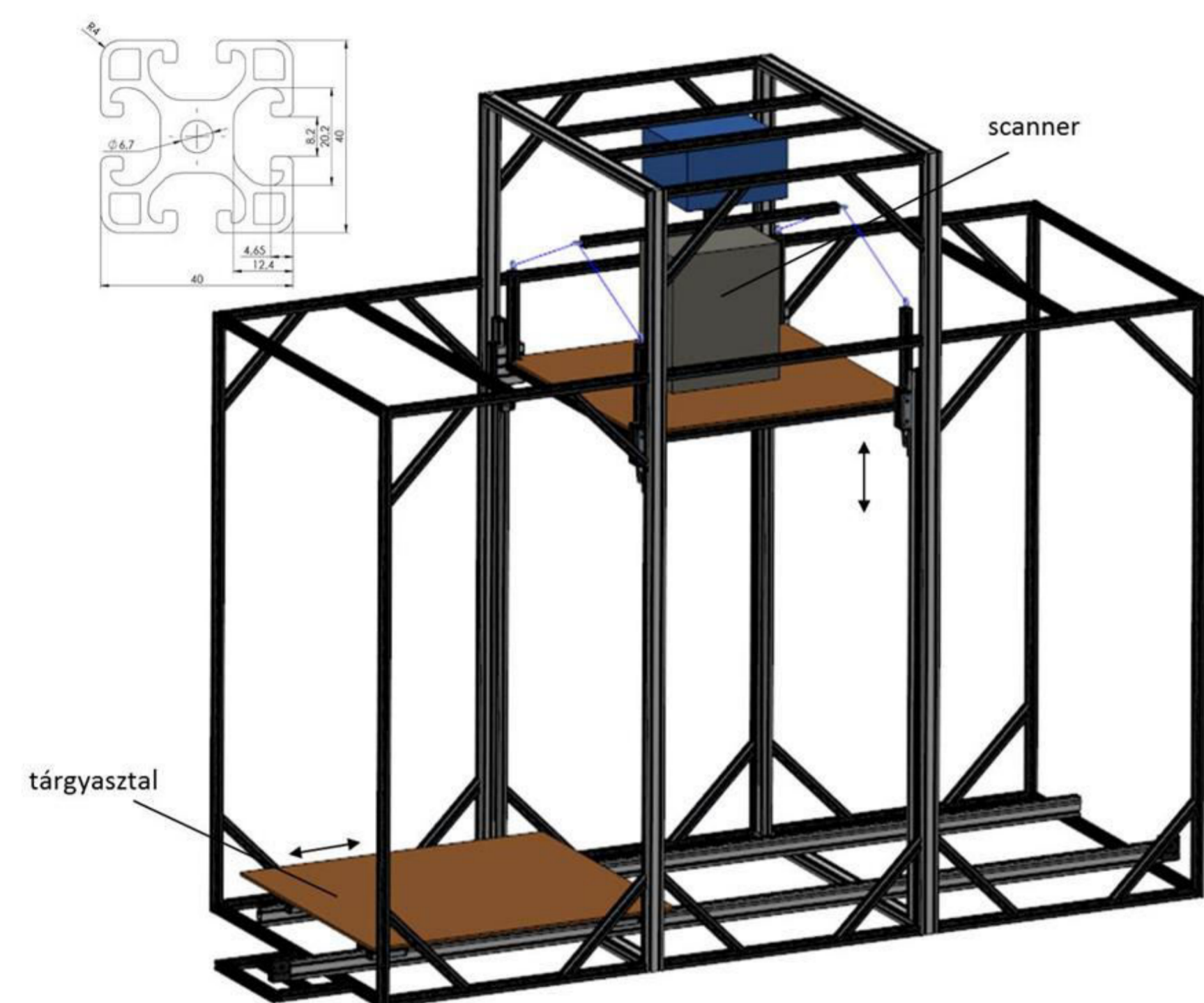


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Underground nuclear explosions can have detectable impacts on surface conditions. The nature of the impact can vary based on several factors including geology. Continuous or fragmented vegetation cover as well as exposed soil may reveal detectable changes related to this impact in the visible and thermal infrared region of the electromagnetic spectrum. With an appropriate sensor assembly, these changes may be detected as OSI-relevant anomalies. The use of multispectral imaging equipment at the surface and from the air is permitted during an On-Site Inspection to search for anomalies. In order to develop an optimal sensor array for overflights different hardware configurations have been tested. Airborne tests typically require a lead-in time and are costly while ground-based tests in a laboratory environment provides an effective means of testing airborne cameras and sensors. In this paper, a testing environment is presented which comprises a modular sensor platform that enables height and illumination to be adjusted and a programmable sample tray.



Mechanical design

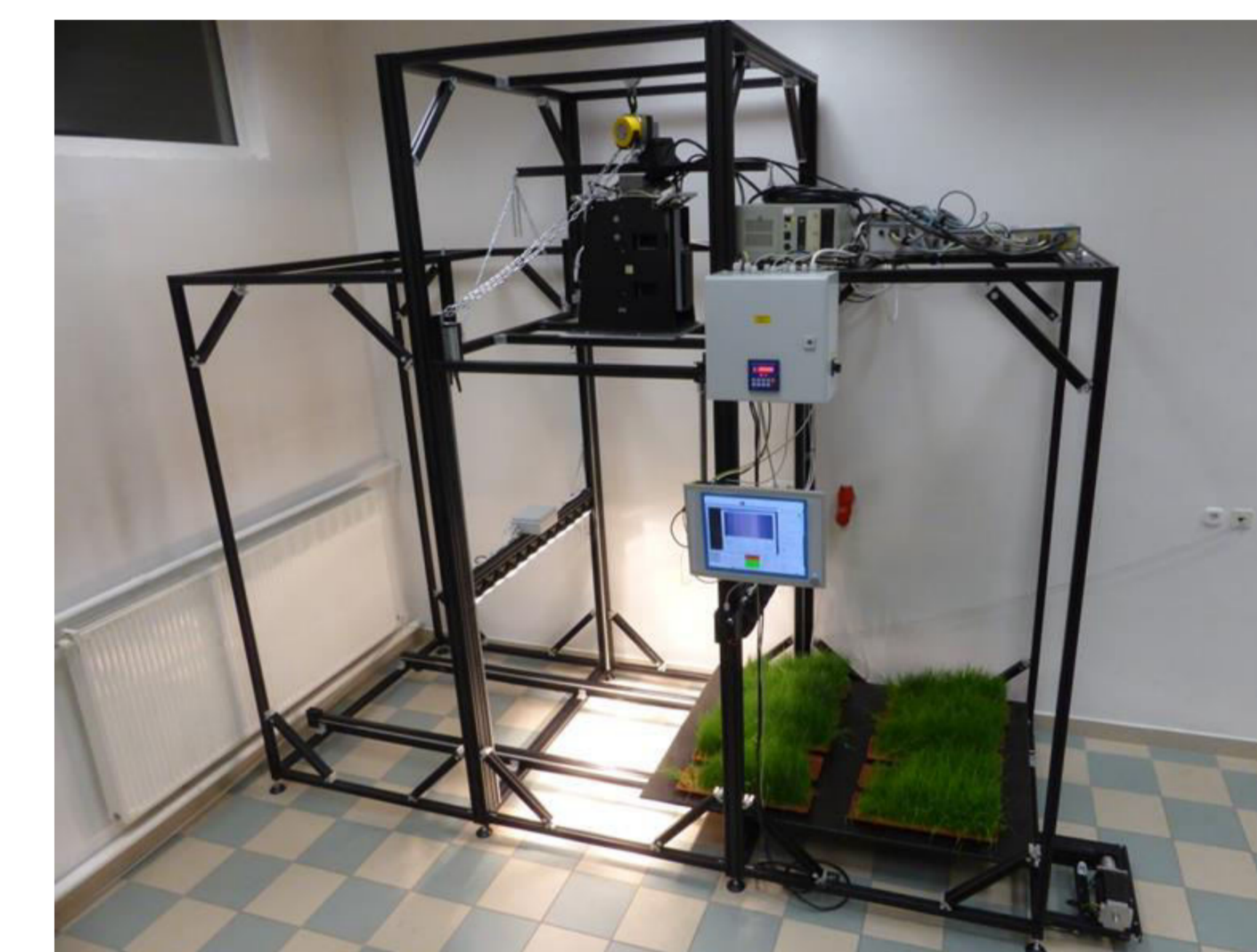


Sample tray control and adjustable illumination in 350-2500 nm range



	AISA Eagle
Spectral range (nm)	400-970
Spectral sampling band (nm)	2,3
Spectral bands	244
Spatial pixels	1024
Spectral depth (bit)	12
Image rate (image/sec.)	up to 100
FOV (degree)	37,7
IFOV (degree)	0,037
Detectors	CCD

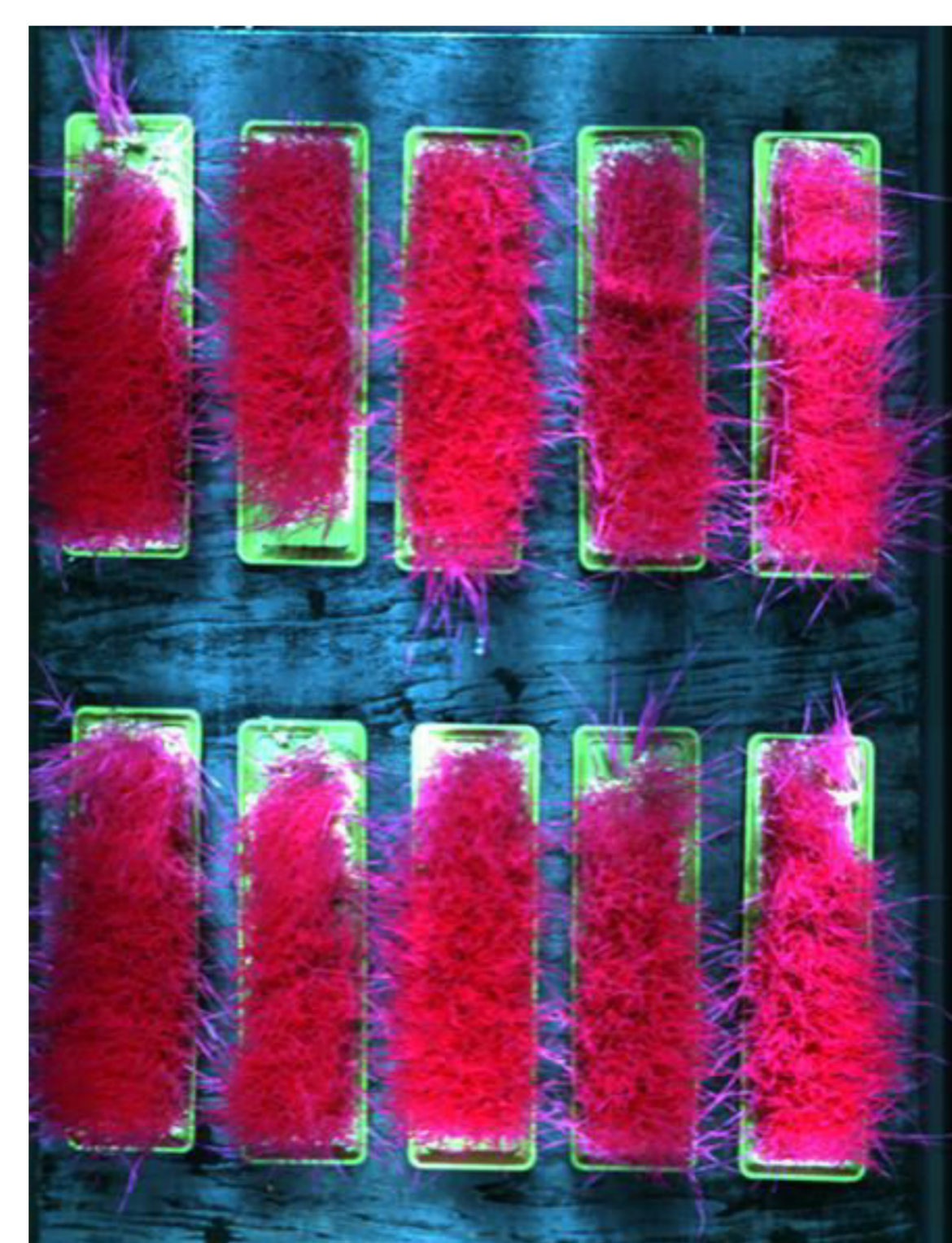
Airborne AISA Eagle hyperspectral sensor



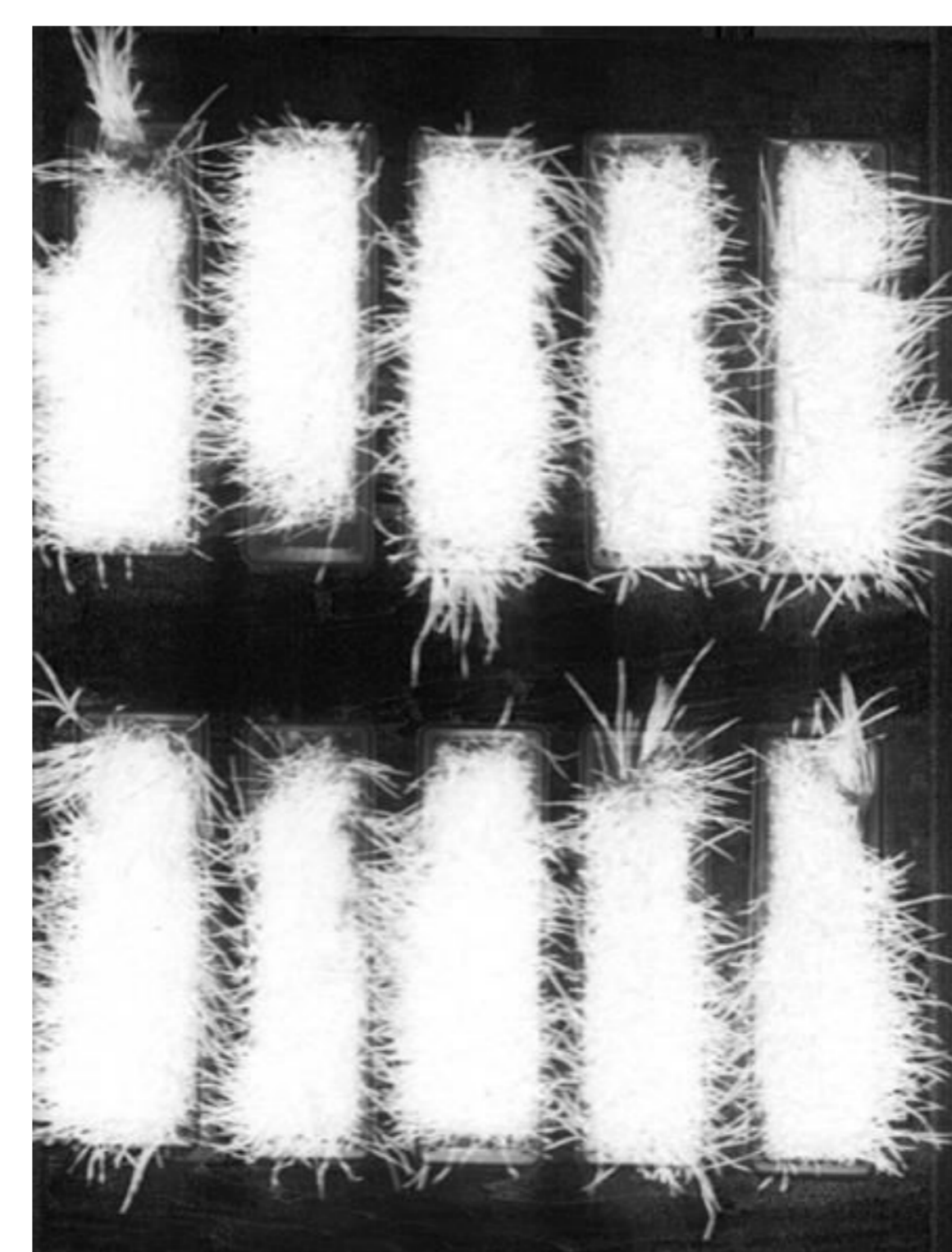
Testing and operating an airborne sensor system under laboratory conditions



RGB images taken from wheatgrass



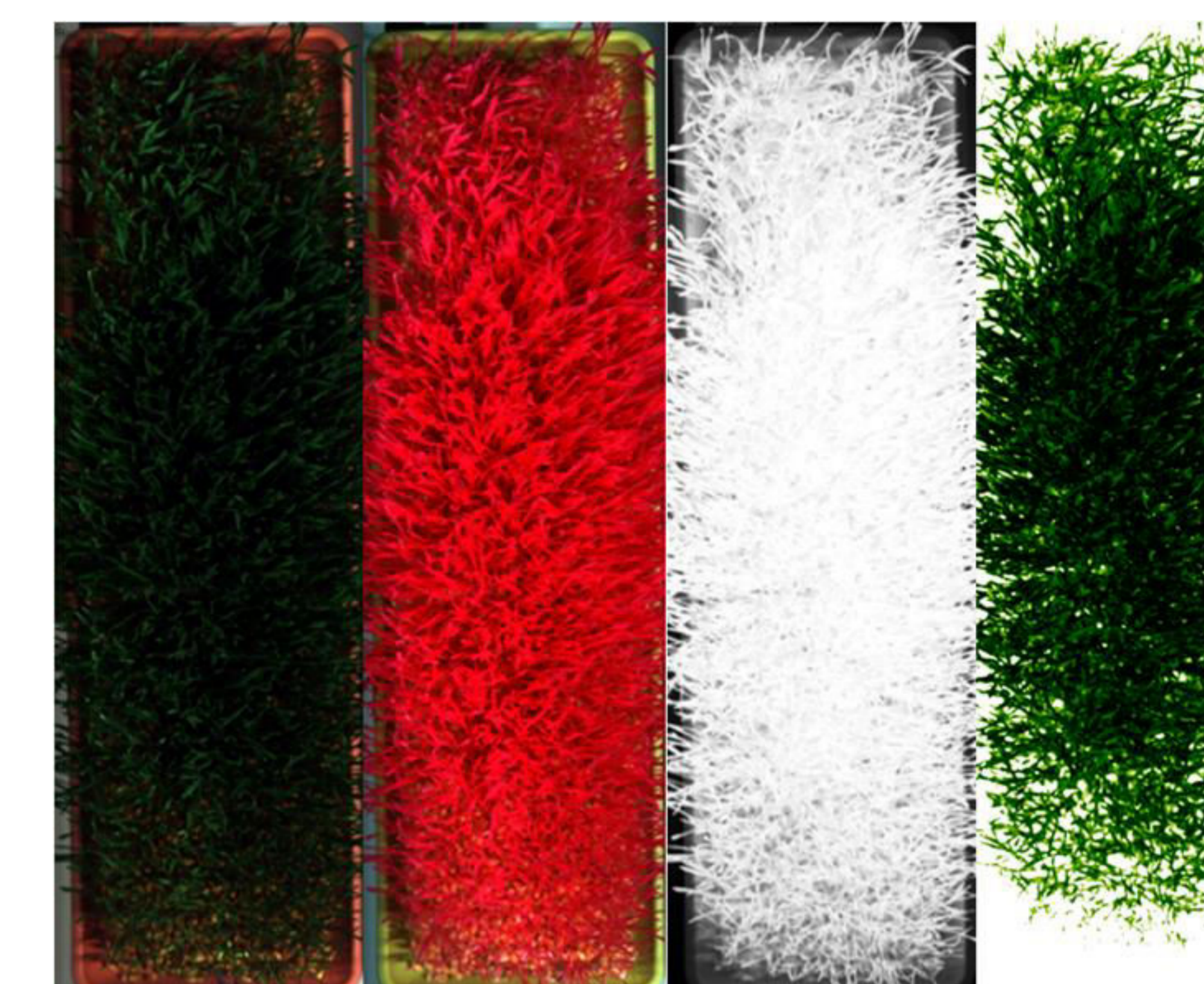
RGB images converted into CIR



NDVI index based grey scale image



NDVI based background removal



High resolution images taken with lower sensor height

A robust mechanical frame was designed and manufactured to provide safe platform for different sensors or sensor integrations. The AISA system has been tested with various settings by modelling different altitudes, ground speeds, angles of solar incidence and irradiation intensity. The system can be used to vary spatial and spectral resolution and sampling frequencies of different airborne sensors. This testing environment offers an opportunity for precise system calibration, fundamental research, system integration tests and hands-on training of airborne imaging in a time and cost-effective manner.