TEXAS A&M AGRILIFE RESEARCH

# PLANT GROWTH AND PHENOTYPING FACILITY

## User Manual*

# Table of Contents

## Section 1.0: Background and Mission

### *Background*

The "Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse" includes two related facilities that are jointly managed under the same structure: i) AgriLife Phenotyping Greenhouse (Bldg #1521), and ii) Borlaug Southern Crop Improvement Center (Bldg #1512). This manual applies to both facilities. The Facility was funded by Chancellor's Research Initiative Funds and leveraged Governor's University Research Initiative Funds to propel the use of biphotonics in agriculture. The facility was released by Vaughn Construction/SSC to Texas A&M AgriLife in March 2022.

### *Mission*

To provide researchers with state-of-the-art environments and technologies to assist in the advancement of soil and crop sciences, agricultural engineering, plant pathology, microbiology, biochemistry, and biophysics.

### *Vision*

Provide preeminent Southern Crop Improvement Center facilities for all Texas A&M AgriLife faculty and researchers through the continuous pursuit of facility improvement, services, and support of cutting- edge research and technology.

### *Intent of Facility*

- Provide adequate conditions that elicit Southern Crop Improvement Center cycles
- Provide adequate space for biphotonic activities
- Engages multi-disciplined scientists and spur new research interactions and programs
- Studies that require precise temperature and lighting control
- Studies with high probability of novel discoveries and/or programmatic impacts, including future grant funding opportunities

### *This facility is not primarily intended for:*

- Simple propagation of plant materials and other plant-associated experiments that can be performed using other existing facilities

## Section 2.0: Facilities Management Structure and Contact Information

***Facility Management and Administrative Oversight***
The Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse Manager will provide communication to the users of the facilities and enforce facility policies and procedures and is the point of contact to the Advisory Committee. Texas A&M AgriLife Research Associate Director and Chief Scientific Officer will oversee the facility.

| |
|---|
| *Facility Manager:*<br>Mr. Troy Vann, troy.vann@agnet.tamu.edu, (979) 324-7999; 2301 TAMU |
| *Manager Assistants*<br>Mr. Andrew McFarland andrew.mcfarland@agnet.tamu.edu ; 2301 TAMU |
| *Administrative Oversight:*<br>Dr. Henry Fadamiro, Associate Director & CSO, AgriLife Research |

***The Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse Advisory Committee***
The Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse Advisory Committee has been established to support the operations of the facilities. The committee will review and recommend changes/updates to facility operation and procedures including user fees, evaluates faculty requests for space and makes recommendations to the facility manager, and provides guidance to the building manager on various matters related to the management of the facility. The committee includes representatives from the various plant science-related departments and units. Each committee member serves a three-year term and may serve multiple terms. The committee will elect a chair who will serve a three-year term. The committee acknowledges the possibility of conflict of interest (COI) when dealing with space and other issues. COI should be minimized when the issue involves the committee member's interest. For instance, when dealing with space requests, electronic voting should be conducted to exclude the vote of the relevant committee member when COI exists.

Advisory Committee Members (2022-2025):

- Dr. David Baltensperger, Soil and Crop Sciences
- Dr. Amit Dhingra, Horticulture
- Dr. Carlos Gonzalez, Plant Pathology and Microbiology
- Dr. John Jifon, Weslaco
- Dr. Seth Murray, Soil and Crop Sciences
- Dr. Greg Sword, Entomology

Additional Texas A&M Contacts:

- Campus Police 911
- University Operator 979-845-3211

- Environmental Health & Safety 979-845-2132
- Facilities Services (SSC) 979-458-5930, http://aggieworks.tamu.edu

## Section 3.0: Fees

The growth facilities fee schedule is designed to partially offset the costs of maintaining and operating the growth facilities. Use of the facilities implies consent to the billing levels and operations of the growth facilities group.

**Space and Labor Fees *All prices listed on a per month basis**

| | |
|---|---|
| **Southern Crop Improvement Greenhouses: $0.60 / Sq. Ft** | |
| 120 sq ft. table | $72.00 / table |
| 167 sq ft. table | $100.00 / table |
| **High Throughput Phenotyping Greenhouses (Robotic): $0.85 / Sq. Ft ($0.60 sq. ft non robotic)** | |
| Small Non-Robotic (B, C, D) | $375.00 / room |
| Biotic Robotic | $500.00 / room |
| Abiotic Robotic | $1,000.00 / room |
| **Growth Chambers:** | |
| PGC Flex | $175.00 / Chamber |
| MTPS | $200.00 / Chamber |
| BDW (BDW w/ C02) | $225.00 ($275.00) / Chamber |
| **Storage Space:** | |
| Lockable Cabinets | $15.00 / Unit |
| Outdoor Ground | $0.50/ Sq Ft |
| **Services (Hourly, minimum of 2 hours):** | |
| Cleaning, Set up, Operations, Robot | $32.00 / Hour |

| **Consumables (Charged per individual item):** | |
|---|---|
| J G C/20 | $21.00 |
| JG C/25 | $16.65 |
| JG Germ | $29.29 |
| 1020 Tray | $0.89 |
| 3.5" Square Pots | $0.15 |
| 3 Gallon Pots | $1.00 |
| 4 Gallon Pots | $2.00 |

## 3.1: Appropriate use of facilities

The growth facilities are intended to be a space where top tier research is conducted. As such, it is the responsibility of every user to maintain the space in an orderly and clean way. Violators of this can have their use of the facilities suspended or revoked in future experiments. Pest control will be provided. All undergraduate, graduate, and professional workers are responsible for maintaining certification in the EPA WPS system.

## Section 4.0: Space Assignment and Requests

Request to use space including greenhouses and growth chambers can be submitted on the Phenotyping and Southern Crop Improvement Center website.

(Web link here)

**Request information must include:**

Primary Investigator name:

Department:

Phone:

Email address:

Space requested (greenhouse number, table numbers, growth chamber):

Person Applying for space (Person in charge of project):

Phone:

Email:

Project name:

## 4.1: Billing

Billing information (by providing this information to us, you are consenting to monthly charges for the use of the space and services)

Account Information for charges: _____

*Please allow 3-5 business days for all account information for billing to be approved*

## 4.2: Research Information

Please include research information and the plant logistics to help ensure the best outcome for both the researcher and the facilities.

Research goals:

Plant type:

Number of plants:

Number of days facility will be used:

Are plants Transgenic:

- Yes
- No

Biosafety Level:

- BL1-P
- BL1-P+
- BL2-P
- BL2-P+

Does your work with the material you plan to grow in the facility require an IBC permit? If you are unsure whether you require an IBC permit, please visit https://vpr.tamu.edu/biohazards-in-research-teaching-or-testing/approval-process/ for help.

- Yes
- No

If you answered yes to question 1, does your IBC permit specifically include the Southern Crop Improvement and Precision Automated Phenotyping Greenhouse on your permit?

- Yes
- No

*If you answered no to question 2, please submit an amendment to your IBC permit to include the location of where you plan to grow your plants and obtain the appropriate approval prior to initiating any experiments. It will be the responsibility of the PI to contact Biosafety for inspection and certification of the facility.*

- Prospective users are encouraged to contact the Facilities Supervisor to discuss their needs prior to submitting a formal space request.

- A valid account number must be submitted on the online application.

- If available, space will be provided typically on a first-come, first-served basis. However, as space becomes limited, prioritization of occupancy may be required.

- Requests for occupancy will be evaluated by the Advisory Committee.

- To promote the fullest utilization of the College's limited growth space facilities, unoccupied areas held in reserve at a user's request will be charged for as if the space were occupied.

- There will be charges for repairs necessitated by improper use or operation of the assigned unit as determined by the Facilities Supervisor.

## Section 5.0: Facility User Responsibility

### Safety

- Fulfill appropriate safety and training requirement to gain key access
- Facility users will provide their own PPE

### Cleaning

- Facility is to be always "tour ready"
- Clean up daily or as needed during use
- Keep work areas clean and orderly
- Floors are to always remain clean if you spill soil or sand sweep it up

### Resources

- All spaces both in the Southern Crop Annex and the Phenotyping Greenhouses are common use.
- Storage in both facilities is short term only. Project Specific Supplies will need to be removed when the project is complete.
- Everything should be labeled by PI's last name. Any items not labeled will be subject to removal

### Reporting

- Report any broken or worn equipment to facility manager
- Report and monitor improper use of facility equipment
- If you see a problem with something a facility user is doing you may tell them directly. Users may also choose to make the facility manager aware.

*The Precision Automated Phenotyping Greenhouse is a working facility as well as a show place. Some amount of workspace clutters is to be expected, but orderliness is still expected of all users. All items in the facility should be labeled with PI's last name. The facility should be "tour ready" at all times. Failure to keep a clean orderly working area will result in loss of privileges to the facility.*

*The Facility Manager will give key card access to the building after a mandatory users training. WPS training is required to use the facility.*

*All material coming into the building must be clearly marked with the PI's name and date it was brought into the facility. This will ensure that all materials are being actively used and that storage areas and cold room space are not being used as long-term storage.*

*Space provided by Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse is for research only. Abandoned projects will be discarded after an attempt is made to locate the owner.*

## 5.1: Storage

- Please contact the Facility Supervisor to discuss storage options.

## 5.2: Biohazardous and Transgenic Plant Materials

- All research that involves the use of transgenic plants, plant pathogens, toxins and recombinant DNA must have an approved Institutional Biosafety (IBC) Permit prior to initiation of the research. If your plant research will involve the use of these agents, you cannot put your plants into the growth chamber facility or greenhouse unless those facilities are listed on your IBC permit as they will require inspection by a Biological Safety Officer.

For more information, visit https://vpr.tamu.edu/biohazards-in-research-teaching-or-testing/approval-process/ Note that in many cases plants must be autoclaved before disposal, including those that are:

- transgenic
- virus-infected
- legally quarantined
- otherwise biologically hazardous
- otherwise required to be autoclaved by research protocols

Project personnel are responsible for:

- Providing autoclave bags. If the bag has a biohazard symbol, please place inside a secondary black bag

- Placing all materials in approved bag, sealing with autoclave tape.

- There are no autoclaves in the growth chamber facility. Therefore, the user must ensure a method to transport bagged autoclave waste out of the facility and proper autoclaving and disposal according to university policies.

## 5.3: Policy Violation

*Users of the Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse are responsible for learning the above policies. The facility manager will communicate policies and remind users when they are in violation. The expectation is that we will all work together to take care of this facility and be mindful of others. Repeated, deliberate violations of these policies may result in building privileges being suspended for that user.*

**Failure to comply with Federal and State laws and/or procedures may result in fines and/or loss of access to the facility.**

## Section 6.0: Safety

- Safety is the highest priority.
- Communicate with the Facility Supervisor when you see an unsafe condition or act.
- Cooperate with the facility managers to ensure your own safety, as well as that of your colleagues.
- It is the PI's responsibility to ensure that they and all members of their laboratory know the location of all safety equipment, including fire extinguishers, emergency showers and eyewashes, phones, and first aid kits.
- Know the emergency evacuation procedure for your area.
- Know where to find safety information, including material safety data sheets and pesticide labels.
- Know emergency phone numbers.
- Closed-toed shoes must be worn.
- No food or drinks, or smoking is allowed on either of the facilities premises.

## 6.1: Robotics

The AgriLife Precision Automated Phenotyping Greenhouse is equipped with robots designed to produce biphotonic and emit increasing wavelengths of energy. These robots are only to be operated with approval from Troy Vann after extensive training. If use of the robot(s) is requested, you must allow a facility employee to operate the program unless further instructed. It is advised to proceed with the necessary caution and report to Troy Vann with any concerns.

- Stay out of the greenhouse(s) during the operation of the robots.
- Remove all electronic devices (cellphones, earbuds, watches, tablets, etc.) while robots are on, and the lights are on/flashing (Figure 1).
- In case of an emergency, stay on the perimeter of the greenhouse while robot is activated.
- Do not operate the robot systems without the consent of Troy Vann.

On the outside and inside of the abiotic and biotic greenhouses there are color-coded lights that indicate the status of the robot systems and the accessibility to the entrances and exits. Before entering thew greenhouses, it is essential that the user understands and checks the status of the light barrier indicators.

Figure 1: Light Barrier Pushbutton Station

**Pushbutton Station Color Codes**

**Green (Solid) –** The door is closed, and the system is ready for auto cycle, or the system is currently in operation.

**Green (Flashing) –** An operator has requested access to a greenhouse entrance by pressing the door pushbutton station while the system is in operation. The system will finish its current operation before allowing the operator to enter.

**Yellow (Solid) –** The robot system is not in cycle. An operator may enter the greenhouse after performing safe entrance procedures.

**Red (Flashing) –** The door is closed, and the pushbutton station needs to be reset.

**Red (Solid) –** The door is open and not reset.

Figure 2: Remote HMI panel and door reset pushbutton

The pushbutton on the HMI panel will also indicate the status of the robot systems (Figure 2), which allows for safe entering and exiting of the abiotic greenhouses.

- If the pushbutton light is **solid yellow**, the robot system is either not in cycle or clear of the section an operator wishes to enter.

When exiting the greenhouses during usage of the robotic systems, the user must inspect and verify that all other occupants have left the room.

## 6.2: Pesticides

- Attend Worker Protection Standard training if you will work with pesticide-treated plant materials.

- Employees and students handling pesticide-treated plant material are strongly encouraged to wear gloves and to wash their hands after working with plants.

- Facility users will be notified 24 hours in advance if pesticides are being sprayed.

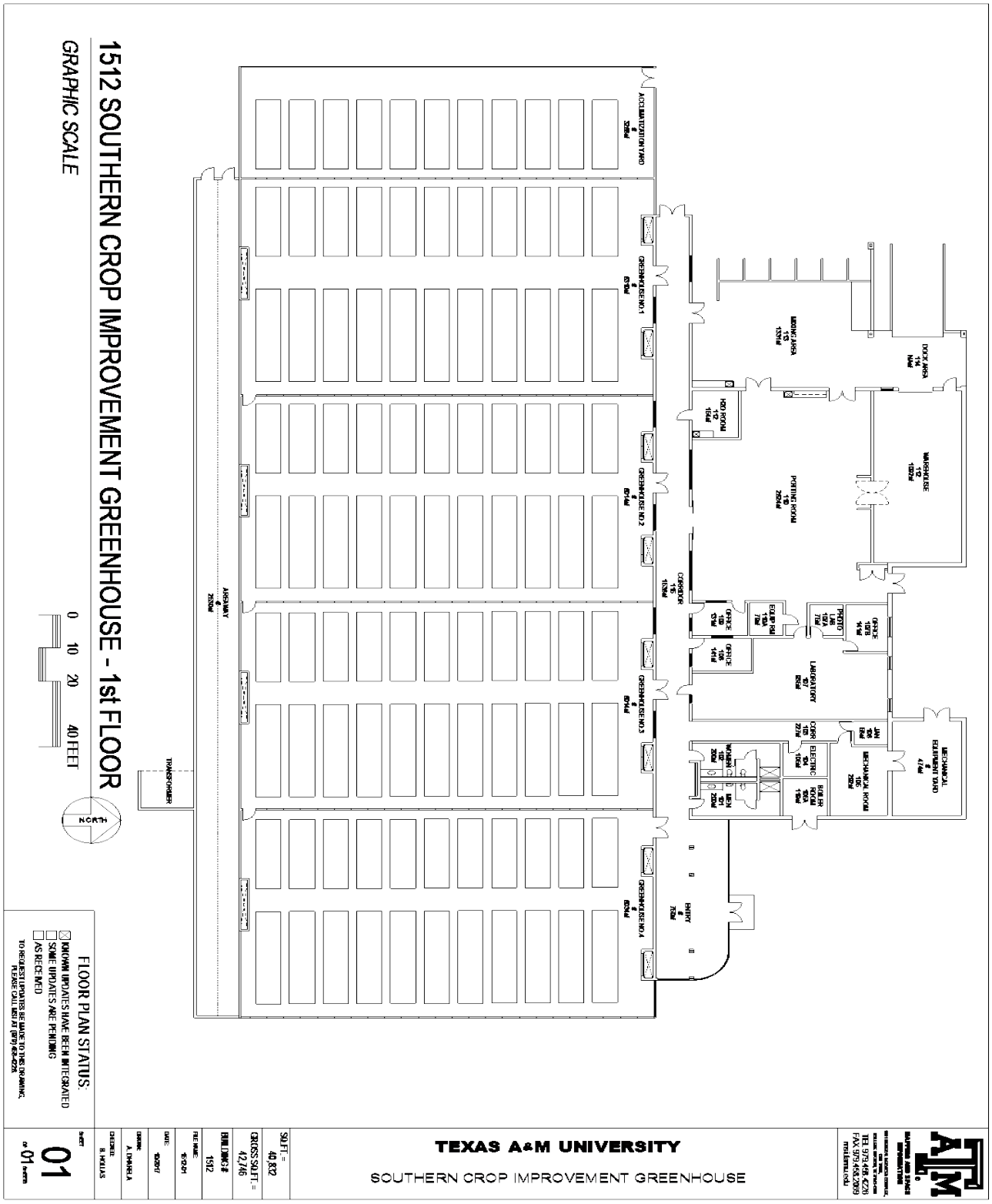
## Section 7.0: Building Access

- Access to each of the buildings can be found on the maps provided in the appendices.

- There is a card access door on the north side of the Southern Crop Improvement Center facility and the southside of the Precision Automated Phenotyping Greenhouse. If you or your lab personnel require card access, you must contact Troy Vann (troy.vann@ag.tamu.edu) and provide him with the name and UIN of the individual requiring card access. Typically, this request should come from the lab.

- Traditionally, all buildings will remain locked after hours, on weekends, and holidays found on the TAMU Academic Calendar.

## Appendix 1: Borlaug Southern Crop Improvement Center Facility



## Appendix 2: Southern Crop Improvement Center and Precision Automated Phenotyping Greenhouse