

Plant growth chamber specification

Item: Modular Plant growth chambers with illuminated racks for growing Arabidopsis as well as Grasses like Rice and Wheat.

Number: Two

Body Design and Dimension:

The body design should be build as reach in growth chamber. The construction should be made up of galvanized or corrosion resistant stainless steel where inner walls are coated with adequate insulated panel. The property of material or insulated cover should minimize the heat and cold loss or intake from inside to outside and vice versa.

The design of these chambers should serve the purpose of growing both Arabidopsis as well as Rice plant in future. The shelves should be replaceable with appropriate combination of light setting and space and height in multilevel shelves for growing the Arabidopsis until they get mature and shed seeds.

Each chamber should be consists of at least of three tier of shelves, which are lighted independently in each tier from top by appropriate lamps. Shelves should be modular in design where one should be able to take extra shelves out and should be able to insert them keeping the growth height of Arabidopsis as well as Rice.

Construction:

Interior: Corrosion resistant stainless steel.

Exterior: Powder coated, Painted, protected steel with a textured finish.

Mobility: Lockable castors enable the chamber to be moved.

The bidder must ensure in the design of chamber it self that shelves steel should withstand the weight of soil, water and plant biomass.

Shelving

At least three tier of adjustable shelving made of sturdy stainless steel with appropriate thickness to bear the weight of soil and plants. Shelves slide in and out on stainless steel rail assemblies and should be vertically adjustable. The shelves should allow a growing height of 20 (± 2) inch per tier.

Door

Door while opening should allow full access to the interior of chamber and when closed keeps the door against doorframe tight via magnetic gasket seal so that internal moisture and cool air does not get leaked. Door should be front facing of the chamber.

Temperature

The plant growth chamber must maintain regardless of the outside weather condition, time of day and season of a year following temperature regimen.

S.N	Temperature range	Temperature stability at set point
o.		
1	+10 to +30 °C lights on	± 0.5 °C
2	+5 to +30 °C lights off	± 0.5 °C

Apart from temperature control a programmable minimum and maximum temperature tracking alarm should trigger automatically. Mandatory audible alarm should be provided.

Refrigeration and Humidity control

The refrigeration system should ensure uniform temperature and relative humidity across the shelves within the chamber. The refrigeration system control should have automatic operation and in the event of failure of the control system it should alert user via audible alarm. Relative humidity should be controllable in the range of 60-75% ($\pm 5\%$) irrespective of outside weather condition and temperature of chamber. Low energy ultrasonic humidity generator and advanced humidity sensors with an alarm are required to control moisture within the chamber.

Lighting system

Lighting system should include lamp canopies (from top only) for Arabidopsis and Rice. Each tier of shelves should be lighted from top by cool fluorescent lamps, supplemented by incandescent lighting lamps if required or better. The light intensity should be programmable from 100 $\mu\text{mol}/\text{m}^2/\text{s}$ to 350 $\mu\text{mol}/\text{m}^2/\text{s}$ by using a combination of fluorescent and incandescent lamps for Arabidopsis or better using dimmable option. Similarly, the light intensity should be programmable from 500 $\mu\text{mol}/\text{m}^2/\text{s}$ to 900 $\mu\text{mol}/\text{m}^2/\text{s}$ for Rice or better by dimmable option. The programming of light option should allow the user to change the day and night cycle length conveniently. Give the justification how the quoted lighting system should be ideal for both Arabidopsis requirements as well as for Rice. If a bidder quote for two separate lighting kits one for Arabidopsis and another for Rice then he should mention the price clearly.

Safety Controls

A user programmable monitor on the chamber should display temperature, humidity and status of day/night cycle digitally. In addition, safety features such as audible and visual alarms for temperature and humidity to notify the user in case of breakdown should be integrated within the monitor. The system monitor should be able to store the temperature, humidity and day / night cycle data for at least one week.

Controlled CO₂ in let option

The plant growth chambers should be equipped with controlled CO₂ in let option where user can either increase CO₂ supply or decrease it. The bidder must quote in optional the price of a CO₂ kit.

Airflow

The airflow design should discharge uniform flow of air horizontally across the shelves when multiple shelves are under use. For growing crop plants the flow of air should be bottom to top in the chamber and have no or minimum impact on the rate of transpiration of plants.

Plant growth area and height

It should give total shelving or floor area more than 55 (± 1) ft² for growing plants with 20 (± 2) inch growth height in each shelf for Arabidopsis. For crop plants multiple shelves should be removable to achieve the growth height approximately 60-inches.

Additional terms and conditions

1. The bidder should take full responsibility of installing chambers and making them functional once they arrive at IISER Mohali. The institute will provide a water tap connection along with appropriate power point plugs.
2. The system should be equipped with all accessories for proper & effective functioning (such as power supply cords, stabilizers etc.) Any up gradation of the system accessories and software within two year from the time of installation should be provided free of cost.
3. Price of individual components should clearly be specified in the standard and optional format in the quote. Note, quote price for the optional kits and shelves including lights should be mentioned. The quotation should justify each specification point by point in their order of requirements. Quotation not done in the proper form may invite technical rejection.
4. Five-years of unconditional warranty for growth chambers and five-year of unconditional warranty on compressors should be provided. Copy of manufacturer's warranty (not agents) to be included at the time of handing over. An appropriate Servo stabilizer should be included in the final price for each chamber and price must be included in the final quote. After five years of warranty period price for five years of annual maintenance contract (AMC) must be quoted with terms and conditions clearly. Similarly comprehensive maintenance contract rate should be supplied.
5. The bidder should be in a position to supply these chambers within three months after getting order.
6. Two extra sets of light bulbs should be included in the final price quote for both the chambers.
7. A server to store the day-to-day parameters of the chambers should be quoted by bidder and included in the final price.
8. A branded Light meter to check the intensity of light should be provided.
9. A high-performance branded vacuum cleaner (2000 watt capacity) should be given by the supplier to clean the chambers.
10. Justify in the order of requirement each specification and provide original catalogue to evaluate the technical bid. Photocopied catalogue will not be accepted for technical evaluation.
11. IISER Mohali reserves the right to change the final configuration of chamber including the warranty and AMC.
12. Due to shifting of the lab in new building, two free shifting and installation of the chambers should be offered without any cost, if required in the first five years of warranty period.