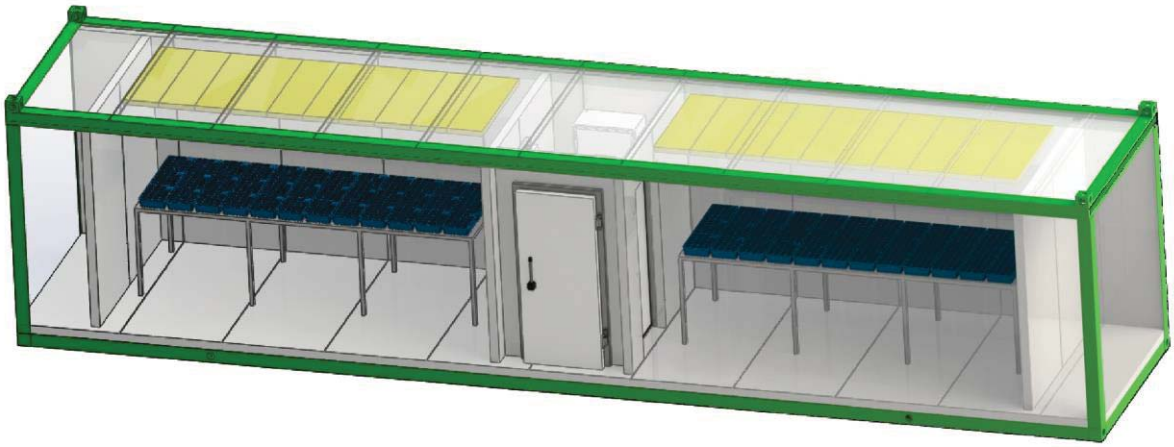
TO:
Research School of Biology
The Australian National University
Linnaeus Way
Canberra 2601
Australia

Quotation Q-170510-Grain Phenomics Climate Facility

Ln	Qty	Description		
1.	4	• **Grain Phenomics Climate chamber pair** Outside dimensions: 12.195m x 2.45m x 2.9m Inside dimensions Chamber 1: 2.2m x 4.4m x 2.0m PUR panel thickness 100mm • **Climate conditions** Temperature: +10°C to +40°C (lights full on) Humidity: 40 - 80%RH • **Light conditions Chamber 1:** Intensity 500µmol/1m Type: LED – white + multispectral Illuminated area: 5.4m^2 • **Light conditions Chamber 2:** Intensity 1000µmol/1m Type: LED - white + multispectral Illuminated area: 5.4m^2 • **Cultivation space:** number of trays: 36 trays each room number of pots: 720 seedling pots 216 large pots per room		



Dimensions

Growth areas:	Cultivation facility for grain plants. Single shelf with space for 36 Trays. Trays hold 20 small pots for seedlings or 6 large pots for adult wheat plants. Lights from the top. Total 10,8m^2 of cultivation area.
Internal dimensions:	10,4 m (w) x 2,2 m (d) x 2,0 m (h)
External dimensions:	12,2 m (w) x 2,4 m (d) x 2,9 m (h)
Growth area:	10,8 m^2 growth areas in a one layer
Growth height:	2m from the floor up to the lower edges of lights

Performance data

Temperature range:	Maximum	+40°C
	Minimum when lighted lamps:	+10°C
	Minimum when lamps are turned off:	+4°C
Stability:	±0.5°C	
Lighting:	Each growth area has its own control unit with independent control and regulation.	

The maximum intensity of light: 500 and 2000 µmol/m^2/s (at a distance of 50-150 cm from the lights.

Regulation of light intensity: 0% to 100%

Each growth area will be individually controlled using the software. Light intensity is controlled individually for each growth area in its entire range.

Head Office / Invoicing Address:
Kolackova 1057/39
621 00 Brno, Czech Republic

VAT Number: CZ60646594
E-mail: info@psi.cz
www.psi.cz

Mailing & Shipping Address:
Drasov 470, 664 24 Drasov
Czech Republic

Tel: +420 511 440 012
+420 511 440 022
+420 388 440 046

1. Insulation walls

Interior surfaces

Covering layer of sandwich panels consist of hot-dip galvanized steel sheet which is painted with quality powder coating. This ensures a hygienically smooth and durable surface even on inaccessible edges, and also the perfect corrosion protection.

Exterior

Chamber is composed of modular layered (sandwich) panels, with thickness of 100 mm, consisting of inner layer formed of a foam polyurethane and of the substrate of galvanized steel sheet equipped with a white powder coat.

Door

Refrigerator rotary door, double, 1900x9[illegible] mm. Metallic, layered with shell made of double-sided galvanized sheet, surface-modified by polyester coat. The door is locked from the outside, but it is always possible to open it from inside - even if it was locked.

Insulation material

Polyurethane foam.

Coefficient of thermal conductivity

0.025 W/mK.

Fresh air

Fresh air is necessary for plant growth, but also brings hydrothermal loads. By optimizing its flow rate regarding the necessary amount needed for growth, the cost of operation can be. Fresh air is drawn through the primary filters G4 (according to EN779), then its temperature is modified to the desired temperature in the space of chamber bay to +10 to +35° C. Its humidity is not modified by electric preheating and water cooler connected to a central source of cooling. It is then filtered by the second stage of G7 filtration (according to EN779). Excess of fresh air is exhausted through a HEPA filter (according to EN779) with prefilter G7 (according to EN779). It is transported by pipeline to the outside area. The entire inlet and outlet of fresh air is controlled by a central MaR system, that monitors the temperature of supply air, sedimentation of all levels of filtration and operation of fans with any monitored disorders. Distribution of air is performed by its addition into the circulating air providing temperature climate.

2. Height adjustable lighting and imaging for each growth area

LED lights

- light equipped with modules with LED light sources
- Intensity of irradiance min. 500 - 2000µmol $m^{-2}s^{-1}$ at a distance of 50-150 cm
- Colours White 6500K, Red-623nm, Green-523nm, Blue-451nm,
  Deep Red-660nm, Far Red-740nm, Infrared-850nm, Infrared-940nm
- operation modes - continuous light, user-modulated light
- simulation of light modes (day, night)
- simulation of light modes (diurnal – dawn, day, dusk, night, 5min resolution)
- simulation of light modes (dynamic fluctuation, clouds, canopy shade)
- light area:10,8m^2
- light radiates minimum thermal energy to avoid influencing the sample
- independent regulation of the intensity of each colour channel, spectral tuning
- lifetime of LED modules at least 90 000 hours at 1% tolerance of defective diodes

Shelf height

- manually adjustable shelf height of 1cm across 1.5m as plants grow

Delivery and Payment Terms:

- All prices are given in AUD and they exclude VAT.
- Country of origin: Czech Republic.
- Warranty: 12 months.
- This quote valid: 6 months
- Delivery term: 5-12 months after a formal PO receiving.
- Banking information for **AUD:**

Account Name: PSI (Photon Systems Instruments), spol. s r.o.
Account Number: 6876652
Bank Name: Ceska Sporitelna, a.s.
Bank Address: Ceska sporitelna, a.s., Olbrachtova 1929/62, Praha 4, CZ-140 00, Czech Republic
SWIFT: GIBACZPX
IBAN (AUD): CZ39 0800 0000 0000 0687 6652

Payment terms:

60% on signing,
30% on delivery,
10% after testing

May 15th 2017

Photon Systems Instruments, spol. s r.o.

Invoicing Address:
Kolackova 39, 621 00 Brno, Czech Republic

Mailing Address:
Drasov 470, 664 24 Drasov, Czech Republic

tel. : +420 511 440 012
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