Plant growing facilities at ITQB NOVA

General rules for plant work
in growth chambers and greenhouses

Oeiras
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2. Plant growth facilities at ITQB NOVA

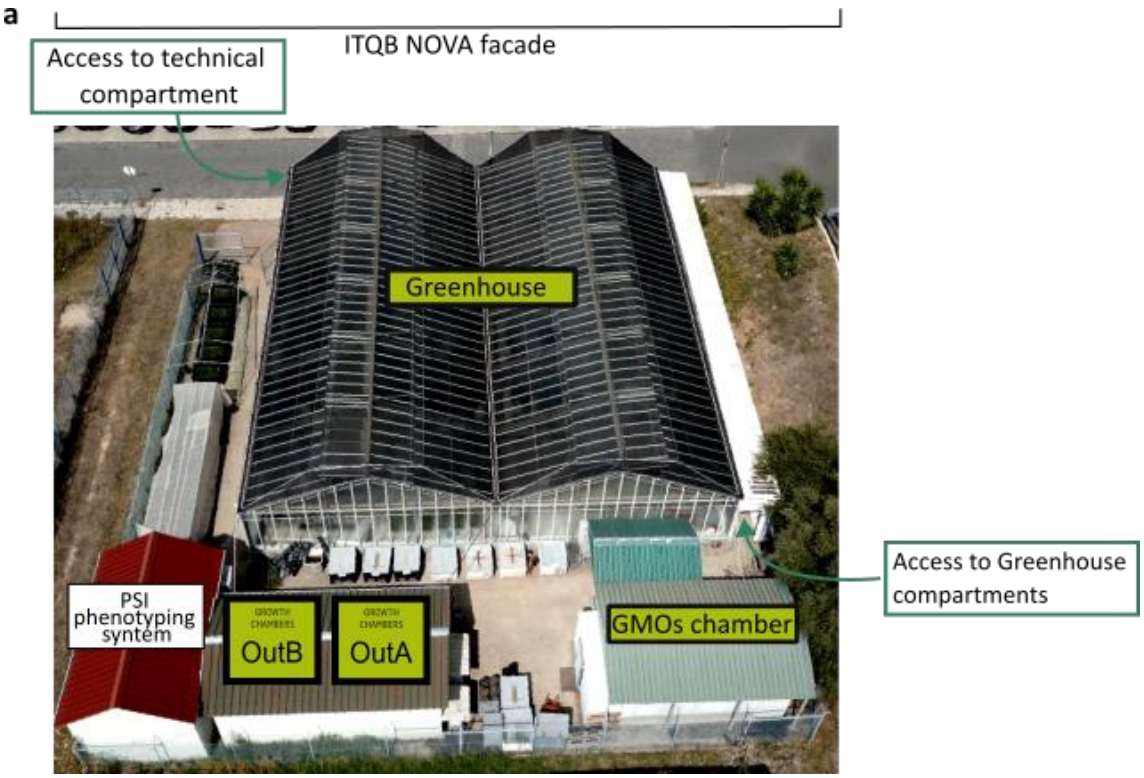
At ITQB NOVA, there is 1 greenhouse and 9 walk-in growth chambers in the following locations (Figure 1).

Greenhouse complex - outside

- Greenhouse
- OutA growth chamber
- OutB growth chamber
- GMO chamber - only available for GPlantS users with clearance

Inside ITQB NOVA building

- 1A, 1B, 1C, 1D growth chambers - 1st floor
- 8A, 8B growth chambers - 8th floor



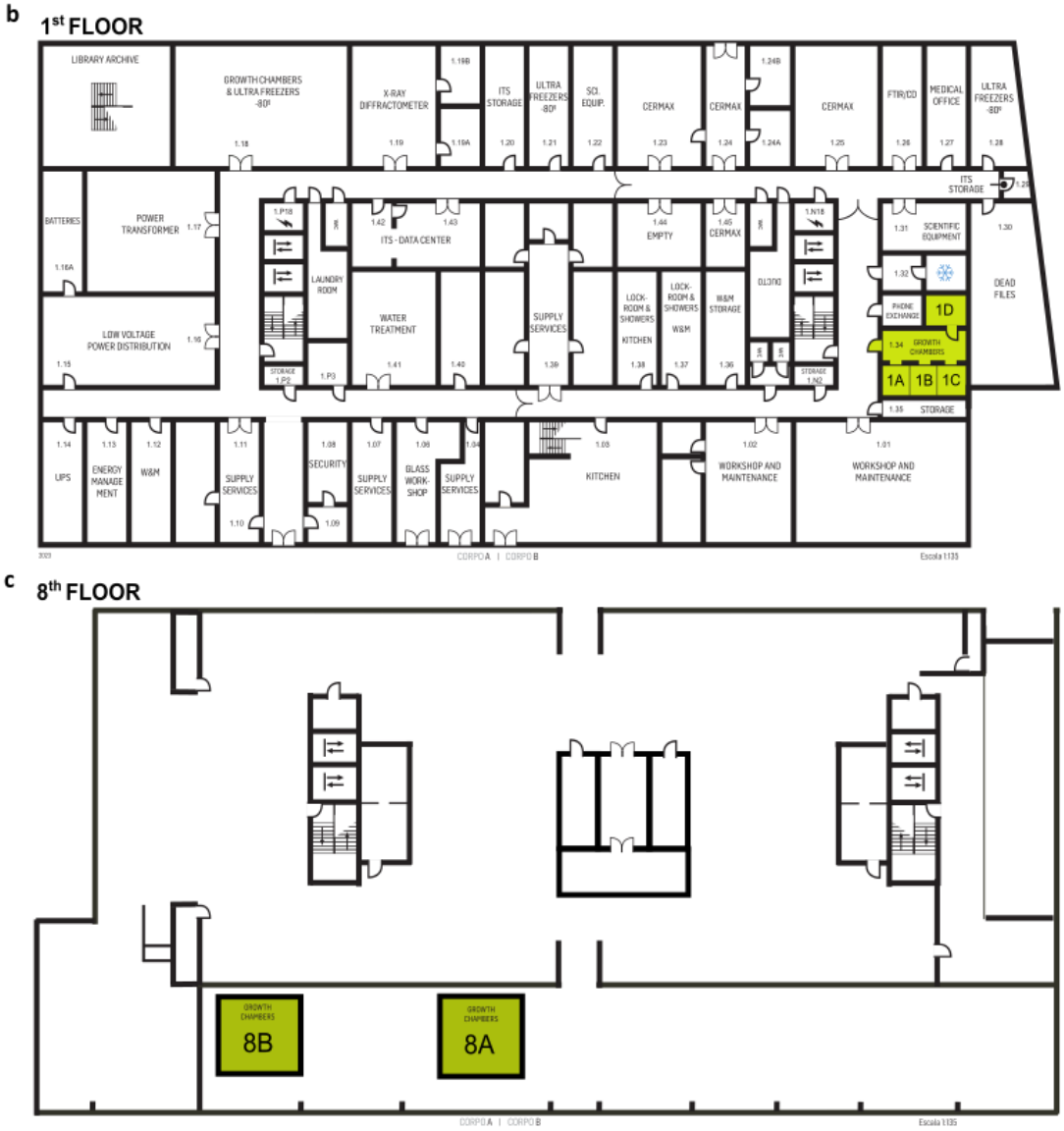


Figure 1 - **Plant growth facilities location**. (a) Aerial view of the greenhouse complex, including the greenhouse, OutA and OutB growth chambers, and GMOs chamber (in green). (b) Plan of ITQB NOVA 1st floor, including 1A, 1B, 1C, and 1D growth chambers (in green). (c) Plan of ITQB NOVA 8th floor, including 8A and 8B growth chambers (in green).

3. Duties and responsibilities of personnel and users

a. Personnel

The ITQB NOVA plant growth facilities have a dedicated technician whose duties are:

- Support users in plant **growth facility operation tasks** (*e.g.*, preparing substrate, filling pots, sowing, planting, transplanting and transporting plants, watering and fertilizing, weeding, pruning, applying phytosanitary treatments, cleaning and disinfecting material, disposing of plant and soil waste). Support researchers in field experiments inside the campus (*e.g.,* OeirasExperimenta). **Support** for these tasks should be requested through a **helpdesk ticket** (https://helpdesk.itqb.unl.pt/rservices/) **two weeks before the date the support is required** to guarantee its execution. Please mention the type of support (soil preparation, type of soil, pot filling, cleaning…).

  For external users (non-ITQB NOVA members): Please contact Ana Fortunato (anasofia@itqb.unl.pt), who will coordinate requests with the plant growth facilities technician. Please observe the two-week in advance policy.
- General **maintenance and organization** of the plant growth facilities, including cleaning, waste disposal, and reporting malfunctions.
- Plant propagation and/or production needed for demonstration **classes or other outreach events** (*e.g.*, open days).

b. Users

The ITQB NOVA plant growth facilities are available to all Green-it research groups and ITQB NOVA members outside the Plant Division upon request by filling the Form and are subject to prior approval.

Eventual maintenance or repairs will be supported by users based on the time of use of the infrastructure.

The ITQB NOVA plant growth facilities are for exclusive use in research activities. However, they may be visited as part of institutional activities/projects open to the community (Open Day, Plant Fascination Day, partnerships with schools, Citizen Science Projects, etc.) provided they are **duly authorised by the ITQB NOVA Direction and coordinated with the RM**. Request must be done by filling the Form.

All users are required to:

Compliance & safety:

- Follow the **plant growth facilities rules**, and **ITQB NOVA safety manual** (https://www.itqb.unl.pt/internal/safety/Safety_Manual_EN.pdf).
- Report **malfunctions or hazards** immediately.
- Ensure the **greenhouse complex is secure** after use (lock doors, shut off equipment).

Plant care & monitoring:

- **Label all plants and/or trays** (MANDATORY: user's name, laboratory number/group leader and institution, if external to ITQB NOVA).
- **Monitor plant health regularly** and report issues like pests, diseases, or nutrient deficiencies.

- **Dispose of waste properly and timely** (See **5. Waste Management**).

Respect for shared space:

- **Minimise interference** with other users' experiments. **Communicate** with users/technicians/RM if needed.
- **Book facilities responsibly**, according to your needs. Communicate with the RM (anasofia@itqb.unl.pt) if you would like to alter the booking. **Be mindful of space** limitations in the plant growth facilities. Unused bookings impact other users' work, so please cancel or adjust your reservation if the space is no longer needed.

Best practices:

- Soil mixtures and pot filling **must be done at the greenhouse complex** (outside or in the technical compartment).
- Use a **closed box to transport plants** when plants are flowering and/or shedding seeds.
- In the shared growth chamber OutA, **bag plants before they dry out** completely to avoid shedding seeds.

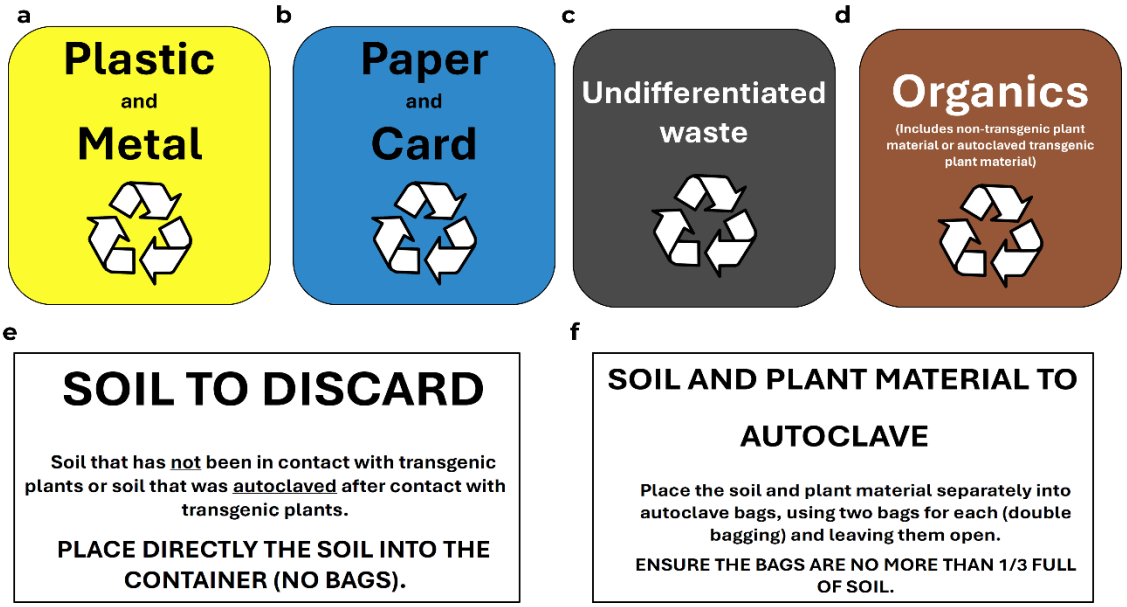
4. Phytosanitary treatments

Upon detecting potential symptoms of pests and diseases, phytosanitary treatments can be administered. The plant growth facilities technician is the **ONLY** certified personnel authorized to handle phytosanitary products. The use of these products by other users is **strictly prohibited**.

For prompt action, users should speak directly with the plant growth facilities technician, who will prioritize the treatment and notify all greenhouse and chamber users. Additionally, users must submit a helpdesk ticket (https://helpdesk.itqb.unl.pt/rservices/) for the phytosanitary treatment.

5. Waste management

Please dispose of waste adequately. Within the greenhouse complex, there are 6 different types of containers labelled as follows:



a. Recycling

Recycling at the plant growth facility follows the guidelines of the Portuguese organization *Sociedade Ponto Verde*, **with plastics disposed of in yellow containers** (**Figure 2a**), and **cardboard and paper in blue containers** (Figure 2b). There are recycling bins throughout the greenhouse complex and in the technical compartment.

b. Undifferentiated waste

All other waste material may be disposed of in trash cans for undifferentiated waste (Figure 2c). All compartments have a trash can for undifferentiated waste. **Do not discard plants** (even if wildtype) **or soil** in the undifferentiated waste.

c. Disposal of plants and soils not derived from transgenic, cisgenic, or new genomic techniques

Plants not derived from transgenic, cisgenic, or new genomic techniques should be placed in the **organic matter container** (Figure

2d). The associated soils should be disposed of in the black containers labelled *SOIL TO DISCARD* (Figure 2f). When the container is full, users must inform the plant growth facilities technician.

<u>d. Handling transgenic, cisgenic and new genomic techniques waste and associated soil</u>

Genetically modified plants require special handling before disposal. Users must **separate genetically modified plants from soil into autoclave bags,** using two bags per disposal and without closing the bags. Afterwards, users should deposit the bags in the grey container labelled *SOIL AND PLANT MATERIAL TO AUTOCLAVE* (Figure 2f) located in the greenhouse technical compartment.

The greenhouse technician will direct the bags for autoclaving and dispose of the waste afterwards.

Beware that the **vacuum cleaner** waste should be disposed of as **containing genetically modified organisms**.

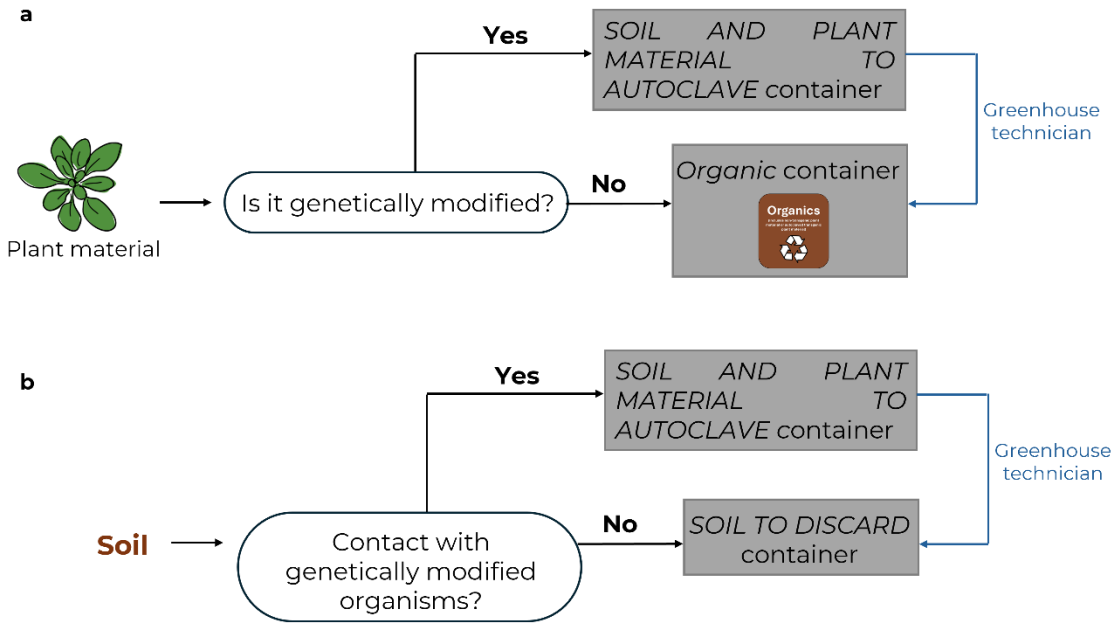


Figure 3 – **Flowchart depicting the disposal process for plant material and soil waste** (a) Plant material. (b) Soil.

6. Greenhouse

All ITQB plant labs have a key to access the greenhouse complex. However, if you do not have access to one, you can request a **key** from the security office on the 1st floor of ITQB NOVA. The key must be returned immediately after use.

Access to the **greenhouse should be done through the door** (NOT through the technical compartment; see **Figure 1**).

The greenhouse consists of **5 compartments** for plant growth; 3 are assigned to a specific research group and 2 are shared. Additionally, there is a technical compartment.

- Compartment 1: Shared.
- Compartment 2: Plant Ecophysiology and Metabolism (PEM) lab and Plant-Microbiome Interactions (iPM) lab.
- Compartment 3: Genetics and Genomics of Plant Complex Traits (PlantX) lab.
- Compartment 4: Genomics of Plant Stress (GPlantS) unit.
- Compartment 5: Shared.
- Technical compartment: Dedicated to plant growth support activities, including soil, pots, benches, and sinks for preparation and cleaning tasks.

In addition to specific rules that may apply to compartments 2, 3, and 4, please follow these universal principles:

- It is **mandatory** for users **to label all materials** clearly with name, lab, and institution, if external to ITQB NOVA.
- Keep compartments clean and organized.
- To use the shared compartments, please contact Ana Fortunato (anasofia@itqb.unl.pt).
- After completing an experiment, return pots and trays to the technical compartment for washing (DIY or requesting support

upon ticket-request to plant growth facilities technician - see **3. Duties and responsibilities of personnel and users**).

- Dispose of all waste following the guidelines in **5. Waste Management**.
- When closing the greenhouse, ensure that no one remains inside the compartments.

- **7. Growth chambers**

Plant Growth chambers: types and features

Name	Brand and model	Topology	Light	Humidity	Other features
1A	Aralab FITOCLIMA 5.000PLH	Up to 6 shelves	LED; 0-600µmol^{-1}m^{-2}s^{-1}	40-80%	Can regulate CO_2 concentration
1B	Aralab FITOCLIMA 5.000PLH	Up to 6 shelves	LED;0-600µmol^{-1}m^{-2}s^{-1}	40-80%	-
1C	Aralab FITOCLIMA 5.000PLH	Up to 6 shelves	LED; 0-600µmol^{-1}m^{-2}s^{-1}	40-80%	-
1D	-	Bench			-
8A	Aralab FITOCLIMA 10000 EHHF	Bench	LED; 150-900 µmol^{-1}m^{-2}s^{-1}		-
8B	Aralab FITOCLIMA 10000 EHHF	Bench	LED; 150-900 µmol^{-1}m^{-2}s^{-1}		-

OutA	Aralab FITOCLIMA 5.000PLH	6 shelves	Fluorescent	-
OutB	Aralab FITOCLIMA 10.000HP	Bench		-

If you plan to use a growth chamber, please follow these steps:

Check availability

- ITQB NOVA users: Log in to the intranet (https://www.itqb.unl.pt/Internal/) using your credentials and select *Booking Grow Chamber* to check availability.

- Users from other Green-it institutions should contact Ana Fortunato (anasofia@itqb.unl.pt) directly.

Booking request

To book a chamber, send an email to Ana Fortunato (anasofia@itqb.unl.pt) with the following details:

- Name
- Lab and Principal Investigator (PI)
- Chamber or shelf ID (for OutA) (see. **Figure 4**)
- Growth conditions (except for OutA, where conditions are set)
- Planned starting date
- Estimated period of use (maximum 120 days).

Each chamber is reserved for one lab/researcher at a time, except for OutA, which is booked by shelf.

- **OutA conditions remain fixed:**
    - Light cycle: 16h light (100 $\mu mol \cdot s^{-1} \cdot m^{-2}$) at 22°C, 8h dark at 18°C
    - Humidity: 60%

Please ensure your booking request is complete to facilitate the process.

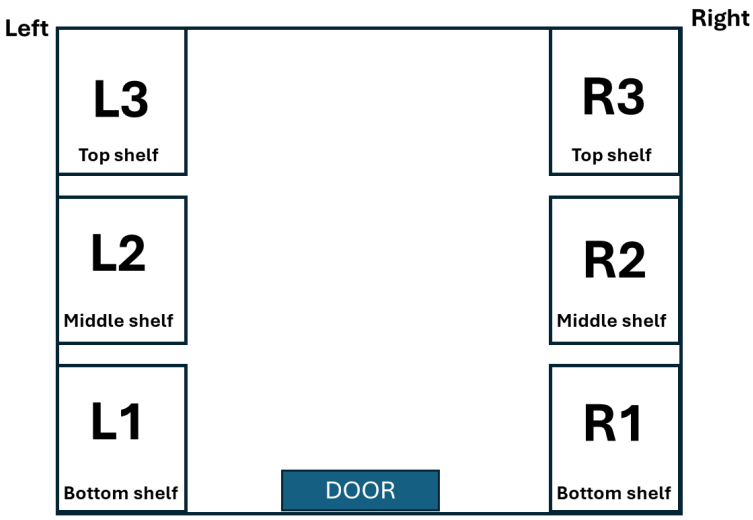


Figure 4 – Shelf layout inside the OutA chamber. Unlike other chambers, the OutA chamber is booked by individual shelves rather than the entire chamber.

Accessing the growth chambers

- **OutA and OutB** (Greenhouse Complex) – Request the key from the security office (1st floor); the keyring includes a key for the external gate. **Return the key immediately after use**.
- **1st and 8th Floor growth chambers** – Freely accessible without a key.

Usage guidelines

Before using a chamber:

- Fill in the **chamber ID sheet** attached to the door. Please use a marker to write on the outer plastic cover.
- If the chamber is **not clean or empty** or if you notice any **malfunction**, report it to Ana Fortunato (anasofia@itqb.unl.pt).

Personal protective equipment (PPE)

- **OutA (shared chamber):** Wear a lab coat and shoe covers (kept inside the support cabinet).
- **All other chambers: Shoe covers** are required.

Preventing contamination

- Minimize **door opening time**.
- For chambers with an **ante-room**, **never open both doors** simultaneously.

- Once you enter the greenhouse on a given day, you may not enter the growth chambers.
- Plants cannot be moved from the greenhouse into growth chambers. Please take this into consideration when planning your experiments.

OutA cleaning

Given that OutA is a shared growth chamber, users should fulfil their expected cleaning duties as established in the **cleaning rota** (attached to the door). Users should **vacuum and wipe the floor**. The vacuum cleaner can be found in the technical compartment. Vacuum cleaner waste should be disposed of as containing genetically modified organisms. A mop, bucket and detergent are available in the anteroom.

Post-experiment cleaning responsibilities

After the experiment, users are responsible for cleaning the growth chamber, which includes:

a. **Disposing** appropriately of all plant and soil material - see **5. Waste management.**
b. **Emptying the chamber.** Please take the pots to the technical compartment, wash them and put them back on the shelves upon drying. If you require assistance from the plant growth facilities technician, use a helpdesk ticket to request it - see **3. Duties and responsibilities of personnel and users**).
c. Ensuring all lights are functioning. If any are faulty, inform Ana Fortunato (anasofia@itqb.unl.pt).
d. **Vacuuming the floor**, including under removable grids if applicable. The vacuum cleaner can be found in the technical compartment. Vacuum cleaner waste should be disposed of as containing genetically modified organisms.

e. **Wiping down** the benches/shelves and floor with soapy water. Benches/shelves should be also disinfected (*e.g.*, 10% bleach or 70% ethanol).

8. GMOs chamber

The GMOs chamber is located in the ITQB NOVA greenhouse complex (see **Figure 1**) and is primarily used for growing transgenic rice plants. It is managed by the GPlantS unit, and only certified GPlantS members are authorized to use it.

To get the certification for access, GPlantS members must read the GMO manual (*Procedures for Safe Working with GM Plants*) and pass a written test. To schedule the test, please contact the ITQB NOVA Safety Committee Coordinator Helena Matias (lenap@itqb.unl.pt),

External members who wish to access the chamber should contact Isabel Abreu (abreu@itqb.unl.pt).