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# PLANT GROWTH FACILITY USER MANUAL

**An Orientation to Policies  
and Practices**

Updated: January 2016

***The policies and guidelines outlined in this manual have been developed by the Plant Growth Facility (PGF) Manager and PGF Advisory Committee***

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### **Mission of the Plant Growth Facility**

To promote a collaborative and stimulating environment for excellence in plant research using advanced technologies and a client-focused service team

### **PGF Staff & Contact Information**

PGF staff members are available on site seven days a week to address any questions/ concerns users may have. General work hours for PGF staff are between 8am-5pm Monday-Friday, with weekend staff present Saturday and Sunday. The PGF Manager is on call 24/7 to address any alarms or emergencies. Feel free to contact the PGF Manager or other staff members directly. We are committed to resolving your inquiries in a timely manner.

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### **PGF Services & Supplies Offered**

A number of standard services and common supplies are included in the growth space rental fee. Extended (non-standard) services & specialty supplies may be offered at an additional fee. Services and Supplies descriptions can be found at <http://danforthcenter.org/scientists-research/core-technologies/plant-growth/services>

#### **PGF standard services (included in growth space rental fee):**

- Programming and monitoring of computer-controlled environments.
- Watering 365 days a year.
- Maintenance of proper soil fertility levels.



- Pest scouting and control measures.
- Adjusting and maintaining supplemental lighting and photoperiod control.
- Greenhouse maintenance and routine sanitation.
- Autoclaving/devitalization of all plant material.
- Setting up automated irrigation systems where appropriate.
- Advise and assist with planting and repotting crops when time permits. Users must give advance notice.
- If the estimated time to complete a requested task is greater than 1 man-hour, a week's notice is required and charges will be incurred (see below). Otherwise, 24 hour notice is sufficient if time is available.

**Supplies provided for users' potting needs (included in rental fee):**

- Potting mixes, vermiculite, perlite, sand, Turface.
- Various sizes of square and round standard greenhouse plastic pots, trays, plug trays, cell inserts and nursery containers.
- Rooting hormone.
- Carts for transport.
- Small supply items such as bamboo stakes, twist ties, pruners, and pot labels.
- Safety items including disposable gloves and personal protective equipment (PPE).

**Extended PGF services (offered for added fee):**

*These services may be offered by the PGF based on time and labor availability. Users will be charged for the following services:*

- Seed sowing in plugs or trays and transplanting of seedlings to pots.
- Direct seed sowing in final pots.
- Transferring to soil from tissue culture and potting up of rooted cuttings.
- Propagation of cuttings and potting of stake cuttings.
- Moving plants from potting room to a growth area, or moving plants from one area to another, unless the change of location is initiated by the staff.
- Maintenance of stock plants beyond the base care above (i.e.: leaf removal, pruning, repotting, restarting new cuttings, keeping records, etc.).
- Any crop specific record keeping and labeling.
- Harvesting and cleaning of seed.
- Pollinating and bagging of flowers.
- Staking and pruning of plants.
- Other services that are beyond standard offerings.

**Facility Users' Responsibility**

**Users should take an active role in monitoring their crops by doing the following:**

- Planning space needs and supply needs in advance. If supplies needed are not the standard ones kept on hand, at least two weeks notice is required. For these special request items, the user may be charged.
- Using the Plant Transfer Record (PTR) system and barcode tags when placing any plants in the facility.



- Spacing plants properly to ensure air movement and access for watering, as determined by the staff.
- Providing relevant instructions and feedback to the greenhouse team.
- Monitoring for insects and diseases (in addition to greenhouse team's program).
- Keeping growth areas and work areas sanitary and orderly.
- Notifying the manager when an experiment is terminated or growth space is no longer needed.
- Removing all PTR tags before plant disposal and checking tags out of the system.
- Returning used trays and large pots to the potting room dishwashing area for disinfection and reuse.
- **Using autoclave (red) bags for disposal of all plant materials and other biowaste**
  - Place any/all plant material in red autoclave bags. These can be found in all work areas, including Potting Rooms.
  - **Do Not Overfill Red Bags!** Bags should be tied up if they are half-full, or if they cannot easily be lifted (>10lbs). Bags will become heavier after autoclaved. If using sand or other heavy media, bags should be tied up when no more than 1/4 full.
  - Place tied bags in designated carts/hoppers or collection areas.

### Housekeeping

The PGF is a busy, working facility, but all users are expected take the time to clean up after themselves and keep their growth and working areas organized.

Users are also responsible for helping to keep the facility sanitary by cleaning up:

- Work tables after potting, harvesting, etc.
- Carts after transport
- Sinks after use. Never pour agar/gel down the drains!
- Greenhouse corridor floors of soil, debris if dropped while transporting your plants.

The greenhouse team works hard to keep an orderly, sanitary facility, but cannot keep up if users don't share responsibility. Depending on workload, we will clean the potting area two times/week, empty trashcans at least once a week and give greenhouses "deep cleaning" and disinfecting at least monthly. We will help discard large experiments and help clean up whenever time allows, but it is the user's primary responsibility to clean up area and discard materials after use .

### Growth Space Rental Fees & Other Charges

Growth space rental fees are associated with the use of greenhouse and growth chambers/room. Growth space rental rates may be found at the following sites:

<http://w3/growthfacility/About.aspx#fees.htm>

As specified above, common supplies are provided for use by the researchers. The PGF may order specialty items on researchers' behalf; however, the cost may be charged back to the requestor's lab. In addition, requests for extended services that are beyond the scope of base-level services mentioned on pg. 3 may incur an additional fee.



### **Requesting Use of Growth Space**

The PGF Manager is responsible for allocating growth space to DDPSC researchers and external clients.

Incoming graduate students, post docs, and visiting scientists should provide information to their responsible faculty or lab coordinator about space needs for their experiments for that period by determining the amount of square feet needed.

Space in growth chambers and growth rooms will be allocated on an as needed basis. Due to the limited availability of these spaces, not all requests will be immediately approved.

The following steps must be taken prior to acquiring growth chamber/room space:

- 1) *Complete a PGF Growth Space Request form and submit via email to the PGF Manager.* Be sure to fill out the form as completely as possible. Incomplete request forms may not be accepted, or will be delayed in processing. Request forms should be submitted at least 2 weeks in advance of desired start date.  
Fillable space request forms may be found by following the below link:  
<http://danforthcenter.org/scientists-research/core-technologies/plant-growth/resources>
- 2) *If space is available,* PGF Manager will notify requestor to discuss and come to an agreement on rental term length, as well as any other outstanding items.
- 3) *If space is not available,* the request will be added to the Wait-List. The requestor will be notified when a suitable growth space becomes available.

### **Guidelines for Allocating Greenhouse Growth Space**

While all PGF greenhouse ranges are well-maintained and of exceptional quality, certain ranges have differing equipment and functionalities that are more conducive to growing certain types of crops. For example, A-range is equipped with 5 air-conditioned compartments; therefore, cool-season crops have priority for this space.

Below are the general guidelines for each greenhouse range. Where applicable, the PGF Manager will operate under these guidelines when allocating growth space.

#### **All ranges:**

- Allotments that allow same/similar crops to be housed in same general area (same range) are preferred. This will increase operational efficiency as well as energy savings.
- Labs whose crops do not meet specific criteria for a certain range may still rent space if there is vacancy and no impending requests to grow plants that are better suited for growth in that range.
- Allotment of space will be as equitable as possible, in attempt to provide each lab with the appropriate and necessary amount of space for their projects.

#### **A Range:**

Growth scenarios that generally meet the following criteria (in no particular order) will have first priority for A-range space:



- Growth of crops requiring lower growth temperatures (<75°F). These plants have priority for air-conditioned spaces (G3-A, G5-A, G6-A, G-12A, G-13A).
- Growth of crops short in stature (< 3 ft. tall). These plants have priority in spaces equipped with multi-tier shelving.
- Growth of crops at no more than 50-60% humidity.

#### B Range:

Growth scenarios that meet the following criteria (in no particular order) will have first priority for B range space:

- Growth of crops requiring high light (higher lighting density in many B range compartments)
- Growth of crops tall in stature (in compartments with high ceilings).
- Growth of crops requiring high temperatures (in compartments with increased lighting density and/or heated floors).

#### C Range:

Growth scenarios that meet the following criteria (in no particular order) will have first priority for C range space:

- Growth of crops needing high light (C range has movable light racks and increased light fixture density in all compartments).
- Growth of crops tall in stature (All compartments have high ceilings).
- Significant space need. Labs that can make use of larger greenhouse space will allow greater space use efficiency of the large C range compartments. This will also have the added benefit of opening up more space in A and B ranges.
- Growth of crops requiring higher temperatures (>80°F). C range is able to maintain high temps (>90°F) even during severe cold (<0°F).
- Crops requiring higher humidity.

### **Terminating use of a Reserved Growth Space**

*By User Request:* During the growth space rental term, a user may wish to terminate their use of the space and stop the accrual of rental fees. This may be requested at any time by simply notifying the PGF Manager via email. In the “Stop Chamber/Greenhouse Use” email, please provide your name, lab/department, chamber/greenhouse number, and date you wish to move out of the growth space. Users must clean out all plant material, containers, and any other items in growth space. Rental fees will be charged until all user materials are removed and chamber can be cleaned by PGF. Advanced notice of intent to stop growth space use will help expedite process.

*By PGF Action:* In an order to maximize the use of limited growth spaces, especially growth chambers and rooms, the PGF has been authorized to remove/reassign any users from a growth space if said user is not using the space appropriately or effectively. The user may be asked to consolidate their plants into another space, or to remove their plants from the facility.



### **Designating a Lab Growth Space Coordinator**

To ensure the best and most efficient use of the limited growth space, one person from each lab or department should be designated as the growth space coordinator for that lab. This person will be the primary contact for PGF staff if there are any space use concerns.

### **Creating a Plant Transfer Record (PTR)**

**All users must create a PTR\* when any plant material is placed into the facility or transferred from one area to another. This applies to both reserved and multi-user growth spaces.**

PTRs may be created at any of the PTR computer stations. PTR stations are available in the Head House Potting Room and C range Potting Room. Use these computer stations to create a PTR and print out a barcode tag. One barcode tag must be placed in each plant container greater than 4.5" (e.g. pots and flats). PTRs allow the PGF staff to track many useful data, including the owner of each plant, rental fees, space use and plant diversity data, special plant care needs, and pest management information. It also ensures that plants in the facility are being used for research purposes. Therefore, it is absolutely critical that all researchers and clients use the PTR system.

**Plants which do not have a PTR record may have services withheld or may be discarded entirely. Continued non-compliance will result in the suspension of services.**

\*CassavaTracker barcoding system may be used in place of PTR system

### **General & Chemical Safety**

The PGF team is responsible for operating the greenhouse in a safe manner. This includes operating under the EPA's Worker Protection Standards (WPS) and handling pesticides and other chemicals in accordance with all federal, state, and local regulations. This is a unique challenge in a facility available to its users 24 hours a day, and so requires a great deal of communication and cooperation between staff members and users.

We are committed to making information available about the chemicals we use. A pesticide application record manual is posted in the potting room. Safety Data Sheets (SDS) and copies of labels are available in the same location.

**PGF users must inform PGF Manager prior to chemical applications of herbicides, fungicides and other regulated chemicals to ensure compliance with all appropriate regulations.**

Faculty members are responsible for their staff's safety compliance in the Plant Growth Facility. Users are responsible for working safely and keeping the facility safe for others. This includes learning emergency procedures (e.g., fire evacuation), and location of phones, fire extinguishers, safety shower/eyewash stations, and first aid kits. See the Safety Compliance Manager (Jim Cox) or the PGF Manager with any specific questions.



### Pesticide Safety

PGF staff will notify users of an upcoming pesticide application (typically at least 48 hrs prior). If a scheduled pesticide application interferes with research, it is the researcher's responsibility to notify the PGF Manager as soon as possible. Users are prohibited from entering any growth area that has been sprayed prior to elapsing of the Restricted Entry Interval (REI); this is typically a 12-hour period from the end of the application. Users are also restricted from entering any area, such as corridors, during an active pesticide spray. EPA-approved NO ENTRY signs will always be on doors of treated areas, meaning the restricted access is currently in effect. See picture at right for example. →



**Users must abide by these signs whenever posted.**

These signs will be taken down after the label-designated restricted entry interval (REI) has passed. Although the control agents used range widely in their toxicity, it is prudent for users to assume that all pesticide applications are potentially hazardous. Individual greenhouse compartments or entire ranges that have been treated with pesticides will be temporarily locked to prevent entry until the REI has expired.

**Violation of entry restrictions by a user (including faculty) is strictly prohibited and may result in suspension of PGF use privileges.**

### Storage

Storage in the Plant Growth Facility is very limited. Items left lying around or otherwise improperly stored pose a safety hazard and are unsightly. *Contact the PGF Manager if you need to store an item.* No items may be stored in greenhouse corridors. Do not use the ledges along the windows for storage. Items found there will be removed.

Only chemicals used for greenhouse or chambers may be stored in the pesticide storage room. All containers should be labeled, including those containing only water. Pesticides for research use—either concentrated or in final solution (such as herbicides for screening)—cannot be stored in the greenhouse. They should be stored properly in a laboratory.

### Restricted Access/Quarantine Areas

Some areas may have restricted access due to the presence of viral diseases, intellectual property, or other factors. Only authorized personnel are allowed in these areas. Other policies/protocols for working in these zones will be posted on the doors. It is the responsibility of the user to read, learn and follow all special procedures related to restricted access areas.

### Bringing in Plants/Cuttings from Outside Sources

**Plants or cuttings that have been grown in the field, another growth facility, or any other external environment must be inspected for pests and disease by the PGF staff prior to entering growth spaces.** Contact the PGF Manager to schedule an inspection appointment if you wish to transfer outside plant material to the PGF. Proper inspection by our trained staff will ensure the safety of your crops as well as those of other researchers. If plants are clean, they may be taken to a growth space, provided that a pesticide application can be scheduled



immediately. If pests are present but treatable, the plants must be temporarily taken to a designated quarantine space where they will be isolated from other plants and intensively treated for pests. In severe cases, plants will not be allowed to enter the growth facility, particularly if plants show evidence of infectious disease.

### **Spacing Plants**

*Plants should be spaced properly on the greenhouse bench or in growth chambers to allow for air movement and access by greenhouse team to water, scout, and spray.* This will reduce incidence of pests and poor watering. Specific recommendations are not possible, due to vast number of species and pot sizes being grown. A PGF staff member will notify you if spacing needs to be modified. Do not use close spacing to make up for lack of space allocation.

### **Transplanting**

*Greenhouse users are responsible for transplanting their plants to keep them from frequently toppling over, or when the watering needs exceeds twice daily.* The PGF team will assist with this if time permits.

### **Collections, “Pet Plants”, and Other Long-Term Crops**

Space in the facility is reserved for research only. Personal use “pet plants” are not allowed. Starting personal garden plants or houseplants is not allowed. Collections should be used actively to fulfill a research mission. Plants should not be kept longer than necessary in the facility, particularly if they’ve completed their life cycle and are not actively growing. Insects and disease become a problem in all of these cases. In addition, this space is unavailable for active work. If you will be growing long-term (perennials, etc.) research crops, please contact the PGF Manager to discuss special care procedures.

### **“Orphan” Plants**

Users should check their crops at least once weekly. Leaving forgotten “orphan crops” in the PGF that are no longer needed not only results in poor use of limited PGF space and resources, but builds unnecessary rental fees for the user. You will be better satisfied with the results if you regularly monitor your plants and work with us to achieve your goals.

### **Audible Alarms**

The greenhouses and growth rooms/chambers are alarmed for temperature emergencies and system failures. If the climate temperature is above or below the temperature alarm set points, you will hear an alarm. You do not need to take action unless the alarm continues for more than 30 minutes, in which case you may contact the PGF manager or another staff member. The PGF Manager is automatically notified about an alarm via the computer control system. The alarm appears on the manager’s PC, and the computer also pages the manager’s phone. Even outside of work hours, the manager can view and acknowledge these alarms. Members of both the PGF and Facilities staff are on-call to respond to alarms and other emergencies 7 days a week.



## **Policy Violations**

**Users of the facility are responsible for learning and following these policies. The PGF manager will communicate policies and notify users if they are in violation. Policies may be modified or updated as necessitated. Any changes will be promptly communicated to the PGF users.**

**Repeated or deliberate violations of these policies will result in greenhouse services being suspended and/or a reduction in allocated space.**

