BIOLOGICAL SCIENCES and BIOCOMPLEXITY INSTITUTE Plant Research Facility

USER HANDBOOK

(Manual copy located on desk in section 95)

Contact Information:
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Executive Director: Dr. Susan Whitehead 540-231-2137, swhitehead@vt.edu

Mission of the facility:

The mission of the BIOLOGICAL SCIENCES and BIOCOMPLEXITY INSTITUTE Plant Research Facility (BIOL-BI PRF) is to provide "state of the art" plant growth space to support and promote scholarship in plant systems by scientists at Virginia Tech. We strive to fully integrate this facility in the learning, discovery, and engagement activities of the department of Biological Sciences, the Virginia Biocomplexity and other plant related departments and institutes at Virginia Tech.

Goals for the facility:

The BIOL-BI PRF will support the research and broader significances of funded projects conducted by Virginia Tech faculty. Some specific goals are to:

1) Enhance the quality of existing research projects in the plant sciences by providing new, high quality plant growth space.
2) Attract new funding by relieving an existing constraint (the shortage of high-quality plant growth space) on proposals written by Virginia Tech faculty.
3) Enhance the recruitment and retention of high-quality faculty in the plant sciences.
4) Improve mentoring of graduate students by exposing them to a state-of-the-art plant growth facility.
5) Foster interdisciplinary interaction among faculty of diverse departments and institutes in the University.
6) Enhance engagement at VT by providing a facility that will encourage faculty to strengthen the broader significances of their proposals through undergraduate research, K-12 discovery programs and community involvement in discovery at VT.

The Nature of the Facility:

The BIOL-BI PRF includes 3240 square feet of plant growth space divided into five 432 square foot growth bays plus one smaller bay for site management and propagation. The

plant growth bays are located at 2410 Smithfield Road and are attached to the Ecosystems Simulation Laboratory (ESL; building # 209). Access to restrooms is available in the ESL. Limited parking is available at the facility including disabled parking spots. A state-of-the-art computer regulated control system (Wadsworth enviro-step) regulates the environmental conditions in each growth bay individually. Users can request specific temperature, humidity, and irradiance ranges. Each bay is outfitted with power outlets, a water source, and a maximum amount of bench space (rolling benches). A sensor array is located in the center of each bay for measuring temperature and humidity. Cooling is provided by a wet cooling pad system supplemented with roof ventilation. Heating is provided by one 8,000BTU gas heater per research bay. Humidity is regulated by utilizing both the heating and cooling systems. Supplementary light is provided by 6 HID lamps per research bay. External-ambient environmental conditions are measured with an onsite climate station. A central computer gathers the data all internal and external environmental conditions, controls all mechanical facilities in each bay and provides environmental data through the internet for users of the facility.

Facility Security

Access to the greenhouse facility and support areas is limited to authorized researchers, and facility personnel. Users will be issued appropriate keys by the facility supervisor. Persons issued keys are responsible for the security of the facility. Doors are to remain locked at all times.

Users are responsible for all equipment and personal belongings brought into the research facility. The facility management is not responsible for any research equipment or personal belongings brought into the facility.

Services Provided by the Facility Staff:

Watering Schedule: A watering schedule will be developed for each research experiment in consultation between the user and the facility supervisor before the experiment begins. The facility staff will provide watering once a day at a maximum. Additional watering frequencies must be provided by the user.

Pest management policy: The facility supervisor will oversee all pest and disease procedures in the BIOL-BI PRF. These procedures will be designed to promote the pest and disease policy defined below. The facility supervisor will be available for consulting about pest maintenance and treatment actions.

Monitoring & Recording Pest and Disease: The facility supervisor will examine all plants within the facility for pest or disease problems on a regular basis (weekly). The presence of a pest of disease will be recorded (organism and date observed) and users will be notified.

Treatment: Once pests have been detected, identified, and recorded the facility supervisor in consultation with the user will establish a pest control program for infected plants. The facility supervisor will be responsible for carrying out the pest

control program, recording the treatment, checking for success and making treatment information available to the user.

Administration of the Facility.

Executive director: The executive director of the BIOL-BI PRF is appointed from the faculty of Biological Sciences by the Department Head of Biological Sciences and the Director of BI. The appointment is a two -year renewable term. The executive director supervises the facility supervisor and works with the BIOL-BI PRF committee to manage the facility as defined by the facility Charter.

BIOL-BI PRF administration committee: In addition to the executive director, the facility administration committee is composed of one faculty member from Biological Sciences and one from BI appointed by their respective academic units. The director of BI and the department head of Biological Sciences serve as Ex Officio members of the committee.

Facility Supervisor: The day to day activities at the BIOL-BI PRF will be handled by the facility supervisor. In addition, the supervisor will oversee the activities of any other staff required to provide the services (e.g. watering) available at the BIOL-BI PRF. Also, the supervisor serves as the liaison between facility users and the administration committee.

Facility user fees:

The BIOL-BI PRF is a Virginia Tech service center (recharge facility): Researchers using bench space in the plant growth bays will be charged on a bench and time basis. The user fees are designed to compensate for part of the maintenance costs of the facility, See the fee schedule below for details. The fee schedule is established by the administration committee in coordination with the Controller's Office at Virginia Tech. Billing and fee collection will be managed by the financial office in the Department of Biological Sciences.

Research Space Request Procedure

Information/Request form: Users will apply for space in the BIOL-BI PRF by filling out the Information/Request form. All request forms will be supplied in duplicate and filed with the executive director and the greenhouse supervisor. This form is available on-line, through the Department of Biological Sciences home page. The administrative committee will decide if and when space will be available for the user.

Protocol for Space Allocation

Space will be temporarily assigned to specific faculty members at VT for specific projects. Following project completion, clean-up, and bay sterilization the space will be reassigned to a new faculty member and a new project as requested. Priority will be given in the following ways:

1) Funded projects will have priority over unfunded projects.
2) Faculty from BI and the department of Biological Sciences will have priority over faculty from other departments or institutes.
3) Pilot projects are acceptable uses for this facility, but have lower priority than fully funded primary research projects.
4) Requests made earlier have priority.

The decision process will be transparent and available for all those concerned to see. Modifications to the priority system will be recommended by the BIOL-BI PRF administrative committee and approved by the Head of the Department of Biological Sciences and the Director of BI.

Policies and Procedures for Using the Facility

Responsibilities of research users:

In general, the user (researcher) must be aware of and follow all procedures described in the BIOL-BI PRF user handbook (This document). If a researcher is identified as disregarding these policies, the facility supervisor will notify the executive director. The executive director will discuss facility use policies with the researcher to resolve the inappropriate use. If the policies continue to be disregarded by the researcher, then the researcher will be asked to remove their research project from the facility.

Facility Security: Users are to make sure that the main doors to the facility are locked at all times. Users will be issued a numbered key for the facility during the duration of their research project. The key is to be returned to the facility supervisor at the conclusion of the project unless a new project is to be initiated immediately following the concluded project. If the key is lost a fee will be charged to the user for rekeying the locks and cutting new keys.

Emergency procedures: Users are to be familiar with all emergency procedures outlined in this handbook.

Access to Research Bays: Users will access their assigned research bay from the hall corridor only.

Cultural Care: Users are responsible for all plant cultural care (except watering once a day at maximum and pest control). Users are responsible for following and implementing all transgenic and restricted plant requirements.

*Pest & Disease Prevention***:** Users will be aware of and follow all pest and disease prevention measures outlined in the user handbook. Because users spend considerable time in the presence of their plants, they should assist the facility supervisor in the examination and early detection of pest and plant health problems. In this way, early treatment may be instituted, minimizing pest and disease effects.

Research Bay Cleanliness: It is the user's responsibility to keep the research space they are using clean and in good order at all times. Users are required to be aware of and follow the protocol for research bay cleanliness established below in this handbook.

Plant Disposal: Transgenic and restricted plants should be disposed of according to the Institutional Biosafety Committee (IBC) approved protocols. It is the researcher's responsibility to ensure proper disposal of restricted plant materials. See link:

https://www.research.vt.edu/ibc.html

Research Documentation: Research personnel/PI must maintain a copy of their Biosafety Manual and/or Chemical Hygiene Plan in their research space/section. All personnel working in the space/section must have signed off on the record in the manual or plan per Environmental Health and Safety guidelines. See link: http://www.ehss.vt.edu/

Environmental Controls: Users will not have access to environmental settings or programs (Wadsworth environmental control system). See facility supervisor for settings required for research projects.

Chemicals or Hazardous Materials: Users are to notify facility supervisor in advance of any chemicals or hazardous materials being brought into the facility. The user is responsible for proper use, storage and removal of all hazardous materials brought on the site.

Completion of the experiment: The user must be aware of and follow all procedures on research experiment completion described below in this handbook.

Emergency Procedures for Safety (contact Environmental Health and Safety at http://www.ehss.vt.edu/about/)

The following are some of the safety procedures for the facility. Additional safety procedures may be made available for users independently from this handbook. Please ask the facility supervisor if there are any other defined safety procedures.

Emergency exiting: During an emergency, there are two exits from each end of the facility. During an emergency, leave the facility by the closest accessible exit.

Fire Alarm Location: Fire Alarm is located near main entry door on right side.

Fire Extinguisher Location: Fire Extinguisher is located in the Ecosystems Simulation Lab building corridor on the right- hand side of the main bathroom door.

IF THERE'S A FIRE

SOUND THE ALARM

If you discover or suspect a fire, sound the building fire alarm.
If there is no alarm in the building, notify other occupants by knocking on doors and shouting "**FIRE**" as you leave the building.

LEAVE THE BUILDING

Try to rescue others ONLY if you can do so safely.
Move at least 50 feet away from the building, out of the way of the fire dept.
Don't go back into the building until the fire department says it is safe to do so.

CALL THE FIRE/POLICE DEPARTMENT - 911

Dial 911 or use an "emergency" phone. Facility phone is located in section 95 on desk.
Give as much information as possible to the 911 operator.

Spill Kit Location: Spill Kit is located in section 95 in bottom left side of cabinet by desk.

Eye Wash/Shower Station Location: Eye Wash Station is located on left side of main door to greenhouse.

Material Safety Data Sheet (MSDS) Notebook Location: MSDS notebook is located on desk in section 95

Please review and be familiar with the safety procedures if needed at the following links:

http://www.ehss.vt.edu/programs/hazardous_chemical_management.php

http://www.ehss.vt.edu/programs/HCM_pesticides.php

Project initiation

The following are some suggestions about initiating a project following approval from the administrative committee to occupy research space in the facility.

1) Read over this user handbook so that you understand all policies and procedures for the facility.

2) Have an initial meeting with the facility supervisor to discuss the plant material, climatic requirements, experimental requirements, hazardous materials, potential pest problems, watering schedule, and safety issues.

3) Request to be assigned an access key to the facility and to your designated research bay.

4) Before your scheduled start date, you can work with the facility supervisor to start your plants from seed or cuttings on the plant propagation bench in the facility. If you intend to bring plant into the facility from another location you must make an appointment with the facility supervisor to examine the plants for pests. If pest are found, remediation must be made before admitting the plants into the facility

5) Post a copy of your Request/Information form on the door of the research bay you will be using.

6) Begin the log book (pages on the clipboard) for your use of the research bay and hang this on the hook provided. Each time anyone enters the research bay they will enter the time-in, date, activity, and time-out on the log sheets. These pages will serve as the log of activity for your experiment.

Plant cultural care

Users are ultimately responsible for all other cultural needs of their plants (with the exception of watering once a day at maximum and pest control), the facility supervisor is available for consultation and welcomes questions on all matters of plant growth, plant health, and pest issues.

Users are responsible for purchasing and providing all expendable supplies (pots, soil, fertilizer, labels, etc.) for their experiment. There will be some limited storage area for assembling the expendable supplies needed for an experiment before the experiment begins. Label all your supplies with name and contact number.

Research bay cleanliness

Research bays, benches and plants should be inspected weekly and all litter or plant debris removed. Dead leaves at the base of plants or on benches or floors should be removed and placed in a garbage container. All used expendable supplies must be disposed of weekly. Garbage containers should be emptied (outside in provided dumpster) weekly. Large amounts of material for disposal should be removed immediately. Dirty pots should be removed from the research bays cleaned, stored properly, or thrown out in the dumpster.

Overcrowding of floors or benches is to be avoided to prevent and or reduce pest incidence.

If the research area is not appropriately cleaned at the end of use by the researcher, then the facility staff will clean the area and a significant charge will be applied to the funding account for this service.

Pest and disease prevention

If at all possible, all plants should be started from sterilized seed within the facility using an appropriate sterile media. If it is not possible to start the plants from sterile seed in the facility, then all material coming from outside the facility needs to be inspected by the facility supervisor for pests or disease prior to placement in research bay. Users should arrange an appointment for inspection prior to bringing their plants and materials to the

facility. If pests or disease are found, then plants will not be allowed into the research bays until the plants are verified to be pest and disease free by the facility supervisor.

Growth media cannot be reused because of nutrient deficiency and pathogen proliferation. Plants should always be potted in clean pots (either new or used that have been washed and sterilized).

All research bays need to be sterilized before the start of experiments with cleaning solutions to kill eggs, larval and mature insects and/or pathogens.

Pests can be reduced through compatible physical, biological and/or chemical means. The appropriate biological control can be introduced and cultural and environmental conditions can be modified (where possible) to favor the life cycle requirements of the plants and/or biological control agent (BCA). Pest and BCA populations are subsequently monitored and appropriate intervention taken.

Supplies (growth media, pots, labels, etc) and storage:

All supplies will be provided by the researcher. New or sterilized supplies will be used in all cases. There will be a limited storage capacity for supplies in the facility. Please discuss the types and quantities of supplies you need for the project with the facility supervisor. In addition, discuss any storage requirements during the duration of the project. We emphasize that only limited storage space is available in the facility.

Growth media, sand and soil:

We prefer that sterile growth media such as promix, perlite, vermiculite, or metromix be used for all experiments. However, we understand that in some cases non-sterile sand and or soil must be added to the growth media or used for plant growth. Soil or sand brought into the facility must be transported in containers to avoid any spillage during transport. Potting using non-sterile sand or soil must be done in the research bay assigned to the user. Spillage while potting should be cleaned up and removed after all plants are potted. Special cleaning care must be used at the end of the research experiment, to ensure that all soil and sand have been removed from the facility and disposed of appropriately.

Final pre-departure clean-up:

At the end of the experiment, each research area used should be thoroughly cleaned of all plant and associated material. Benches and floors should be cleaned and sterilized with the appropriate cleaning solution as directed by the facility supervisor. At the end of the experiment, discarded plant material and soil should be quickly disposed of in the outdoor garbage bin.

SIGNATURE PAGE

This manual MUST be read before beginning work in the BIO-BI PRF greenhouse.
Please acknowledge that you have read this manual by printing and signing your name below.

Print Name	Sign Name	Date