



File No.51-4/PPFS/GET(12-197-B)/Pl.Phy.

Dated: 10-01-2025

**NOTICE FOR E-PROCUREMENT THROUGH GeM**

Online GeM e- bid are invited from reputed Manufacturere/Supplier/Authorized dealer in two bid system (Technical and Financial) for purchase of scientific equipment **Portable Photosynthesis with Fluorescence System with Accessories, Qty. 01 No.** for **Genome Editing Project** on behalf of Director, ICAR-Indian Agricultural Research Institute, New Delhi. Please visit [www.iari.res.in](http://www.iari.res.in) for details Rules and Regulation and log in [www.gem.gov.in](http://www.gem.gov.in) for online e-bidding.

Details of Gem Bid is/are as mentined below:

GeM Bid No.	<b>GEM/2025/B/5806289</b>
Bid Submission start date and time	10-01-2025
Last Date & Time for submission of bid	01-02-2025 11.00 a.m.
Date & Time for opening of Technical Bid	01-02-2025 11.30 a.m.

Sd/-  
Asstt.Admn.Officer

**Annexure I**  
**Technical Specifications of Portable Photosynthesis with Fluorescence System**

Photosynthesis System should be portable and ideal for field or lab work that should include with control facility of CO<sub>2</sub>, H<sub>2</sub>O, Light, Temperature, Flow etc.

1. CO<sub>2</sub> and H<sub>2</sub>O infrared gas analyzers must be located in the sensor head.
2. **CO<sub>2</sub> Gas Analyzer and concentration control.**
  - i. Type: Absolute non-dispersive infrared gas analyzer.
  - ii. Number: two qty.
  - iii. CO<sub>2</sub> measurement range: 0 to 3000 ppm/ $\mu\text{mol mol}^{-1}$ . (4 second averaging at 400  $\mu\text{mol mol}^{-1}$ ),
  - iv. Precision/Resolution:  $\leq 0.1 \mu\text{mol mol}^{-1}$  or better.
  - v. CO<sub>2</sub> Control Range: 0-2000  $\mu\text{mol mol}^{-1}$  with CO<sub>2</sub> Cartridge.
  - vi. CO<sub>2</sub> Cartridge with Lifetime: >8 hours after puncture.
  - vii. Orientation sensitivity  $\leq \pm 0.1 \mu\text{mol mol}^{-1}$ .
  - viii. Accuracy: Within 1% of reading at 200  $\mu\text{mol mol}^{-1}$  or above
3. **H<sub>2</sub>O Gas Analyzer and concentration control**
  - i. Type: Absolute non-dispersive infrared gas analyzer/solid state detector or better
  - ii. Number: two qty.
  - iii. H<sub>2</sub>O measurement range: 0 to 75  $\text{mmol mol}^{-1}$ .
  - iv. Precision/Resolution:  $\leq 0.01 \text{mmol mol}^{-1}$  or better.
  - v. H<sub>2</sub>O Control Range: 0 – 90% RH (noncondensing).
  - vi. Accuracy- within 1.5% of reading at >5  $\text{mmol mol}^{-1}$
4. **Temperatures.**
  - i. Operating Temperature Range: 0–50 °C.
  - ii. Temperature Control Range: Leaf Temperature:  $\pm 10$  °C from ambient.
  - iii. Chamber exhaust air temperature (1 qty) and temperature control block type (1 qty): Thermistor
  - iv. Thermistor with Range: -10 – 60 °C; Accuracy:  $\pm 0.15$  °C or better.
  - v. **Leaf temperature sensor:** Type (1 qty): Type E fine-wire thermocouple  
Sensitivity Range: -10 – 60 °C  
Accuracy:  $\leq \pm 0.5$  °C total
5. **Air pressure**
  - i. Console pressure sensor: Range 50 to 110 kPa with accuracy  $\pm 0.4$  kPa
  - ii. Signal Noise:  $\leq 0.004$  kPa peak-to-peak with 4-second signal averaging
  - iii. Chamber pressure sensor control : Range: -2 to 2 kPa
  - iv. Control Range: 0 – 0.1 kPa (dependent on flow rate through the chamber)
6. **Light Measurement and control system**
  - i. PAR measurement range: 0 to 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$  with Accuracy:  $\pm 5\%$ .
  - ii. Light source must be suitable for all leaf areas.
  - iii. PAR/Quantum Sensors (2 Nos.): one in the cuvette/chamber, 1 for Ambient.
7. Leaf/Air/Mass Flow must be range of 0 – 1400  $\mu\text{mol s}^{-1}$  (for low to highly photosynthetic leaf/scientific experiments).
8. Provision for measuring leaf gas exchange using the ‘Dynamic Assimilation Technique’ capable of recording fast measurements (10-15 seconds) along with reduced uncertainty in parameter estimates for high throughput applications.
9. **Communication:** 1 Ethernet port; 2 USB Port in the console.
10. Rechargeable battery (capacity: 6800mAh) (4 Nos. or more) for operation in field to work up-to >16 hours or more. Instrument configuration and data acquisition must have the ability to be remotely controlled through Ethernet connection. Data storage: 8 GB Flash memory expendable upto 32 GB.

11. Console display sunlight-readable TFT LCD with capacitive touch screen. Instrument should have self-diagnostic and alerts for any error with the measurement (e.g., air leak) and control settings (e.g., condensing RH, VPD) targets during measurement.
12. Photosynthesis measurement Parameters: CO<sub>2</sub> absolute, CO<sub>2</sub> difference, H<sub>2</sub>O absolute, H<sub>2</sub>O difference, flow, ambient pressure, Leaf chamber Air temperature (upper and lower), leaf temperature, ambient temperature, PAR, Ambient PAR, Evaporation, VPD, H<sub>2</sub>O conductance, Net photosynthesis, Intercellular CO<sub>2</sub> concentration etc.
13. Chlorophyll Fluorescence Measurement/ Control parameters: PAM fluorometer well integrated on leaf cuvette sensor head and not as separate unit / instrument. Ability to flash high saturation light intensity upto 16,000  $\mu\text{mol m}^{-2} \text{s}^{-1}$  and measure fluorescence signal over larger leaf area (6 cm<sup>2</sup>) with light variability  $<\pm 10\%$  over 92% of the aperture. Measuring light peak wavelength 625 nm, blue actinic peak wavelength 475 nm, far-red peak wavelength 735 nm, actinic light output 0 – 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$  total at 25 °C, Uniformity  $<\pm 10\%$  over 92% of the aperture with white top gasket, leaf area with 2-6 cm<sup>2</sup>.
14. The fluorometer should have modulated frequency: 1 Hz – 250 kHz for high resolution induction kinetics. Should be capable for OJIP transient studies to study photophysical details of pigment LHC.
15. The system should have the options to connect at least 8 external sensors such as soil temperature, soil moisture sensor so that these parameters can be measured simultaneously with leaf gaseous exchange and chlorophyll fluorescence.
16. **Accessories:** Tripod (1 No.), Panheadmount, Chemicals: Soda lime for CO<sub>2</sub> scrub (5 bottles); Silica gel for H<sub>2</sub>O scrub (5 bottles); 8g CO<sub>2</sub> cartridges (300 nos.); System spares: Leaf Thermocouple (1 No.) Propafilm kit (1 No.); Air Pipe (1 No.); Alligator wrist clip (1 No.); Console filter kit (1 No.); Chamber interface gasket; Filter and barbs; Swabs O Rings; Spring assy. Light Source Gasket Kit; Single bay battery charger with adapter; Power supply to console. Printed manual, Data Downloading software, (List of spares attached).
17. User-cleanable optics and simple maintenance procedures to minimize down time and maintenance costs of IRGAs. The system should have option for recalculation of stored data with other parameters.
18. A standard warranty for **three years** should cover the instrument, its components, and software.
19. The bidder is required to provide certification affirming the absence of any manufacturing defects in the instrument.
20. Original Brochure highlighting (Point number must be mentioned in brochure) the desired specification must be enclosed with the quotations. Quotation will not be considered without original brochure.
21. List of Five best publication having citation of the given instrument.
22. The quoted price must cover the instrument cost along with taxes (GST and customs) and any other charges, as well as transportation to the institute. The quoted price must be valid for at least 90 days.

**It may please be noted that proposed Equipment /Specification is Proprietary of M/s Li-Cor Inc., USA has the proprietary rights on manufacture of this equipment. However, if any manufacturer is engaged in business of manufacturing the same equipment/item and considers itself capable to supplying the same to the Institute as per desired technical specification, delivery terms etc. at competitive rates he may participated in this tender alongwith documentary proof as require in the bid.**