Standard Operating Procedure for UTM Research Greenhouse

Contact Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
<th>Number</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Biology</td>
<td>General Inquiries</td>
<td>905-569-4455</td>
<td><a href="mailto:biochair.utm@utoronto.ca">biochair.utm@utoronto.ca</a></td>
</tr>
<tr>
<td>Joan Lee</td>
<td>User Committee Chair/Greenhouse Coordinator</td>
<td>905-828-5423 647-221-3391 (cell)</td>
<td><a href="mailto:joanp.lee@utoronto.ca">joanp.lee@utoronto.ca</a></td>
</tr>
<tr>
<td>Brenda Pitton</td>
<td>Greenhouse Assistant</td>
<td>905-828-5423</td>
<td><a href="mailto:brenda.pitton@utoronto.ca">brenda.pitton@utoronto.ca</a></td>
</tr>
<tr>
<td>Carolyn Moon</td>
<td>Department Manager</td>
<td>905-828-5361</td>
<td><a href="mailto:carolyn.moon@utoronto.ca">carolyn.moon@utoronto.ca</a></td>
</tr>
<tr>
<td>Campus Police</td>
<td>Non-medical emergencies</td>
<td>905-569-4333</td>
<td></td>
</tr>
<tr>
<td>Medical Emergencies</td>
<td></td>
<td>Call 9-1-1 (dial 9-9-1-1 if using the facility phone)</td>
<td>Please inform campus police so that they may direct emergency services to your location.</td>
</tr>
</tbody>
</table>

Introduction
This document serves to provide guidance on the operation and maintenance of the University of Toronto Mississauga’s Research Greenhouse (RG). The RG has five environmentally controlled glasshouses (1 large, 4 small) and additional storage and experimental preparatory and processing areas that serve as an interdepartmental resource for plant research. Space can be requested by any faculty member (or their associated lab members) on the UTM campus following the procedures described below.

Oversight & Management
The RG is administered by the UTM Office of the Vice-Principal Research (OVPR) and managed by the Department of Biology. Facilities Management and Planning (FMP) provide support for garbage/compost removal and cleaning. The Engineering Department provides support for the operation of the facility as it relates to hydro and water services and the proper functioning of equipment. The User Committee is responsible for determining the standard operating procedures of the RG, considering user’s needs and requests for space that may impact other researchers.
**Personnel and Responsibilities**

Personnel that will work in the RG include staff, faculty, post-doctoral researchers, graduate students and undergraduate students.

**Staff:**
The staff responsible for the daily operations and monitoring of the RG

- Joan Lee, Greenhouse Coordinator (GC) who oversees the RG and the rooftop greenhouse (joanp.lee@utoronto.ca; 905-828-5423). The GC will coordinate and/or perform daily walk-throughs of the facility to ensure proper operation of the facility.
- Brenda Pitton, Greenhouse Assistant (brenda.pitton@utoronto.ca) and work-study students whose job it is to assist in the maintenance and operation of both the RG and rooftop greenhouse.

Successful experiments require preventing the movement of pest insects and pathogens to the RG from the rooftop greenhouse or from outside. Thus, staff and researchers alike must take precautions to prevent pests. For example, individuals should avoid visiting the RG after visiting the rooftop greenhouse or field sites; please visit the RG first at the beginning of the day. Likewise, individuals should avoid moving between glasshouse units. Staff and researchers should consider wearing lab coats when entering pest-sensitive experiments. Experiments should be started using fresh clean material (e.g., seeds) whenever possible. If plants are started from material taken from the field or another facility it is important to thoroughly inspect and treat the material for any signs of insects or pathogens. All material not started from seed should be treated with appropriate biocontrol as per recommendations from the GC.

Staff should report any operational problems to the Chair of Biology, the Biology Departmental Manager, the Chair of the User Committee, and contact the engineering department when necessary. Staff should also report potential problems observed with experiments to PIs and students/PDFs running the experiments in question. These problems may include but are not limited to wilting, disease, pest outbreak and pots falling over.

The GC is responsible for coordinating space and tracking usage, programming environmental conditions to meet researchers’ needs and ensuring that the glasshouse is working properly and is in adequate condition for research. Greenhouse staff will prepare signage on the door of each unit indicating the lab using the unit, contact names and numbers, plus any notes on special conditions, procedures or access. Staff may also be called on for advice in plant husbandry and experimental protocols.

Staff are not responsible for the physical setup, maintenance or clean-up of experiments, which is the responsibility of researchers. In consultation with the GC and Departmental Manager of Biology, researchers can pay for additional services such as watering, experimental maintenance at the rates shown below in the table (see Fees).

**Researchers:**
Researchers are comprised of faculty, post-docs and students. Faculty or personnel from their lab are responsible for requesting space, determining the environmental settings required and...
communicating this to the GC. Researchers are responsible for all aspects of the experimental setup, maintenance and clean-up. Since there is limited storage for soil, pots and materials, used soil should be disposed in the dumpster outside of the facility by researchers, and pots should be either disposed or cleaned promptly after the completion of an experiment. If researchers do not clean up an experiment within a week of completion following a reminder email, they will be charged for the removal of material at $50/hour of clean-up time by staff with a minimum of 1 hour billing.

Researchers are required to order and pay for their own supplies, including plant material, pots, soil, fertilizer and CO\textsubscript{2}. All materials including pots should be pest-free before entering the RG. Field pots can be cleaned in the Davis Building or outside of the RG using a hose or pressure washer. Dirty pots generated from experiments at the RG can be cleaned in the facility’s sinks. Please make staff aware of any sink backups. The GC may be able to provide guidance on vendors.

It is important that researchers promptly communicate any and all potential problems with the building to the GC.

**Emergency Procedures**
In the event of medical emergency call 9-1-1. Non-urgent emergencies, including major problems with the operation of the facility can be directed to the campus police: 905-569-4333, who can direct calls to building engineers. A phone is available in the facility. Calls require dialing 9 for an outside line.

The GC can be reached at: 905-828-5423
The Chair of the User Committee (Prof. Ingo Ensminger) is available at: 905-569-4599.

General Inquiries can be directed to the Department of Biology at: biochair.utm@utoronto.ca, 905-569-4455

**Fees (for UTM personnel only)**

<table>
<thead>
<tr>
<th>Service</th>
<th>Fee</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Access fee</td>
<td>$300.00</td>
<td>per year (incl. Research and Rooftop Greenhouses)</td>
</tr>
<tr>
<td>Glass house (single)</td>
<td>$75.00</td>
<td>per month</td>
</tr>
<tr>
<td>Glass house (double)</td>
<td>$150.00*</td>
<td>per month</td>
</tr>
<tr>
<td>Technician Time (eg. weekend watering)</td>
<td>$21.00</td>
<td>per hour (minimum 1/2 hr)</td>
</tr>
<tr>
<td>Bench Fee</td>
<td>$30.00</td>
<td>per month</td>
</tr>
</tbody>
</table>

*Reduced rates for the double room may be available if less than half of the room is being used and access to other rooms is restricted

Billing will be invoiced by the Department of Biology and the GC will be responsible for reporting the periods of usage by each lab quarterly to the Biology Manager.
Charges are assessed per unit (not per bench), but researchers can organize amongst themselves to share space and costs of units. Such arrangements should be clearly communicated to the GC at the time of space request for billing purposes.

**Access to the Facility**
Access to the facility will be by card swipe. Faculty should request access for personnel (please provide UTORid) in their lab from the Department of Biology Manager (Carolyn Moon; Carolyn.moon@utoronto.ca; 905 828-5361). Faculty must inform the Department of Biology Manager when they no longer need access.

All researchers should restrict their activities to the common-use areas and the units they are renting. This is to prevent disruption of sensitive experiments and the movement of pests between units.

Guests to the facility must be accompanied by either a staff member or a researcher with authorized access to the RG. Guests should not be permitted to stay on site alone.

**Training**
All researchers must receive training on safety, protocols and procedures from the GC before using the RG. This will include but is not limited to how to acquire access to the facility, best practices for avoiding movement of pests, protocols related to storage of materials and equipment, clean-up during and after experiments, how to report problems, and protocols related to emergency.

The training should be requested from the GC in advance of using the facility. Training can be requested by filling out the UTM Research Greenhouse Training request form on the Research Greenhouse website: [http://www.utm.utoronto.ca/biology/greenhouse](http://www.utm.utoronto.ca/biology/greenhouse)

Undergraduate research assistants require training if they will be entering the RG on their own; they do not require training if they are accompanied by and assisting researchers that have already received training.

**Requesting Space & Environmental Conditions**
All requests for space should be made in writing to the Greenhouse Manager using the online request system available on the Biology website ([http://www.utm.utoronto.ca/biology/greenhouse](http://www.utm.utoronto.ca/biology/greenhouse)) at least two weeks before the start of an experiment.

Requests for space should include:
1. The amount of space required (see bench sizes below)
2. The start and end dates of the experiment; if the experiment unexpectedly starts later or runs longer than planned please submit a modified request as soon as possible
3. The environmental conditions required, including:
   a. Max/min temperatures
b. Start and end times of supplemental lighting

c. Desired/required humidity level

d. Shading requirements

e. Venting requirements

f. Any additional specific requests

g. A brief description of the research, including the organism(s) being studied, and any extraordinary treatments being used (e.g. the use of live insects or pathogens, CO2 enrichment, etc.)

h. The name and number of the cost center and fund center from which funds should be withdrawn

i. Whether the researcher is able to share the space with other researchers if space is limited. Researchers sharing existing space are still required to submit a request form for approval prior to occupying the space.

Bench sizes:
In planning for research needs, please note that the large unit contains five benches with the following dimensions:

- Fixed bench: 5.49m x 0.76m
- Roll top bench 1: Large bench: 3.51m x 1.24m
- Roll top bench 2: Medium bench: 3.66m x 1.24m
- Roll top bench 3: Large bench: 3.51m x 1.24m
- Roll top bench 4: Medium bench: 3.66m x 1.24m

Smaller units contain three benches with the following dimensions:

- Fix top bench: 1.83m x 0.76m
- Roll top 1: 3.51m x 1.24m
- Roll top 2: 3.66m x 1.24m

Note: Request for space that might impact other researchers (e.g., the use of herbivorous insects, pathogens, etc.), will be considered by the user committee and further details or requirements may be requested before approval.

Storage
There is some space for the storage of soil fertilizer, pesticides, clean pots and other equipment and material. The RG should be used for equipment and supplies that are in active use. Long-term storage should make use of the storage facility on Principal’s Drive. Keys for this facility can be requested from Assistant to the Chair (905-828-3876).

Pesticides
Pesticide use on plants is permitted provided that the individual performing the pesticide application is properly licensed and trained to do so, and proper healthy and safety protocols are followed. Researchers should consider alternative means of controlling pest insects, including biocontrol, non-pesticide treatments (e.g., soap in water) and discontinuing
experiments followed by running the glasshouse unit at maximum temperature for several days. Pesticide use should be used as a last emergency resort to save critically important experiments and requests for pesticide use should be sent to the Chair of the User Committee and GHM. At least one member of the GH staff should be properly trained and certified to mix and apply pesticides.

Pest control products are available on a shared basis for plant material in the research greenhouse facility. Requests for pest control products can be made by submitted UTM Research Greenhouse Pest Control request to Joan Lee – Greenhouse Coordinator.

**Cleaning**

Cleaning will be the responsibility of all users of the RG. Researchers should sweep soil from the floors and counters that originates from their work, and remove pots, and other supplies or equipment from common-use areas. Used soil and pots should be moved by researchers to appropriate compost or garbage bins on the exterior of the building.

Cleaning staff from FMP will remove garbage weekly, sweep the floors of common-use areas, and clean or service bathrooms.

The RG staff should provide a thorough final cleaning of the floors and benches after each researcher has completed their experiment. This may require a final removal of some residual plant material, washing down or power-washing the floor to remove build-up of soil and algae. A complete powerwashing of the glasshouse units should be performed at least annually by RG staff.

**Equipment, Supplies and Repairs**

The RG will provide all major equipment required for plant growth. This equipment includes hoses, soil mixer, sinks, ebb and flow flood benches, soil storage containers, pot washing containers, a pesticide cabinet and mixing station. The RG staff will request for the replacement of light bulbs, and report needs for repair to the Department of Biology Manager and user committee chair. The GC or the Core Facility Manager should contact the building engineer in the event of a system failure, such as a loss of hydro, water, and other major infrastructural problems. In consultation with the Manager of Biology and the OVPR, the GC will coordinate the ordering of replacement parts or repairs to the facility.

Researchers should report any possible problems with equipment to the RG staff. This includes minor issues (e.g., light bulbs), as well as major issues such as problems with heating/cooling.

**Rooftop Greenhouse vs RG**

The RG and existing growth chamber space should be the first choice for most research needs. The Rooftop greenhouse can be used for research on a case-by-case basis in consultation with the GC, Chair of Biology and the User Committee. The rooftop greenhouse will implement an equivalent pay structure to the RG ($300 annual access fee provides access to both).