

# High Throughput Image-Based Phenotyping for Determining Morphological and Physiological Responses to Single and Combined Stresses in Potato

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## Materials

Name	Company	Catalog Number	Comments
1.1" CMOS Sensor with RGB camera	PSI, Drásov, Czech Republic	<a href="https://psi.cz/">https://psi.cz/</a>	The sensor delivers a resolution of 4112 × 4168 pixels for side view and 2560 × 1920 pixels for top view. The sensor is extremely sensitive and is a real megapixel CCD replacement and produces sharp, low-noise images
FluorCam	PSI, Drásov, Czech Republic	FC1300/8080-15	Pulse amplitude modulated (PAM) chlorophyll fluorometer
Fluorcam 10 software	PSI, Drásov, Czech Republic	Version 1.0.0.18106	For Chlorophyll fluorescence images visualization and analysis
GigE PSI RGB – 12.36 Megapixels Camera	PSI, Drásov, Czech Republic	<a href="https://psi.cz/">https://psi.cz/</a>	For the side view projections, line scan mode was used with a resolution of 4112 px/line, 200 lines per second. The imaged area from the side view was 1205 × 1005 mm (height × width), while the imaged area from the top view position was 800 × 800 mm.
Hyperspectral Analyzer software	PSI, Drásov, Czech Republic	Version 1.0.0.14	For hyperspectral images visualization and analysis
Hyperspectral camera HC-900 Series	PSI, Drásov, Czech Republic	<a href="https://hyperspec.org/products/">https://hyperspec.org/products/</a>	Visible-near-infrared (VNIR) camera 380-900 nm with a spectral resolution of 0.8 nm FWHM
Hyperspectral camera SWIR1700	PSI, Drásov, Czech Republic	<a href="https://hyperspec.org/products/">https://hyperspec.org/products/</a>	Short-wavelength infrared camera (SWIR) camera 900 - 1700 nm with a spectral resolution of 2 nm FWHM

InfraTec thermal camera (VarioCam HEAD 820(800))	Flir, United States	<a href="https://www.infratec.eu/thermography/infrared-camera/variocam-hd-head-800/">https://www.infratec.eu/thermography/infrared-camera/variocam-hd-head-800/</a>	Resolution of 1024 × 768 pixels, thermal sensitivity of < 20 mK and thermal emissivity value set default to 0.95. with a scanning speed of 30 Hz and each line consisting of 768 pixels. The imaged area was 1205 × 1005 mm (height × width).
LED panel	PSI, Drásov, Czech Republic	<a href="https://led-growing-lights.com/products/">https://led-growing-lights.com/products/</a>	Equipped with 4 × 240 red-orange (618 nm), 120 cool-white LEDs (6500 K) and 240 far-red LEDs (735 nm) distributed equally over an imaging area of 80 × 80 cm
Light, temperature and relative humidity sensors	PSI, Drásov, Czech Republic	<a href="https://psi.cz/">https://psi.cz/</a>	Sensors used to monitor controlled conditions in greenhouse
MEGASTOP Blue mats	Friedola	75831	To cover soil surface
Morphoanalyzer software	PSI, Drásov, Czech Republic	Version 1.0.9.8	For RGB images visualization and analysis and color segmentation analysis
PlantScreen Data Analyzer software (Version 3.3.17.0)	PSI, Drásov, Czech Republic	<a href="https://plantphenotyping.com/products/plantscreen-modular-system/">https://plantphenotyping.com/products/plantscreen-modular-system/</a>	To visualize and analyze the data from all imaging sensors, watering-weighing unit and environmental conditions in greenhouse
PlantScreen Modular system	PSI, Drásov, Czech Republic	<a href="https://plantphenotyping.com/products/plantscreen-modular-system/">https://plantphenotyping.com/products/plantscreen-modular-system/</a>	Type of phenotyping platform
Plantscreen Scheduler software	PSI, Drásov, Czech Republic	Version 2.6.8368.25987	To plan the experiment and set the measuring protocol
SpectraPen MINI	PSI, Drásov, Czech Republic	<a href="https://handheld.psi.cz/products/spectrapen-mini/#details">https://handheld.psi.cz/products/spectrapen-mini/#details</a>	Light meter to adjust light level on a canopy level
TOMI-2 high-resolution camera	PSI, Drásov, Czech Republic	<a href="https://fluorcams.psi.cz/products/handy-fluorcams/">https://fluorcams.psi.cz/products/handy-fluorcams/</a>	Resolution of 1360 × 1024 pixels, frame rate 20 fps and 16-bit depth) with a 7-position filter wheel is mounted on a robotic arm positioned in the middle of the multi-color LED light panel with dimensions of 1326 × 1586 mm.
Walk-in FytoScope growth chamber	PSI, Drásov, Czech Republic	<a href="https://growth-chambers.com/products/walk-in-fyotoscope-fs-wi/">https://growth-chambers.com/products/walk-in-fyotoscope-fs-wi/</a>	Type of chambers used to grow the plant